

# PROCEEDING

THE 8<sup>th</sup> INTERNATIONAL CONVENTION OF INDOONESIAN ASSOCIATION  
OF TECHNOLOGICAL AND VOCATIONAL EDUCATION (APTEKINDO)  
AND 19TH INDOONESIAN CONGRESS OF FT/FPTK-JPTK

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RAVTE  
Regional Association for  
Vocational Teacher Education  
in East and Southeast Asia

# **EDUCATIONAL TECHNOLOGY AND VOCATIONAL IN ASEAN ECONOMIC COMMUNITY, INTERNATIONAL CONFERENCE PROCEEDINGS**

**3-6 August 2016**

**Auditorium State University of Medan, Medan, North Sumatera, Indonesia**

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**FACULTY OF ENGINEERING  
STATE UNIVERSITY OF MEDAN  
NORTH SUMATERA, INDONESIA**

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INTERNATIONAL CONFERENCE PROCEEDINGS**

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## Preface

We feel thankful to Allah for the blessing so that the book of proceeding of National Seminar completely compiled in relating to the 8th National Convention of Indonesian Association of Technological and Vocational Education (APTEKINDO) and 19th Indonesian Congress of FT/FPTK-JPTK 3 - 6 August 2016 in State University of Medan.

The main objectives of the seminar is to improve the capability in vocational technology in theme: **The role of educational technology and vocational in Asean Economic Community (AEC)** which is adopted from the researches in order to upgrade the graduates to be International standard so that the output of LPTK-PTK be able to compete in AEC. Therefore, the National seminar, convention and workshop of Indonesian LPTK-PTK may emerge the thoughts how to strength the role of LPTK to improve the quality of the vocational teachers in Indonesia.

Hopefully this proceeding book will be useful to develop technology, art, and culture. This book also can be as a reference to intensify the National development.

The committee would express our gratitude to all participants and stakeholders in supporting the National seminar, convention and workshop of Indonesian LPTK-PTK

Medan, 6 August 2016  
Chairman,

Prof. Dr. Abdul Hamid K, M.Pd.  
NIP. 195802221981031001

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The opportunity and challenge of vocational education in facing Asean Economic Community (AEC)

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- EI-05-037 AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY  
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EI-01-001

## AN OVERVIEW OF VOCATIONAL EDUCATION TRAINING IN GERMANY

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**Abstrac** :Germany has lower unemployment rate compared with other European Union (EU) countries. The German Federal Government successfully implemented vocational education training (VET) system to match the need of labor market. In this paper, brief description of vocational education training system in Germany is presented. The training consists of full-time vocational training and dual system. The dual system involves in-company training and part-time vocational training. The in-company training provides student with real experience of work in company environment. The dual system is approximately around 53% of an age cohort training at upper secondary level. After completing the training, most of the participants go to work as skilled worker. During working, many of them continue vocational training. This system successfully increases the skill of the future employee which is proved by low unemployment rate in Germany. However, adaptation and changes might be required if other countries want to implement this system.

**Keywords:** vocational training, dual system, in-company training

### I. INTRODUCTION

Labor market requires various skills and competence with constant renewal of competence based on changes of many aspects [Fin10]. The needs of the market are commonly filled by youths who graduate from education and training system. In many countries vocational education and training (VET) has very important role on the economic competitiveness. Development of VET should be based on quantitative and qualitative prediction of the long term prediction of national labor needs. In order to maintain the continuous improvement of VET, the representative of industries, VET providers, teachers and students.

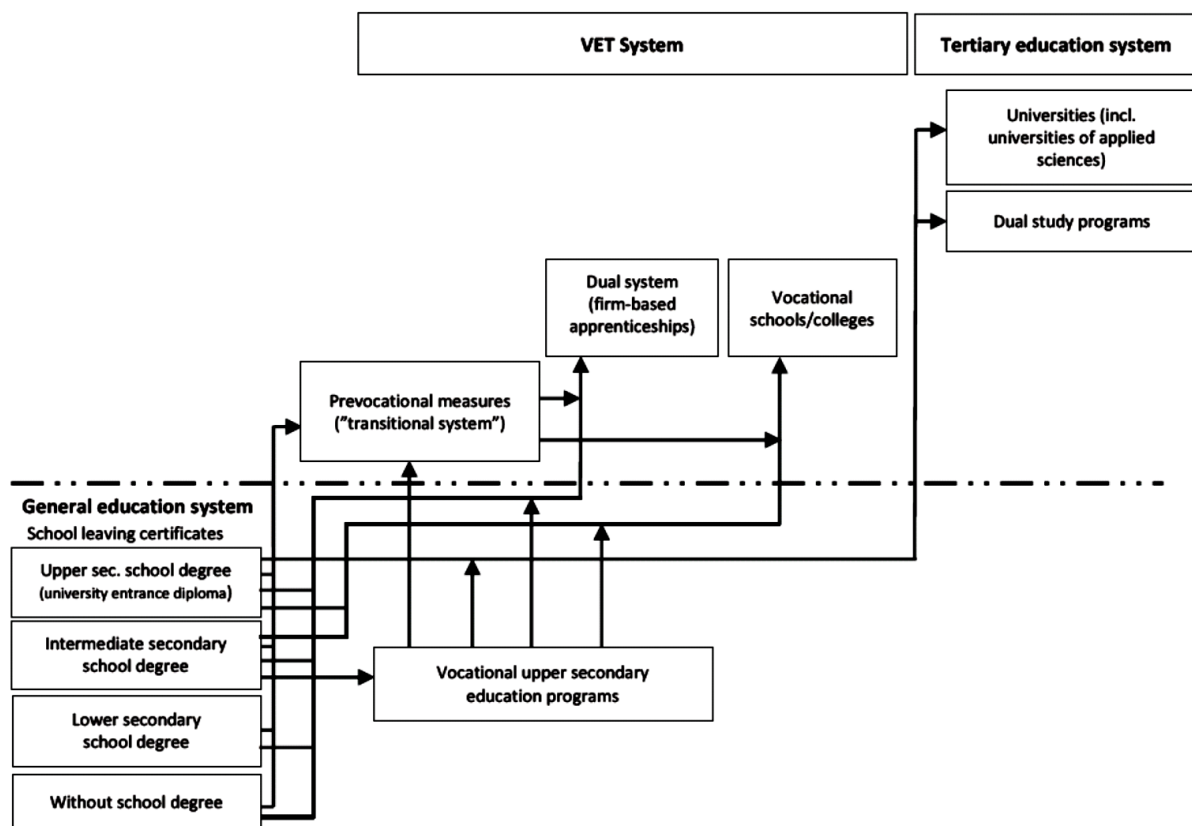
In the European Union are approximately 5.7 million teenagers under 25 years old that do not have any jobs in 2013 because economic situation. The countries search for the solution to overcome the problem. Gap between school and employment is one of the problems that have to be solved. VET is designed to narrow the gap, especially with the dual vocational training system that combine theoretical aspect in vocation school with real job experience in company. The system produces skilled worker with real life training and also gives transition for young people into the labor market. [Eul13].

Youth Unemployment rate in Germany is approximately 8% at the end of 2013 according to EUROSTAT which is the smallest rate in Europe. One of the fundamental bases for innovation, entrepreneurship and economic growth in Germany is the dual vocational training form. The number of trainee reaches 1.43 million which are more than 50 percent of every age group [Ger14]. Germany invests much resource on the VET which conducts more than a half million company-based training every year. The huge numbers of training help to maintain the economic power so that Germany can play key role in Europe to leads the other countries to stabilize their economic condition. The

government, association and other voluntary institution and people work hard to keep the high standard training which match with the industrial need. Federal, state government, social partner and the companies coordinate to work together in order to provide the young generation with the best quality of training. Everybody involved in the system has the same interest to continuously keep and improve attractiveness,

## II. VET SYSTEM CONFIGURATION

Three different model of VET are the basis of German VET system which are dual system, school-based vocational program and prevocational training measures. The pathways into the VET system can be from different German education system school leaving certificates as shown in the figure below:

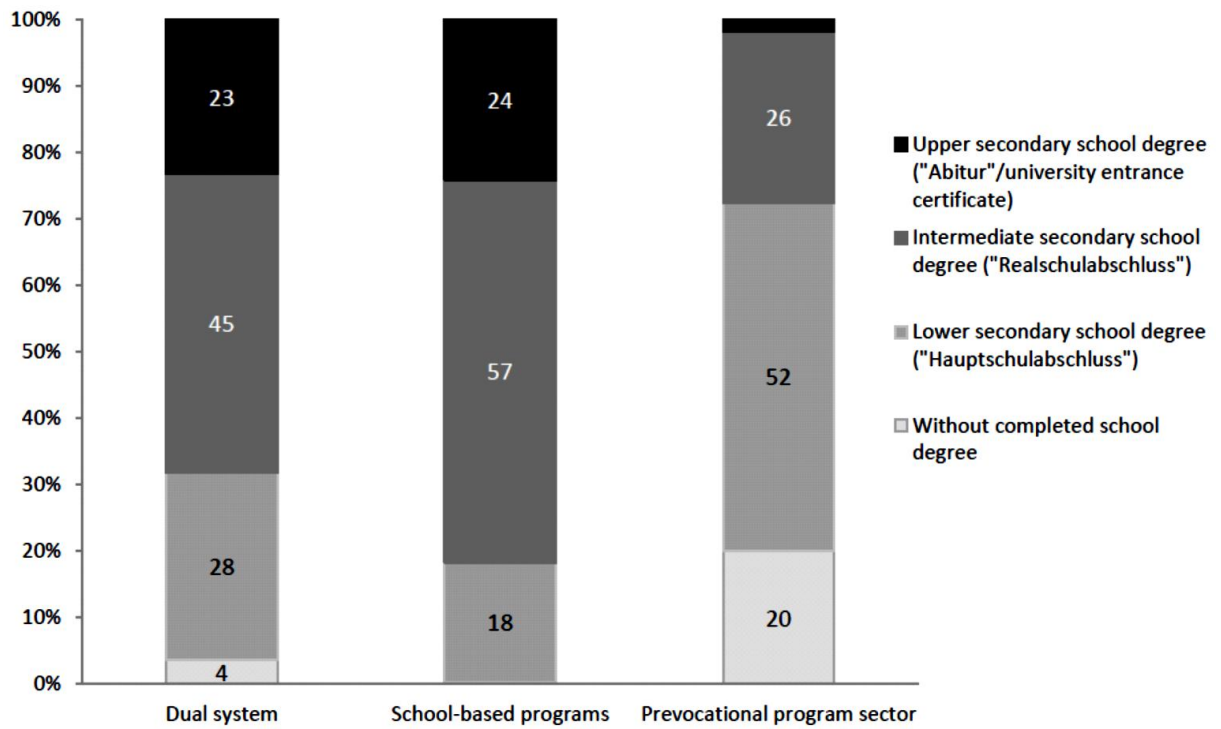


**Figure 1.** Pathways into and within VET system and tertiary [SPC+14]

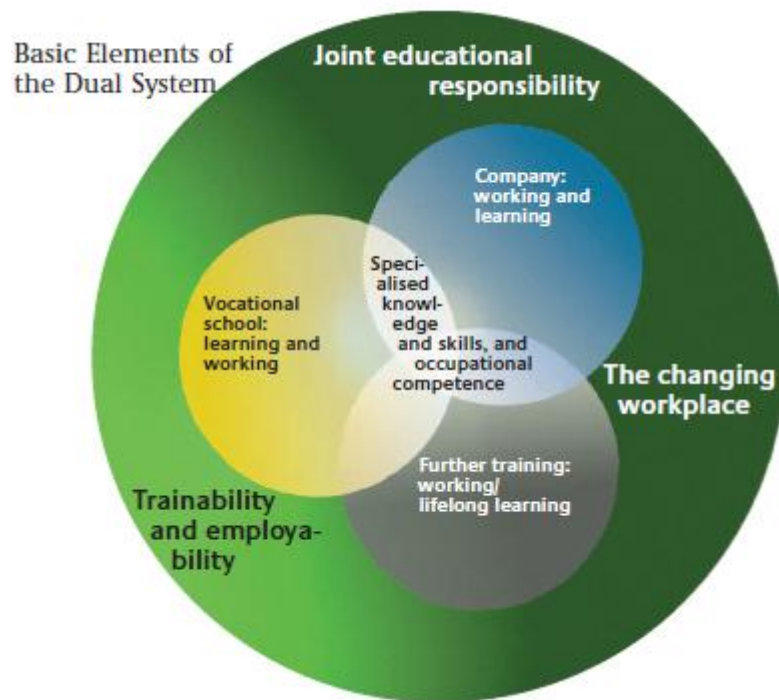
In Fig1, the formal requirement to enter the VET system is very low. Young people without school degree even can join the dual system program. It means that formally everybody can join the program. However, practically is only small percentage of the overall participants because the youth have to apply for the program and the system will choose the best applicant. As can be seen in figure 2, the teenagers without degree who join the dual system are 4% of all participants. Usually they join the prevocational program. The school-based programs usually are offered for sector such as health, pre education, social work (nurses, kindergarten teachers, medical assistant). Most participant of the dual and school based program are from intermediate school degrees which are approximately 45 and 57%,



respectively. The youth with university entrance certificate also go to the VET system which are around 25 percent of all participants.



**Figure 2.** Educational distribution of the new enrolment into three different VET segment, 2012 [SPC+14]



**Figure 3.** Basic elements of the dual system [Ger03]

The dual system, the most popular VET segment, combine the learning and working in vocational school with working and learning in the company. Further training is also provided for lifelong learning to renew the competence of the employee.

The description of the VET system compared to the tertiary education system is presented in Table 1. The most different of this to system is on the curriculum. The VET system curriculum is derived from the labor market and economic demand qualification.

**Table 1.** Stylized description of the institutional characteristics of the fully qualifying sectors of the German VET and tertiary education systems [SPC+14]

	Fully qualifying VET programs		Tertiary education system (without ISCED 5a)
	Dual apprenticeship train-	School-based training programs	
Dominant learning	Vocational competence		Educated personality
Instruction principle	Practice is integrated (com- bination of 4/5 workplace learning and 1/5 school- based learning)	Practice is integrated (com- bination of work in hospitals or extended periods of internships in occupation- related firms and school- based learning)	Distance to practice (learn- ing in separate organiza- tions)
Reference point for curriculum	Labor market; economy's demand for qualifications		Canon of representative and systematic knowledge; orientation towards (social)science
Governance	Corporatist self- governance(chambers) and national Joint Committee of the Federal Institute for Voca- tional Training (composed of representatives of major stakeholders*) on the basis of federal regulations (Vocational Training Act)	State-run ( <i>Länder</i> )	State-run ( <i>Länder</i> )
Financing	Shared private (firm com- ponent) and public (school compo- nent)	Mostly public (sometimes school fees required)	Public
Financial support for learners	Apprenticeship wages (paid by firms)	No	No (only performance grants and government financial aid/student loans for students from low-income families (Bafög))
Status of learner	Apprentice with work contract	Student	Student
Teaching staff	Craftsmen (or professional trainers in large firms), private work contracts; for school component: staff trained in academia	Professionalized; mostly public service employees; staff trained in academia	Professionalized; public service employees; staff trained in academia

### III. TRAINING MARKET SITUATION

Training market situation differs from years to years for different States. Training market is analyzed based on expanded supply and demand ratio (expanded ANR) in [Ger14]

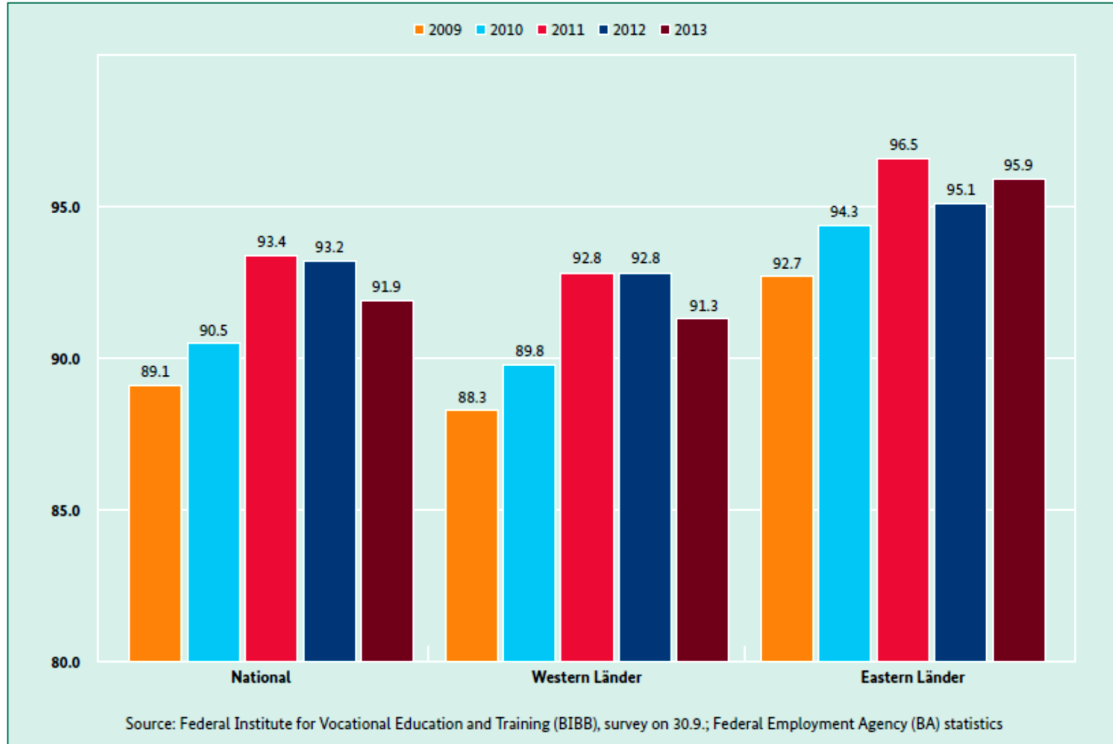


Figure 4. Expanded supply to demand ratio of training

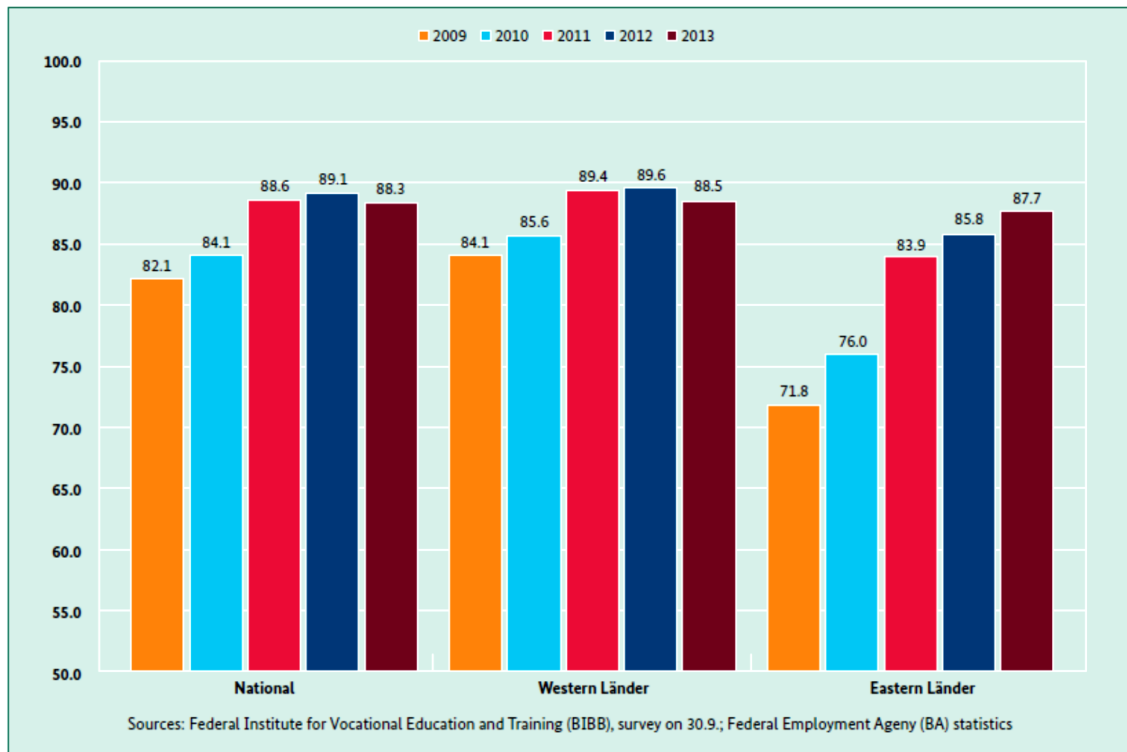


Figure 5. Company based training places for 100 applicant based on expanded ANR



Based on BBIB survey, the supply of training is more than the demand for training. However in the real situation there are still many applicant search of training so that expanded ANR is selected to reflect the expanded demand. The demand is defined as newly concluded training contracts and unplaced applicants also includes applicants with an alternative on the 30th of September who still want to be placed in training.

#### **IV. CONCLUSION**

Germany successfully implements VET System to match the labor market needs. The challenges is contradictory fact which are the companies are difficult to fill the training place the offer where as many young people still do not manage to find a training place quickly. The system may be adapted in other countries with some changing depends on the national situation.

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## **ANALYZE THE CONSTRUCTIVIST APPROACH : RADICAL AND SOCIAL CONSTRUCTIVISM IN THE RELATIONSHIP BY USING THE IMPLEMENTATION CAREER LEVEL ON THE VOCATIONAL EDUCATION**

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**ABSTRAC** : Vocational education is oriented to the secondary educational in which focusing on the development of the student in order to be ready to work professionally and ready to improve their self-potential, in particular, field work. The aim of this paper is to analyze the constructivist approach to vocational education, the relationship between radical and social constructivist and the implementation of the career level on the voked. The result of this discussion to explain the relationship between radical constructivism and social constructivism is viewed the strong abilities. Radical constructivism related the construction mental structure and meaning by individual. After studying, the social constructivism is more focused the social interaction than the individual knowledge construction, the stressing of construction is shown about the meaning in the social interaction activities. Implementation would be successful about the career in the vocational education and needed the educators to make an active facilitator, particularly to guide the students by question with their assumptions and trained the students by reconstructing the new meaning of knowledge, so that students can be a good career.

**Key words** : Constructivism, Radical Constructivism, Social Constructivism, Career, Vocational Education

### **I. INTRODUCTION**

As part of the national education system, vocational education is an education in secondary education that promotes the development of the ability of learners to be able to work in a particular field, the ability to adapt in the workplace, see employment opportunities and career development in the future. Development of vocational education curriculum should be comprehensive and responsive to the social dynamic, relevant not overload, and able to accommodate the diversity of needs and advances in technology. There is a tendency in the world of education today is to go back on the idea that children will learn better if the environment is created naturally. Learning would be more meaningful if the child has his own what he learned, not knowing. Oriented learning targets proved successful mastery of subject matter within the competence given the short term, but fail to provide children solve problems in the long-term life. Contextual approach (contextually learning and teaching) is an approach to teaching that characteristic fulfill that hope. Contextual learning is a concept of learning where the teacher presents real-world situations into the classroom dam encourage students to make connections between the knowledge possessed by the application in their lives as members and the community. With this concept, the learning outcomes expected to be more meaningful for students. Seven major components underlying the application of contextual learning in the classroom. Seventh major component that is constructivism, questioning, inquiries, community learning, modeling, reflection and authentic assessment..



The argument in this paper is based on social constructivism and radical constructivism in related implementation career level on the vocational education. At first, the author introduced the notion of constructivism, radical constructivism, and social constructivism in brief in conjunction with the implementation of vocational education career.

## II..LITERATUR REVIEW

### 1. Constructivism

Constructivism meaning varies according to one's perspective and position. In the context of education, there is the philosophical meaning of constructivism, as well as personal constructivism as described, by Piaget. 1967 <sup>1)</sup>. It seems imperative to introduce the notion of constructivism in epistemology, philosophy, and theory of learning. Constructivism is a system of beliefs (worldview) in which the construction of knowledge or process of knowing is compared metaphorically with the construction of a building or furniture or an artifact, Ernest. 2010 <sup>2)</sup>. The act of construction depends on what tools an individual already has. The tools are prior conceptions of the world through experiences. An individual may construct knowledge of something based on what he or she already knows about it and how he or she reconceptualizes the new experiences based on earlier experiences. The process of knowing is related to one's cognitive, affective, psychomotor, mental, and metacognitive responses to the change within those conceptions, Glasersfeld. 1995 <sup>3)</sup>. Hence, one's construction of knowledge stands on what he or she already has in the form of prior knowledge and conception, and how the new experiences adapt to the new conceptions, schemes, or actions. Steffe & Thompson. 2000 <sup>4)</sup>.

Constructivism has many faces- trivial, constructionist, cultural and social, radical, critical, feminist, and postmodern constructivism. One can be a trivial constructivist or a constructionist. Others can be critical or feminist or postmodern constructivist in terms of how they practice teaching and learning and how they conceive and implement the respective epistemologies. The intent this paper focuses on radical and social constructivism in the Relationship by using the Implementation Career Level on the Vocational Education. Doolittle and Camp. 1999 <sup>5)</sup> Constructivism look not as a single entity (entity), but looked at as a series of theoretical. Doolittle and Camp Classify understanding constructivism into : cognitive constructivism, radical constructivism, social constructivism.

Based on some opinions on the definition of constructivism being addressed by experts in the above it can be concluded that constructivism is a philosophy of knowledge that had the notion that knowledge is the result of construction (formation) the man himself. Humans construct their knowledge individually and through their interaction with objects, phenomena, experiences and their environment. A knowledge is considered correct if it can be useful knowledge to deal with and solve problems that appropriate. Suparno. 2008:28 <sup>6)</sup>.



## 2. Radical Constructivism

Radical Constructivism, see Fischer. 1995<sup>7)</sup> is part of a larger 'constructivist' movement in the philosophy and sociology of science (Schwandt)<sup>8)</sup>. Radical Constructivism puts forward two main claims. Glasersfeld. 1989: 162: a<sup>9)</sup> knowledge is not passively received but actively built up by the cognizing subject; b) the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality.

The paradigm of radical constructivism assumes that the mind is like an organism undergoing through an evolutionary process. Wuketits, 1984<sup>10)</sup>. The metaphor of the evolved mind, to this author, is the cognitive re-construction of the experiential world that continues an adaptation to better and clearer conceptual or mental percepts or schemes through reorganization of this world. Ernest, 1995; von Glasersfeld, 1995. It is worth noting that Radical Constructivism differs from Darwinian models of evolutionary epistemology in that it does not propose that different constructed knowledges gradually converged and eventually will merge into one knowledge system representing 'the real world' in full.

## 3. Social Constructivism

Social constructivism emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding. Derry, 1999; McMahan, 1997<sup>11)</sup>. This perspective is closely associated with many contemporary theories, most notably the developmental theories of Vygotsky and Bruner, and Bandura's social cognitive theory (Shunk, 2000). Social constructivism, strongly influenced by Vygotsky's. 1978<sup>12)</sup> work, suggests that knowledge is first constructed in a social context and is then appropriated by individuals. Bruning et al., 1999; M. Cole, 1991; Eggen & Kauchak, 2004. According to social constructivists, the process of sharing individual perspectives-called *collaborative elaboration*. Meter & Stevens. 2000, results in learners constructing understanding together that wouldn't be possible alone (Greeno et al., 1996).

Social constructivism views each learner as a unique individual with unique needs and backgrounds. The learner is also seen as complex and multidimensional. Social constructivism not only acknowledges the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards it as an integral part of the learning process. Wertsch. 1997<sup>13)</sup>.

## 4. Career Defenition

In his foreword for the 2007 Handbook of Career Studies, by Gunz & Peiperl<sup>14)</sup>, Schein states that "The career field has grown enormously, but it is far from integrated. Rather, a few paradigms built on individual developmental theories such as those of Super and Holland have dominated the field. Such lack of integration is not in itself a problem, but the disregard of researchers in one paradigm for the relevant work of researchers in another paradigm is a problem when each set of researchers presents their work as the final and correct analysis of a particular area. Until this day, the meaning of career is understood differentially. For a long-range, historic view of career theory, we refer to the contribution from Moore, Gunz and Hall, 2007, in Gunz & Peiperl.



With Parsons (1909) as a pioneer, traditional definitions restrict career to professional work life which included advancement. Exemplary in this respect is the Oxford English Dictionary. 1989<sup>15)</sup> definition of career as “a course of professional life or employment, which affords opportunity for progress or advancement in the world”. The most cited definition here is that of career as “the evolving sequence of a person’s work experiences over time”, Arthur, Hall & Lawrence, 1989, p.8<sup>16)</sup>. Gunz & Peiperl (2007, p.4) attribute the relative success of this definition to its “virtue of being succinct and of leaving the matter open as to whether we are interested in experiences as the person experiences them (the so-called subjective career), Hughes, 1937<sup>17)</sup> or as others see them (the objective career) and whether we are interested in the person as an individual or in the institutions through which he or she passes in the course of life (and in so doing, transforms and is transformed by them to a greater or lesser extent). Even broader, including the life career, Super. 1976<sup>18)</sup> defines career as “the sequence of major positions occupied by a person throughout his preoccupational, occupational and postoccupational life; includes work related roles such as those of student, employee, and pensioner, together with complementary vocational, familial and civil roles“ (p. 20).

Indeed, the career spectrum broader meaning and deeper than similar terms. Career implies a sequence of occupation, job and positions occupied throughout a person's work experience. (Tolbert, 1974). In line with this opinion, Healy 1982: 5<sup>19)</sup> argues that a career can be defined, “as the sequence of major position occupied by a person throughout his, or her preoccupational, occupational and post-occupational life.”

Both this sense indicates that a person's career occurred since the time of study, work, and retirement. The problem that arises is whether the position of learning, work and retirement can be regarded as a career? That by Super (1976) referred that are more careers oriented person. The position can be seen as a career, depending on one's view and perspective regarding career where he was using. The most important thing is how the quality of the individuals behaved in any such position. With this assumption, it can be said that the quality of behavior in these positions can be felt and meaningful to the lives of the individuals themselves.

Career success can be achieved through education, hobbies, profession, social, personal, and religion. Career covers all aspects of an individual's life, which includes (1) life-roles, such as workers, family members and citizens; (2) life-settings, such as in family, community agencies, school or work; and (3) life-events, such as in entering a job, marriage, duty, loss of a job, or resign from a job. Based on the various opinions on the above, it can be concluded that a career is a meaningful self-realization through a series of activities and covers all aspects of life are realized because of the strength of the inner person. Self-realization will be worthwhile when there is satisfaction / happiness of ourselves and the environment.





### **III. METHODS**

This paper is done by exploring the sources related to the topic. This study was descriptive qualitative research to explore the information constructivist approach (radical and social) in relation to the implementation of a career in vocational education. Source of data to be used is secondary data obtained by collecting data that is required in papers or collect references and literature related to the discussion in this paper such as research reports, theses and journals as well as reference books and data another support in varied websites that have relevance to this study. Data collection technique used is a literature review that is by collecting data by examining a number of literature such as research reports (theses, journal), books and other supporting data in the varied websites related to this topic.

### **IV. RESULTS AND DISCUSSION**

Radical and Social Constructivism in connection with use of Implementation in Vocational Education Career Level

In theory, radical and social constructivist approach in vocational education is an approach that is very strong implications in which knowledge is formed from the formation process of construction based on experience. Radical and social constructivism are both seen as more powerful forms of constructivism. Radical constructivism attention to the construction way of thinking structure and meaning individually to interpret and construct the experience of interacting with the environment. In this case the radical construction is deemed to have a higher degree of cognitive constructivism than construction of mental structures (Doolittle and Camp, 1999). Social constructivism more attention to the social interaction of the individual knowledge construction; the emphasis on the construction of meaning in social interaction activities.

Career Implementation in vocational education in theory illustrates that the concept of constructivism relevant and influential in the career development of students in vocational education. The combination of radical and social constructivism is a powerful form of constructivism shows that the development of construction mental structure and meaning individually to interpret and construct the experience of interacting with the environment and with regard to social interaction with emphasis on the construction of meaning in social interaction activities will greatly affect the level career in vocational education.

From a career guidance standpoint, the important thing to remember about vocational education is that it has been seen for too long as useful to only highly restricted sample of the total student population rather than to all or most students. The mutual contributions of vocational education to Career Education are examined as recommendations are developed for greater meshing of these two elements of the educational process.

Through career counseling approaches in vocational education from an early age by implementing radical and social constructivism approach will give students to the variety and diverse types of careers in the field of vocational training. Reality it requires the ability to make a certain career choices



appropriate level of student comprehension and understanding of the potential opportunities and career opportunities. The phenomenon that indicates that the service career information needs of vocational education students have not been met, so that vocational students are confused in the face of the world of work. Although they are ready to enter the workforce as an area of expertise or skills practiced.

## **V. CONCLUSION**

In the final stage of the come from this research the conclusion and suggestions from the research carried out the radical and social Constructivism in relation to implementation career level on the vocational education.

1. Philosophy of constructivism assumed that knowledge is the result of human construction. Humans construct their knowledge through their interaction with objects, phenomena, experiences and their environment.
2. Social constructivism and radical constructivism are a powerful form of constructivism. Radical constructivism attention to the construction of mental structures and means the individual to interpret and build the experience of interacting with the environment. Social constructivism more attention to the social interaction of the individual knowledge construction; the emphasis on the construction of meaning in social interaction activities.
3. Implementation of radical and social constructivist approach early on will give an idea of the direction of career and vocational education for students to develop a career and a good competence.



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## IMPLEMENTING PROJECT-BASED LEARNING (PBL) IN FINAL COLLECTION TO IMPROVE THE QUALITY OFFASHION DESIGN STUDENT

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**ABSTRACT:** Fashion design education is one of education that prepares students to work in fashion design field. Students research future fashion trends, sketch designs, select colors, fabrics and patterns, and give instructions on how to make the products they designed. Fashion design education not only nurture and develop student's creative skills, it also teaches essential practical skills such as production techniques and material properties, to create a final product. According to this, new educational methods and strategies are needed in order engage students in the learning process and guarantee higher quality. Project-based learning (PBL) is example of educational approach that takes in account student-center learning. Project based learning (PBL) provides opportunities for students to build these qualities, as well as more deeply learn traditional academic content and understand how it applies to the real world. The methods of Literature review will apply in this research. Literature searches process through journal, proceeding and book. Literature searches are also undertaken most using computer and electronic databases. PBL methodology enhances students learning and improves students' confident, technical skill, soft skill and prepare graduate for professional practice. The benefit of implementing PBL are increase team work skill and student motivations, articulation between theory and practice, inquiry and problem solving.

**Keywords:** Project-based Learning, Final Collection, Fashion Design.

### I. INTRODUCTION

The center of global economic gravity is shifting toward Asia. The Association of Southeast Asian Nations (ASEAN) is in the process of creating a single market and production base, called the ASEAN Economic Community (AEC), which will allow the free flow of goods, services, investments, and skilled labor, and the freer movement of capital across the region. AEC is prepared starting in late 2015 by all members of ASEAN which aims to improve the economic stability in the ASEAN region and form the economic area among ASEAN countries is strong. With the enactment of MEA at the end of 2015, ASEAN member countries will experience a free flow of goods, services, investment, and an educated workforce of each country. Indonesia is part of the ASEAN community trying to prepare oneself and take advantage of opportunities AEC, and should increase the capability to be able to compete with other ASEAN member countries. In the implementation of the ASEAN single market, the readiness of human resources is an important concern. Qualified, skilled and high competitiveness human resources is a necessity in the face of this global competition. Education is the key to producing quality human resources.

Fashion design education is one of education that prepares students to work in fashion design field such as fashion journalist, fashion illustrator, fashion stylist, pattern maker and fashion educator. Fashion designers are the people who create the clothing and accessories. They research future fashion trends, sketch designs, select colors, fabrics and patterns, and give instructions on how to make the



products they designed. Fashion designers use their creative and technical skills to create varieties of clothing and accessories. Along with sketching and constructing original products, designers constantly study the industry to stay informed of current trends and to be able to forecast future styles. Fashion designers often have a bachelor's degree in fashion design and gain hands-on experience through internships and assistant positions. Some fashion designers are self-employed. They generally work for individual clients on a contract. Other designers are employed by manufacturing establishments, wholesalers, or design firms, creating designs for the mass market.

Fashion design education not only nurture and develop student's creative skills, they also teach essential practical skills such as production techniques and material properties, to create a final product. Final collection is one of kinds of course in fashion design education. This course prepares students to learn to become a fashion designer, how to develop collections and how to show collections. This course needs theory and practice how to realize 2D sketching become 3D in real garment and fit on the human body. To show the collection, students need collaboration with another organization such as model, choreographer, lighting, photographer, beautician, hair do and others. Students need social skill and good communication to build good network cooperation.

The project of the final collection is intentionally very similar to that of designing a commercial collection. The difference of them is final collection in university requirement of curriculum while a commercial collection can only be validated by the market. The final collection could help students to confirm this – think of it as a dress rehearsal. This practice also enables to complete the skill set necessary to succeed in fashion design field (Atkinson, 2012:10).

Teachers must prepare a teaching method in accordance with the purpose of learning. The need for more student-center in fashion design education, which provide design experience to students, foster the development of soft skills and the link between theory and practice are some of the recommendation. According to this, new educational methods and strategies are needed in order engage students in the learning process and guarantee higher quality. Project-based learning (PBL) is example of educational approach that takes in account student-center learning. Project based learning (PBL) provides opportunities for students to build these qualities, as well as more deeply learn traditional academic content and understand how it applies to the real world (Larmer, 2015:2). Project-based learning not only positive learning outcome but also helped the students to improve their cognition, work ethics, and interpersonal skills (Kettanun, 2015).

## **II. PROJECT-BASED LEARNING**

“Project-based learning (PBL) is a model that organizes learning around projects” (Thomas, 2000: 1). Even though assigning projects to students in traditional classroom is not a new phenomenon, project-based learning is quite different from the usual application. Thomas listed five major criteria for a method of learning to be called project based-learning: (1) PBL projects are central, not peripheral to the curriculum, (2) PBL projects are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline, (3)



Projects involve students in a constructive investigation, (4) Projects are student-driven to some significant degree, (5) Projects are realistic, not school-like (2012: 3-4). In PBL, the project is the central teaching strategy; students encounter and learn the central concepts of the discipline via the project. PBL projects may be built around thematic units or the intersection of topics from two or more disciplines, but that is not sufficient to define a project. An investigation is a goal directed process that involves inquiry, knowledge building, and resolution. Investigations may be design, decision-making, problem-finding, problem-solving, discovery, or model-building processes. PBL projects incorporate a good deal more student autonomy, choice, unsupervised work time, and responsibility than traditional instruction and traditional projects. PBL incorporates real-life challenges where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented.

“Project based learning (PBL) provides opportunities for students to build these qualities, as well as more deeply learn traditional academic content and understand how it applies to the real world” (Larmer, 2015: 2). PBL as “a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks” (\_\_\_\_, 2009:12). “Project-based learning involves students in an extended process of inquiry in response to a real-world problem”(Jackson, 2012). Inquiry is keys for PBL, students seek for information and knowledge, starts by posing questions, problems or scenarios. Students will identify and research issue and questions to develop their knowledge or solutions. PBL provides a way to learn deeply and responds real world. Students can think, solve problem, and interact with friends or others. This method can apply to find new way for real learning systematically with teacher as facilitator.

Klein mentions characteristics of PBL such as (1) Leads students to investigate important ideas and questions, (2) Is framed around an inquiry process, (3) Is differentiated according to student needs and interests, (4) Is driven by student independent production and presentation rather than teacher delivery of information, (5) Requires the use of creative thinking, critical thinking, and information skills to investigate, draw, (6) conclusions about, and create content, and (7) Connects to real world and authentic problems and issues (p.8). With those characteristics in mind, teachers can plan learning experiences that result in in-depth understanding of important ideas in the content. Because students are driving the learning, they can draw upon their strengths and create projects that incorporate their own interests, native language, cultural background, abilities and preference for using different types of media.

Larmer (2015) says that project based learning is a powerful teaching method that does the following: (1) Motivates students, (2) Prepares students for college, careers, and citizenship, (3) Helps students meet standards and do well on tests that ask students to demonstrate in-depth knowledge and thinking skills, (4) Allows teachers to teach in a more satisfying way, and (5) Provides schools and



districts with new ways to communicate and to connect with parents, communities, and the wider world (p.2).

### **III. STEPS IN PBL**

In National Academy Foundation (2009: 16-17), there are 5 steps for PBL: (1) begin with the end in mind, (2) craft the driving question, (3) plan the assessment, (4) map the project, and (5) manage the process. Jackson (2012) says, it has five key characteristics: (1) outcomes are tied to curriculum and learning goals, (2) essential questions and problems lead students to the central concepts of the subject, (3) investigations and research involve inquiry and knowledge building, (4) students are responsible for designing and managing much of their own learning, and (5) projects are based on authentic, real-world problems and questions that students care about.

Klein (2009: 11) suggest that there are five planning process (steps) in PBL; (1) establish content and skill goals, (2) develop formats for final product, (3) plan of the scope of the project, (4) design instructional activities, and (5) assess the project. Projects should be directed toward essential ideas or themes in the curriculum that are rigorous enough to support in-depth study and student construction of meaning.

Step (1); establish content and skill goals include big idea/theme, big ideas or theme provide an overall goal for a project-based unit and offer possibilities for interdisciplinary collaboration. Once the big ideas or themes have been determined, the teacher provides a framework for students to pursue those essential ideas or themes by crafting essential questions. The integration of content and learning skills is an essential component of project-based learning and should be identified in the project outcomes. Students need to learn, practice, apply, and extend these skills as part of the project design. Step (2); develop format for final product includes authentic products and presentation/performance formats and portfolio. Authentic products have a real-life context and involve thinking and learning as the product is created, they cannot be simply copied from somewhere else. To document their learning process, student should create a print or electronic portfolio in which all draft of work is maintained. Complete portfolio for all projects can become part of students overall academic portfolios. Step (3); plan of the scope of the project include developing a timeline and scope for the project. A well-constructed project plan includes more than a sequence of activities; it is a design for supporting and directing students as they create products to complete the project. Step (4); design instructional activities include instructional strategies, possible mini lessons; decide how to launch the project, planned assessment, rubrics for project-based learning. Step (5); assess the project design, once all the instructional activities have been designed, teachers may pause to reflect on the design, looking for alignment with curriculum priorities, clarity and feasibility of organization, availability of resources, and the differentiation that is planned for meeting the needs of all learners.

The project of the final collection is intentionally very similar to that of designing a commercial collection. The difference of them is final collection in university requirement of curriculum while a commercial collection can only be validated by the market. The final collection could help students to





confirm this – think of it as a dress rehearsal. This practice also enables to complete the skill set necessary to succeed in fashion design field (Atkinson, 2012:10).

#### **IV. FINAL COLLECTION**

Final collection is project of fashion design student. The project is part of learning for aspiring designers. Students prepare everything to make the final works/collection and show it off. Activities start from research inspiration, developing design to realize the complete garment then exhibit in fashion show event. The process and format of presenting a collection is an important time for any design student and is charged with a heightened sense of expectation. Essentially, fashion shows are promotional events aimed at encouraging buyer or private clients to place orders and for the press or other media to provide favorable coverage. For fashion design students the prospect of being offered employment is enticing, but it is important to remember that an exciting fashion show does not necessarily equate to a job offer or commercial success. Moreover, fashion shows are expensive events to host, with the ever-present risk of going over budget.

Fashion shows are essentially promotional events. In the fashion industry they are mainly used to present and sell merchandise to an invited audience and to promote the image and standing of a company. This is also true for many fashion students who view inclusion in a fashion show as a validation of their work. All fashion shows required detailed planning, including budgetary considerations and level of pre-publicity. This includes confirming a venue and agreeing a date, casting and booking models, arranging fittings and preparing a seating plan as well as considering music and lighting requirements (Hopkins, 2012: 164).

Faerm (2011:24-25) says the key stages of fashion design development is (1) inspiration and research, (2) using color for effect, (3) selecting appropriate fabrics, (4) using the croquis process, (5) editing down to a six-figure narrative, (6) using prototypes and final samples, (7) finalizing collection. Hopkins says how to developing the design includes: (1) research process, (2) working with sketchbook, (3) line planning and range building, (4) costing and pricing, (5) presenting a collection. Whereas Atkinson (2012) in his book, there are five ways to developing the final collection: (1) finding inspiration, (2) your sketchbook, (3) finding material, (4) manipulating material, (5) development and sampling.

#### **V. IMPLEMENTING PBL IN FINAL COLLECTION OF FASHION DESIGN EDUCATION**

In PBL, the project is the central teaching strategy; students encounter and learn the central concepts of the discipline via the project (Thomas, 2000: 3). A project is a complex effort that necessitates an analysis of the target (problem analysis) and that must be planned and managed, because of desired changes that are to be carried out in people's surroundings, organization, knowledge, and attitude to life; it involves a new, complex task or problem; it extends beyond traditional organizations and knowledge; it must be completed at a point in time determined in advance (Barge, 2010). In final Collection, the purpose of learning is students can create final

collection through developing design collection to realize this garment collection and to show this work to public. PBL is applied in this learning approach.

I offer five planning process for project-based learning by Klein (2009: 11) such as: (1) establish content and skill goals, (2) develop formats for final product, (3) plan of the scope of the project, (4) design instructional activities, and (5) assess the project. The implementation for fashion design education as follows:

### (1) Establish Content and Skill Goals

Projects should be directed toward essential ideas or themes in the curriculum that are rigorous enough to support in-depth study and student construction of meaning. Final collection is one of course in fashion design education. In Indonesia, this course is for final-year students. The content and skill goals of this final collection course are student can develop a collection, manage event organizer, and show their collection. The big idea or theme is developing collection and showing to the public. And the question is how to create the best collection and how to make succeed this big event.



**Figure 1.** Elements of Establish Content and Skill Goals

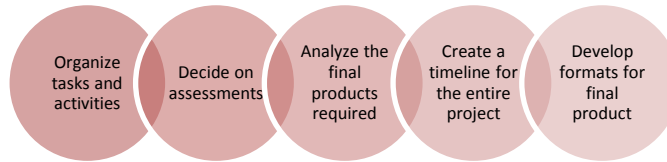
### (2) Develop Formats for Final Product

Klein demonstrates two kinds in this plan as authentic Products and Presentation/Performance Formats and portfolio. To develop final product in fashion final collection needs long process. Students prepare for their collection. This collection need research process. Collections are usually presented to buyer or the press. Collection must be shown to the public. How to show to public we need event organizer. So this course very complicated and need well preparation and also took a long time. The authentic products are portfolio and 2 best collections. Portfolio contains start from inspiration, sketches, to prototype. It is essential to have a professional display portfolio from the very start as a way of keeping designs and artwork flat, orderly and portable (Jones: 194). The portfolio should look like the work of one person and show up your strengths. Portfolio should be organized to maximize your appeal and fit the advertised role.

### (3) Plan of the Scope of the Project

Students are more likely to be engaged in their learning if they see a connection to their own world. That connection can be made through the subject matter itself (e.g., science experiments or

research on current issues), or through the product the student is expected to create or the presentation or performance the student is expected to give (e.g., a television talk show segment, a dance performance, or a podcast).



**Figure 2.** Plan of the Scope of the Project

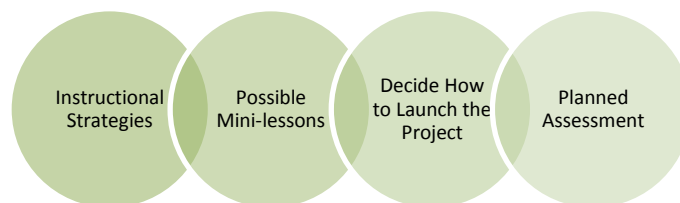
Every student has project what to do. They must develop collection in one theme and collect in fashion portfolio. Every student has responsibilities for committee in event organizer. Every student creates two to three fashion works and shows in fashion show event.

Developing collection	<i>Research inspiration</i> First decide what for collection to say to audience, as well as what it should elicit visually. The research spent time for combing books, internet, museum, libraries and any other sources to unexpected ideas.	2 weeks
	<i>Using color for effect</i> Color, its scale and context of the surrounding colors must be evaluated closely to create the desire emotions.	1 weeks
	<i>Selecting fabric</i> Selecting fabric to consider silhouette and garment details, so select the fabric fiber, weaves and weight that will be required as well.	1 weeks
	<i>Working drawing</i> Working drawings are important aspects of developing collection. These drawings are more practical than illustrations or aesthetic drawing and are motivated by the need to problem solve a garment design or a detail.	3 weeks
	<i>Designing fabric idea</i> The close examination of the surface detail of inspiration can stimulate exciting ideas about texture and colors. The fabric can design by own textile, using methods as embroidery, dyeing, knitting or printing.	2 weeks
	<i>Using prototype and final sample</i> Like blueprint sketches are flats and need to realize the collection in 3D. The draping or pattern making process will enable to discover better solutions of fit, drape, proportion and overall construction.	3 weeks
	<i>Finalizing collection</i> After muslin and pattern corrections through the fitting process on live model, final samples in the selected fabrics are ready to be made. At this stage all design decisions, fabric choices and treatment; finishes should have been decided on.	6 weeks
Managing event organizer	<i>Leader, secretary, finance</i> They are very important to make the event runs smoothly	During study
	<i>Event division</i> Responsibility for the success of the event, make schedule, find the place of event	
	<i>Runway</i>	

	Responsible for model, choreographer and music	
	<i>Sponsor</i> Responsible to find sponsor to support the event	
	<i>Documentation</i> Responsible for photos and videos	
	<i>Stage and decoration</i> Responsible for stage, backdrop, lighting, and decoration	
	<i>Equipment</i> Responsible for all of equipment that needed by another divisions	
	<i>Food and beverage</i>	
	<i>Accommodation</i>	
Showing the collection	Showing the final collection, every student show the best creation. Collaboration with make-up expert and hair do to perfect performance. Every division cooperate to succeed the event.	1 day

#### (4) Design Instructional Activities

A well-constructed project plan includes more than a sequence of activities; it is a design for supporting and directing students as they create products to complete the project. A plan helps you develop the timeline for the project with interim deadlines, decide the balance between teacher instruction and student investigation, incorporate both group and individual activities, and identify the skills that your students need to successfully complete the project. In this course has three domain, first developing collection, second managing event organizer, third showing the collections.



**Figure 3.** Design Instructional Activities

#### (5) Assess the Project

One of assessment form in PBL is rubrics. Teachers should develop their own rubrics, or have the class develop rubrics for project-based learning. According to Klein rubrics break down the tasks in an assignment into separate categories for assessment. For example, a rubric for a research paper might contain criteria for five categories: (1) content; (2) organization; (3) depth of research; (4) use of primary resources; and (5) writing mechanics (p. 17). Rubrics will help teachers create an assessment plan that is fair and accurate, targets specific content and skills, and provides timely, useful feedback to students.

In final collection, students learn about three kinds of knowledge and skill, first about developing collection, second managing event organizer, and showing the collection. In PBL students



not just study about making project but students engaged in the inquiry process, problem-solving and decision making. In developing collection, students research about inspiration, selecting color and fabric, manipulating fabric, sketching/drawing, making prototype, and finalizing the project. All of this process, students make decision and all of the process involves the inquiry process. This is according to Jackson (2012) that “Project-based learning involves students in an extended process of inquiry in response to a real-world problem”.

This course also engaged about social skill, students must collaboration with another organization such as model, choreographer, lighting, photographer, beautician, hair do and others. Students need social skill and good communication to build good network cooperation. Sometimes students have to face many hurdles in event organizing. This learning process require for students to solve the problem. Showing final collection is the moment awaited students to show the best of them. Dreaming of being a designer has been in front of the eye. They show their work on the stage. They will work hard and have high motivation. As a young designer only once they have a chance of performing in public. PBL is very suitable for implementing in this subject. This method gives high motivation for students, prepare students for real life, according to Rodriguez (2015) that PBL encourage students’ motivation and improves their results. They not only acquire better technical training, but also improve their transversal skill. Both students and teachers identify a set of benefits of PBL, such as team work skills, increased student motivation, articulation between theory and practice, problem solving, amongst others (Fernandes, 2014). In the project-based learning, by solving different problems it is possible to develop creative ideas while improving highly developed skills (Sart, 2014).

## **V. CONCLUSION**

To conclude, it is possible to implementing PBL in final collection of fashion design education. PBL methodology enhances students learning and improves students’ confident, technical skill, soft skill and prepare graduate for professional practice. Several evidences from students and teacher support this idea. Teachers and students identify a set of benefit of PBL, such as team work skill, increase student motivations, articulation between theory and practice, inquiry and problem solving.



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## THE ROLE OF COSMETOLOGY LABORATORY IN PREPARING COMPETENT GRADUATES

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**ABSTRACT :** A cosmetology laboratory is a facility equipped with specialized equipment to conduct experiments as a means of supporting the development of science and education. The role of cosmetology laboratory was evaluated in terms of: 1) the number of existing labs standardized against the subjects within the curricular structure of the department; 2) laboratory floor area compared to the number of students; 3) facilities and infrastructure; 4) performance of practicum subject lecturers and technician. The present study was descriptive of the conditions of the cosmetology lab. Data were collected by means of observation and questionnaires. Data were analyzed using descriptive statistics. The collected data were compared with existing laboratory standards. Results showed that the number of labs was adequate, but those labs were underused. The lab area remained inadequate, so that the practicum had to be done in several shifts to meet the target competence of graduates. Lab facilities and infrastructure were adequate but less than optimal (76%). Lecturers' performance showed a mean score of 3.95, categorized as good. Technician's performance showed a mean score of 3.125, categorized as adequately good. In conclusion, there is a need for improvement of lab operations by utilizing the existing labs and taking the existing curriculum into account. This is because the ratio of the number of labs, lab floor area, facilities and infrastructure, and technician's performance were adequate but less than optimal. Practicum lecturers' performance was adequate but it required improvements.

**Keywords:** Laboratory, lab standardization.

### I. INTRODUCTION

The Undergraduate Study Program of Cosmetology Education is among the study programs of the PKK (Home Economic Education) Department of Faculty of Engineering of the State University of Surabaya (Unesa). It was established by the decree of the Minister of Education and Culture in 2009. Admission of cosmetology students was initiated in 2006, being one of the following concentrations: culinary art, fashion, and cosmetology education within the PKK Department. The number of students is shown in the following table.

Admission Year	Number of Students	Transfer	Graduated
2010	38	2	36
2011	54	7	38
2012	50	-	2
2013	60	4	-
2014	53	4	-
2015	59	5	-
Total	315	22	76

Source: The 2015 PDPT of Unesa



The above table shows that approximately 260 students would use labs for the purposes of study program practicum, testing and analysis of scientific experimental studies, experimentation, or observation. The present study sought to assess the adequacy of lab conditions, especially the cosmetology labs, with regard to the needs and the number of students. The cosmetology practicum labs consisted of a science lab, a computer lab, a facial make-up lab, and Spa. With the integrated laboratory grants, the Cosmetology Department received additional labs for hairdo, wedding, entrepreneurship, and facial skin care. The purpose of the present study was to examine the efforts to improve the labs for the purpose of increasing the competence of graduates by taking into account the number of students, lecturers, and facilities and infrastructure in the Cosmetology Department.

According to *Kamus Bahasa Indonesia* (2008), a laboratory is a room equipped with specialized equipment to conduct experiments, investigations etc. According Jaya (2012), a laboratory is defined as a place equipped for testing and analysis of scientific experimental studies, a place that provides an opportunity for experimentation, observation, or practicum in a field of study. According to Ibrahim (in Lutfi, 2013), a laboratory is a means of supporting the department of the study program concerned, and the basic resource to develop sciences and education.

Labs play multiple roles in the learning process, including: (1) the students and teachers are involved in conveying concepts based on investigations, discoveries and experimentations; (2) the students and teachers are involved in linking the concepts discussed to everyday life; (3) the students and teachers are involved and the former can give student grouping-oriented tasks and (4) students and teachers are involved to create models of learning to strengthen the understanding of concepts (Daryani, 2008: 1).

Availability of adequate labs in a college is vital. According Supardi (2012), availability of labs is a demand in line with developments in teaching and curricular developments that require students to be active. Therefore, it is necessary to optimize the number of the available labs standardized to the subjects in the curricular structure of the study program, lab floor area relative to the number of students, facilities and infrastructure, and the performance of practicum lecturers and technician. Thus, the present study deals with “Optimizing the Laboratory of the Undergraduate Study Program of Cosmetology Education of PKK Department of State University of Surabaya”.

## **II. METHODS**

The present study was descriptive of the conditions of the cosmetology lab. It performed a theoretical study and optimized the lab performance. The standards used were government regulations on the number, area, facilities and infrastructure of a laboratory. The objective of study was the optimization of cosmetology labs, consisting of the number of the existing labs standardized by the subjects in the curricular structure of the study program, the lab floor area





relative to the number of students, facilities and infrastructure, practicum lecturers' performance, and technician's performance. The objects of the study were labs, students, practicum lecturers, and technician. Currently, the cosmetology labs consisted of a bridal lab, a facial skin make-up lab, a facial skin care lab, a Spa lab, a hairdo lab, a science lab, a computer lab, and a salon.

Data were collected by observations and questionnaires. Observations were conducted to obtain data on the number of labs, lab floor area, and lab facilities and infrastructure. Questionnaires were used to collect data from students about the performance of lecturers and technician. The objects of the present study were the bridal lab, the facial make-up lab, the skin care lab, the spa lab and the hairdo lab. Data were analyzed by using the descriptive statistics of percentage and mean values. Conclusions of the observation results were drawn using Regulation of the Minister of Education and Culture No. 40 of 2008, in which observation results shall be converted as follows: 1 = bad (1.00 – 1.99) or equivalent to  $\leq 25\%$ , meaning that the lab requires repairs; 2 = less good (2.00 – 2.99) or equivalent to  $26\% \leq 50\%$ , meaning that the lab can still be used but does not meet the standard; 3 = fairly good (3.00 – 3.80), or equivalent to  $51\% \leq 75\%$ , meaning that the lab can still be used but does not meet the standards; 4 = good (3.81 – 4.00) or equivalent to  $\geq 76\%$ , meaning that the lab meets the criteria. By the same guidelines, the questionnaires were assessed using the criteria: 5 = excellent; 4 = good; 3 = pretty good; 2 = poor; 1 = bad.

The procedure of the present study consisted of three stages: preparation, execution and reporting. The preparatory stage began with lab observations, review of the theory, preparation of proposals, drawing up of instruments, validation of the instruments and a seminar of the proposal. Lab observations were carried out by a team of researchers by identifying and observing the existing labs of the cosmetology department, consisting of the cosmetology lab located on the 2<sup>nd</sup> floor of A3 building, the entrepreneurship lab (salon) on the 1<sup>st</sup> floor of UPT building, the bridal lab on the 2<sup>nd</sup> floor of A8 building, the facial make-up lab on the 3<sup>rd</sup> floor, the SpA lab, the facial skin care lab, and the hair care lab on the 4<sup>th</sup> floor. The conditions of facilities and infrastructure are as shown in figures in the Appendix. Temporary observations showed that the lab facilities remained relatively lacking, and so did the layout of facilities. This was due to the fact that, at the time of photographing, there was no lecture because of the even-semester break.

The execution stage was conducted by documentation of the labs; data collection by administering the questionnaires to students; interviews with students, practicum lecturers, sub-lab officers, and technician; organizing and processing of data collected; and group discussions of researchers. Data collected were analyzed. The reporting stage consisted of drawing up a draft report, conducting a seminar on the study results, preparing a research report, drafting the article and including it in a national seminar.



### III. RESULTS AND DISCUSSION

This section is organized as follows: (a) the number of labs; (b) the lab floor area; (c) the lab facilities and infrastructure; (d) the performance of practicum lecturers; (e) the performance of technician.

#### a. The Number of Labs as Standardized by Subjects

Over time, the Cosmetology Department has several labs in accordance with the needs of the curriculum, including the Design lab, the Science lab, the Computer lab, salon, the Bridal lab, the Facial Makeup lab, the Skincare lab, the Spa lab, and the hair care lab. Based on observations and review of curriculum (appendix) and faculty policies, the labs qualifying the criteria for the study were the bridal lab, the makeup lab, the facial skincare lab, the spa lab, and the hair care lab. The number of labs is shown in the table below:

Lab Names	Subjects
1. Bridal lab	1. Makeup design
	2. Basics of Housekeeping
	3. Traditional hair and bun styling
	4. Modern hair and bun styling
	5. International Bridal Make-up
	6. Indonesian Bridal Make-up I
	7. Indonesian Bridal Make-up II
	8. Decorative Make-up
	9. Crafts
	10. Fantasy Make-up Show
2. Facial Make-up Lab	1. Basics of Make-up
	2. Facial Make-up
3. Facial Skincare Lab	1. Facial Skincare
4. SpA	1. Solus per Aqua
5. Hair Care Lab	1. Hair care
	2. Basic hairdressing
	3. Hair coloring
	4. Hair curling and straightening
	5. Hairdressing Design

The bridal lab (on the 2<sup>nd</sup> floor of A8 building) was used by the students for the subjects: Traditional Hair Styling (3 credits), Modern Hair Styling (3 credits), Indonesian Bridal Makeup I (3 credits), Indonesian Bridal Makeup II (3 credits), International Bridal Makeup (3 credits), Basics of Housekeeping (2 credits), Crafts (2 credits), Room Decor (2 credits), and Fantasy Makeup Show (4 credits). The Facial Makeup lab was used for the subjects of Basics of Makeup, Makeup Design and Facial Makeup. The Facial Skin Care lab was used for the subjects of Facial Skin Care (3 credits), and the Hair Care lab was used for the subjects of Basics of Hairdressing, Hairdressing Design, and Hair Curling and Straightening and Hair Coloring. The SpA lab was used only for the subject of SpA. The lab floor area was unevenly distributed in which there was a lab used for a large number of subjects., while there was a lab used only once in a year, such the SpA lab.

**b. Lab floor area**

Observations showed the floor area of the labs is as follows:

Lab Names	Size	Area
1. Bridal lab	9 x 18 m	162 m <sup>2</sup>
2. Facial Make-up lab	9 x 9 m	81 m <sup>2</sup>
3. Facial Skin Care lab	9 x 9 m	81 m <sup>2</sup>
4. SpA	9 x 9 m	81 m <sup>2</sup>
5. Hair Care lab	9 x 9 m	81 m <sup>2</sup>

Based on the field data, the bridal lab of 18 x 9 m was used optimally for practicum subjects. The lab consisted of a warehouse and an instructor room, both being 2 x 3 m in size. The Facial Make-up and Skin Care labs had a warehouse and an instructor room, both of which were 2 x 3 m in size. In addition to having a warehouse and an instructor room, the SpA lab also contained partitions for steam and Jacuzzi rooms, each measuring 2 x 2 meters. Similarly, in addition to having a warehouse and an instructor room, the Hair Care lab was partitioned for hair washing room of 2.5 x 9 meters. The partition led the practicum room to be a bit cramped. Additionally, with the number of students, lab area and practicum subjects, the students taking practicum subjects for each class had to be divided into two parts or sometimes divided into 3 shifts. Based on regulation of the Minister of Education and Culture No. 40 of 2008, with regard to lab practicum, such activities as massage requires an area of 8 m<sup>2</sup>, hairdressing 4 m<sup>2</sup>, and facial skin care 6m<sup>2</sup> per learner. Thus, the area of the existing labs in the Department of Cosmetology remained inadequate given the average number of students per class of 50. Thus, in order to optimize the competencies that must be achieved by students, the practicum subjects should be carried out by turns; for example, the hair care lab with an area of 68 m<sup>2</sup> should be used only by 18 students for a practicum, thereby requiring 3 shifts. With regard to the Spa lab with an area of 54 m<sup>2</sup>, since an individual learner requires an area of 8 m<sup>2</sup>, each class should be divided into 4 shifts of 7 learners.

**c. Facilities and Infrastructures of Facial Makeup Lab**

Observations showed that the facilities and infrastructure of labs at the Department of Cosmetology are as follows:

Lab Names	Space available (%)				Mean (%)
	Practicum	Instructor	Warehouse	Cupboard	
1. Bridal lab	100	70	80	80	82.5
2. Facial Makeup Lab	90	80	80	80	82.5
3. Skin Care Lab	90	80	70	60	72.5

4. SpA	80	80	80	80	80
5. Hair Care Lab	70	70	70	70	70

Based on the observation guide, a makeup lab should have the following items: (1) students' practicum tables; (2) students' practicum chairs; (3) a lecturer's table; (4) a lecturer's chair; (5) a whiteboard and its accessories; (6) practicum equipment; (7) minimal practicum materials; (8) adequate electrical devices; (9) cleaning tools; (10) trash cans; (11) AC; (12) ventilation; (13) sewers; and (14) mirrors. In general, the five labs had 1 to 13 items, while several labs had additional facilities in accordance with the following lab characteristics.

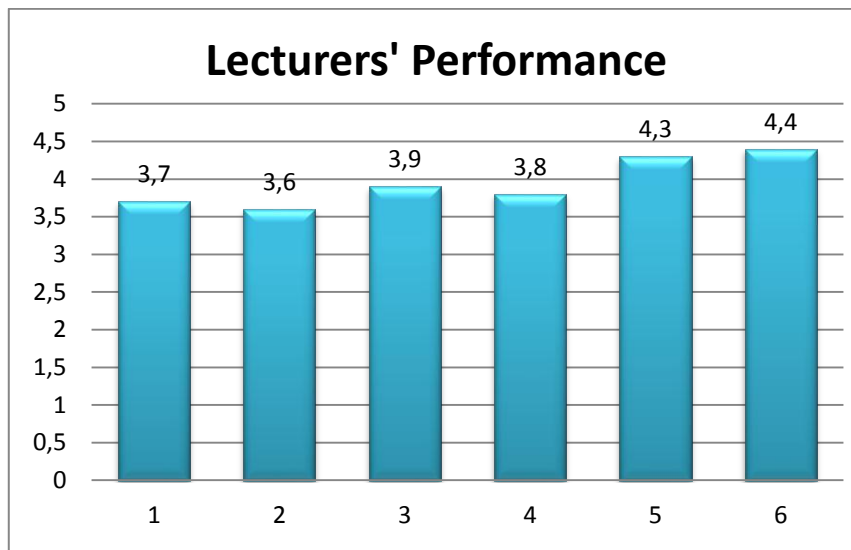
Standard Facilities	Lab Names				
	Bridal	Facial Makeup	Skin Care	SpA	Hair Care
1 to 13	Adequate	Adequate	Adequate	Adequate	Adequate
14. Change rooms	√	√	√	√	-
15. Clothes Racks	√	√	-	-	-
16. Sinks	-	√	√	√	-
17. Water Heaters	-	-	√	-	-
18. Drying places	-	-	√	-	-
19. Trolleys	-	-	√	√	√
20. Facial beds	-	-	√	-	-
21. Electric Facial devices	-	-	√	-	-
22. Vavozone	-	-	√	-	-
23. Wood lamps	-	-	√	-	-
24. Bathtubs	-	-	-	√	-
25. Body steam	-	-	-	√	-
26. Massage Beds	-	-	-	√	-
27. Wash bags	-	-	-	-	√
28. Drog cups	-	-	-	-	√
29. Steamers	-	-	-	-	√
30. Tripods	-	-	-	-	√
Facility condition	83%	90%	83%	80%	75%

Lab Names	Conditions of Infrastructure and Facilities			Conversion
	Infrastructure	Facilities	Mean (%)	
1. Bridal lab	82.5	83	82.7	4
2. Facial Makeup Lab	82.5	90	86.25	4
3. Skin Care Lab	72.5	83	77.7	4
4. SpA	80	80	80	4
5. Hair Care Lab	70	75	72.5	3

Table 6 shows that the conditions of the lab infrastructure and facilities of Department of Cosmetology, particularly the bridal, facial makeup, skin care and spa labs meet the criteria, thus requiring no repair but only improvement. However, the hair care lab can be used but remains short of the standards.

**d. Practicum Lecturers' Performance**

Data collected for the performance of practicum lecturers consisted of (1) all those lecturers who at the time of starting lab works explained the procedures for working at the lab; (2) lecturers performing supervision, mentoring and guidance to students; (3) lecturers' motivating the students to work with discipline; (4) lecturers' explaining the tools and materials to be used for working at the lab according to the practicum topics; (5) lecturers' evaluating performance, tools, and materials after working at the lab; (6) lecturers' urging the students to continually maintain the cleanliness and neatness of the lab. Data are presented as follows:



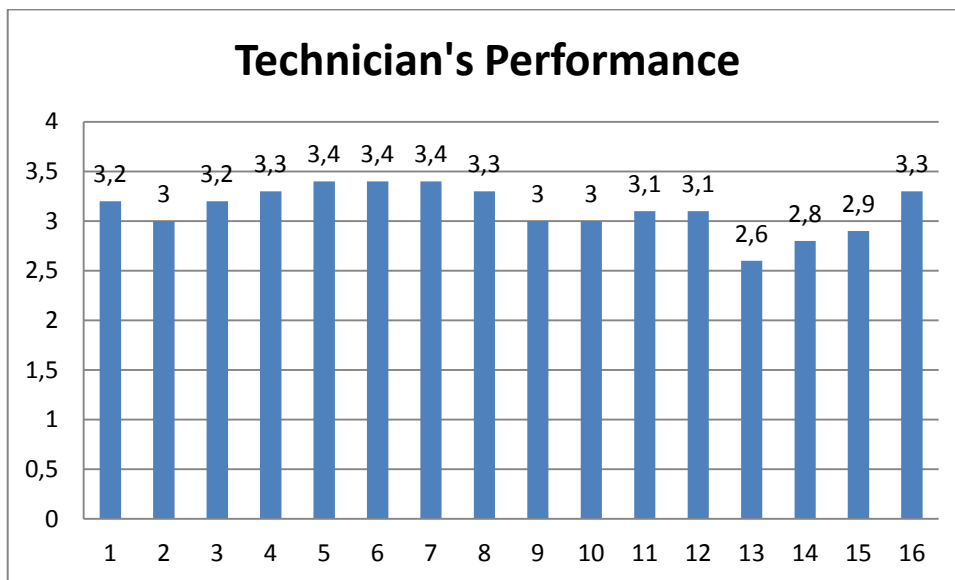
**Figure 1.** Performance of practicum lecturers

The above figure shows that lecturers' optimization of supervision, mentoring and guidance to students had the lowest score in the above six items, despite the closeness to the good category (3.6). Lecturers' performance with regard to monitoring, mentoring and guidance to students had the highest score of 4.4 with a good category, that is for the item of lecturers' evaluating performance, tools, and materials in accordance with lab works, and urging the students to maintain the cleanliness and neatness of the lab.

**e. Technician's Performance**

Since its establishment in 2006, it was only in 2010 that the Department of Cosmetology had a technician. The technician was an alumnus of a cosmetology vocational senior high school and had experience with working in a salon in Surabaya. The issue was an imbalance of the number of labs with the number of students and technician in the Department of Cosmetology. The items for the performance of technician consisted of the technician's duties with regard to the readiness of devices and materials, such as (1) setting up the devices at the lab; (2) repairing minor damage to the devices; (3) checking the devices before use; (4) preparing the materials or tools for student activities; (5) reporting the severely damaged devices that should be replaced; (6) maintaining cleanliness and simultaneously the security of the lab; (7) being aware of the schedule of lab use at least in the week; (8) keeping the cleanliness of the lab and storing the tools and

materials in their place; (9) recording and reporting the chemicals diminishing in amounts for immediate replenishment; (10) recording the lab tools or materials at the ledger and inventory cards; (11) together with lecturers preparing and checking the lab tools or materials; (12) continually monitoring and serving the students during the practicum; (13) checking the fire extinguishers; (14) continually checking the floor in order to avoid slips; (15) checking the ventilation and maintaining good air circulation during the practicum; (16) being at the lab during the practicum, except with the permission of the lecturers or being ordered for practical purposes. The above items are presented in the following figure.



**Figure 2.** Technician's Performance

The above figure shows that the technician's performance for the items of checking fire extinguishers, continually checking the floor in order to avoid slips, and checking the ventilation and maintaining good air circulation during the practicum are within the poor to fairly good enough category with a mean score of 2.73 (as per regulation of Minister of Education and Culture No. 40 of 2008). Other items are fairly good and good. However, the overall performance of the technician is fairly good with an average score of 3. The low performance of the technician was possibly due to the fact that there was only one technician in the Department of Cosmetology. Thus, the number of technicians in the Department of Cosmetology should be increased.

#### IV. CONCLUSION

Based on the results of data analysis, conclusions can be drawn that the number of lab in the Undergraduate Study Program of Cosmetology Education, especially the bridal, makeup, facial skin care, spa and hair care labs was adequate, but its use was less than optimal. The area of the existing labs remained inadequate, leading practicums to be done in several shifts to meet the target competence of graduates. Lab facilities and infrastructure were adequate but less than optimal (76%). Lecturers' performance was categorized as good with a mean score of 3.95



(rounded). Technician's performance was categorized as fairly good with a mean score of 3.125. Thus, there is a need for improvement of lab operations by utilizing the existing labs and taking the existing curriculum into account. This is because the ratio of the number of labs, lab floor area, facilities and infrastructure, and technician's performance were adequate but less than optimal. Practicum lecturers' performance was adequate but it required improvements.

It is recommended to add labs with the floor area as per the standards of regulation of the Minister of Education and Culture No. 40 of 2008; for example, every learner requires 4, 6, and/or 8 m<sup>2</sup> of makeup labs, depending on the competencies to be achieved, such as 4 m<sup>2</sup> of hairdressing floor area for each learner, 8 m<sup>2</sup> of massage floor area for each learner. There is a need for improvement of lecturers' performance and addition of at least a technician for each two labs for optimal use of the labs. The curriculum of SpA subject should be reviewed by increasing the credits to 4 credits distributed to the odd semester and second semester, thus optimizing the use of the labs. And so does the use of the skin care and makeup labs. Lab facilities and infrastructure can be improved by referring to the labs in the appendix of the present study report.

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ATTACHMENT



Bridal Laboratory



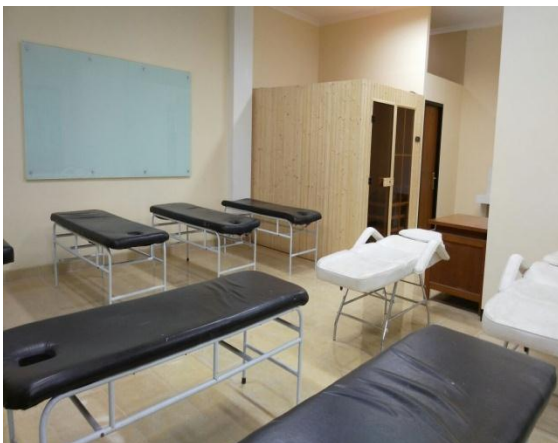
Bridal Laboratory



Facial Makeup



Lab Skin Care Lab



SpA Lab



Hair Care Lab







EI-01-012

## REDEFINING VOCATIONAL TEACHERS COMPETENCE: IMPLICATE TO PREPARE VOCATIONAL TEACHERS CURRICULUM IN INDONESIA

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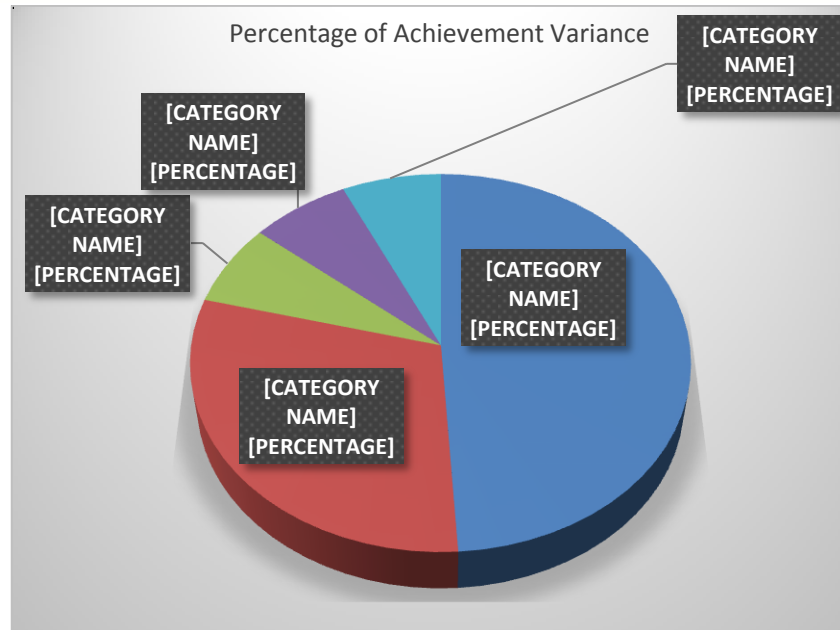
**ABSTRAC:** Indonesian regulation for teachers define four competencies: pedagogical, professional, social, and personality competence. These competencies are same to teachers in all level and type of education. Vocational education has different characteristics with general education, so they need a different spesification of competence. Redifining vocational teacher competence is importance to be guiding for planning, selecting, certification, licencing, remunerating, promoting, improving management, performance appraisal, professional developmnet, and others. In preparing vocational teacher context, redefining vocational teachers competence is importance to design effective education and relevant curriculum and learning system. There are many approaches to define vocational teachers competence: philosophy approach, introspective approach, DACUM approach, functional approach, and task analysis.

**Key words:** vocational education, teachers, competence

### I. INTRODUCTION

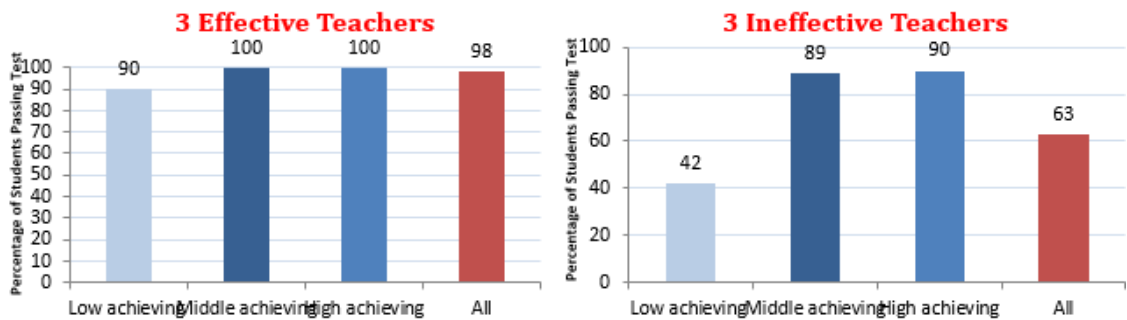
Vocational education (include Vocational High School) that prepares students primarily to work in a specific field (Undang-undang No. 20 Tahun 2003) has a strategic role in the preparing of human resources, especially middle-level manpower. Various studies (Sukamto, 1998: 110; Abbas Ghazali, 2000: 57-85; Widarto, 2007: 67-85) shows that vocational education is still a profitable investment in preparing skilled manpower intermediate level. This was reaffirmed by government policies such as the revitalization of vocational education including Vocational High School (Kompas, June 24, 2016).

One of the underlying factors that determine the quality of vocational education is the teacher. United Nation with the 2030 Agenda for Sustainable Development (2015) declare: by 2030, all governments ensure that all learners are taught by qualified, professionally-trained, motivated and well-supported teachers. The teacher's role is very significant for any successful learning process (Jones, Jenkin & Lord, 2006: 1; Zamroni, 2008: 40; Zamroni 2009: 4; Indra Jati Sidi, 2000). Meta analysis done by Hattie (2005) showed that teachers are the most important external factor in determining student achievement. It is clear that teachers have a central role in determining educational quality.



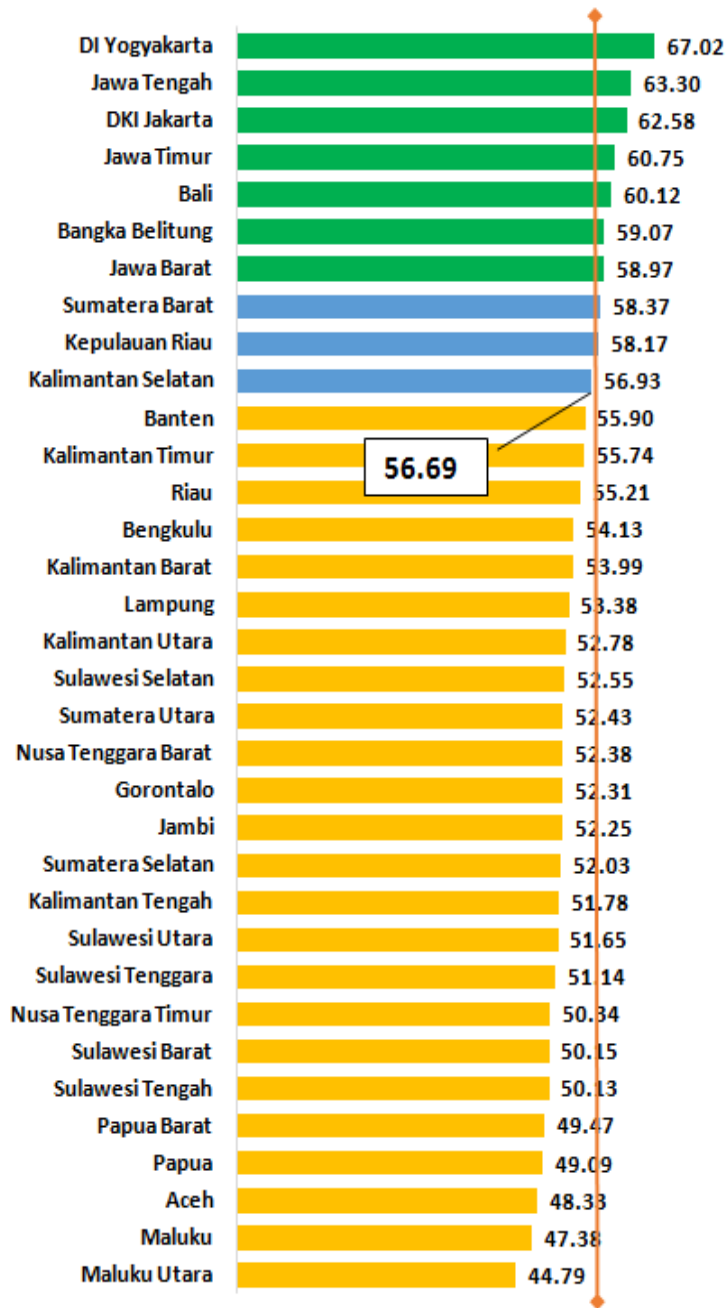
**Fig.1.** Determine factors of student achievement (Hattie, 2005)

Studies conducted by Carey (2014) also stressed the importance of teachers' role in determining the success of students (Figure 2). Comparison of the effective teachers and ineffective teachers show that there are differences achievement of students who are taught by effective teachers and ineffective teacher.



**Fig. 2.** Effective Teacher and Ineffective Teacher

The studies clearly show the teacher's role in determining educational quality. Various efforts have been made in order to improve teacher quality through education, training, apprenticeship and other programs, including certification. However, the data in the field shows there are many problems in an effort to improve the quality and performance of vocational education teachers. Condition of teachers in Indonesia can be seen from the results of teacher competency test set out in Figure 3 and



**Gambar 3.** Mean of Teacher Competence Test (Ditjen Guru dan Tenaga Kependidikan, 2015)

**Tabel 1.** Result of Teacher Competence Test (Ditjen Guru dan Tenaga Kependidikan, 2015)

NO	NILAI	PERSENTASE PER-JENJANG						TOTAL
		TK	SD	SMP	SMA	SMK	SLB	
1	1-10	0.01	0.02	0.03	0.02	0.03	0.01	0.02
2	11-20	0.04	0.08	0.13	0.12	0.08	0.06	0.09
3	21 - 30	0.43	2.06	1.93	1.72	1.23	1.14	1.77
4	31 - 40	3.82	13.23	9.69	7.79	8.26	8.08	10.66

5	41 - 50	14.21	23.79	19.29	15.38	19.24	18.33	20.75
6	51 - 60	30.80	29.21	25.10	21.42	26.64	30.20	27.57
7	61 - 70	37.51	20.02	23.10	23.40	26.30	26.81	23.18
8	71 - 80	12.08	9.07	13.84	17.95	13.56	12.84	11.57
9	81 - 90	1.08	2.24	5.86	9.48	4.26	2.35	3.73
10	91 - 100	0.01	0.29	1.04	2.72	0.41	0.19	0.66
	TOTAL	100	100	100	100	100	100	100

Based on the data in Figure 3 and Table 1, it appears that the competence of teachers including vocational high school teachers not evenly good views of the location and of each level. Various efforts to improve the competence of teachers needs to be done both in terms of qualifying and distribution.

Various problems that can arise due to the formation of teachers is not optimum. In Vocational High School context, one of the problems that need to be assessed is the competence of teachers from the formulation, assessment, coaching, and rewards. Undang-undang No. 14 Tahun 2005 tentang Guru dan Dosen are further elaborated in Peraturan Pemerintah No. 74 Tahun 2008 tentang Guru and the Permendiknas No. 16 Tahun 2007 tentang Standar Kompetensi Guru formulated that the competencies required of teachers include pedagogical competence, personal competence, social competence, and professional competence. The competency applies to all teachers in all region of Indonesia at all levels and types of education. In the context of vocational education, these formulations are not enough, and not representing characteristic of vocational education as education for work. Therefore one of the efforts to improve the quality of vocational teachers, teacher competence is crucial formulated in accordance with the characteristics of vocational education.

## II. DISCUSSION

Teacher is the instrumental input the most influence on the creation process and the quality of education (Glatthorn, Jones & Bullock (2006: 3). The best strategy for improving school achievement to be qualified and competent teachers in every classroom (Walter & Grey, 2002). Efforts to improve the quality of education will not meaningful without the support of professional and qualified teachers (Stronge, Gareis, & Little, 2006: 2).

Various studies (Sofa, 2003: 150; Sinamo, 2002: 6; Rychen and Salganick, 2003: 43) basically agreed that the competence is knowledge, skills, and attitudes required to work. Robbins (2006: 52) defines competence is the ability as an individual's capacity to perform various tasks in a particular job.

Teacher competence can be defined as a set of minimum essential characteristic of all teachers are required to perform the work (The Evaluation Center at Western Michigan University, www.wmich.edu). Peklaj (2006: 4) formulated five components of teacher competence: effective



instruction, life-long learning, classroom management and communication, assessment and evaluation of individuals' learning progress, and professional competencies in a more general sense. National Project on the Quality of Teaching and Learning / NPQTL (McLeod, 2001: 2) reveals that competence can also be interpreted as a set of mastery of abilities that must exist within the teacher in order to realize the performance professional appropriately and effectively. Rosenshine and Furst (Robert, et.al, 2006: 1-2) synthesize various research identified five basic characteristics of effective teachers are: clarity, variability, enthusiasm, student opportunity to learn the material, and task oriented.

In an effort to assessment and certification of vocational teachers, there are various formulations of competencies that must be owned by a teacher (Wagiran, 2013). Some attribute the formulation of the competence of teachers, among others:

. American Association for Vocational Instructional Metrial (AAVIM). Fourteen teacher competence:

- a. Program Planning, Development, and Evaluation
- b. Instructional Planning
- c. Instructional Execution
- d. Instructional Evaluation
- e. Instructional Management
- f. Guidance
- g. School-Community Relations
- h. Vocational Student Organization
- i. Professional Role and Development
- j. Coordination of Cooperative Education
- k. Implementing Competency-Based Education (CBE)
- l. Serving Students With Special/Exceptional Needs

. the National Project on the Quality of Teaching and Learning (Marsh, C., 2004: 361).

Five areas of teacher competence:

- a. Using and developing professional knowledge and values,
- b. Communicating, interacting and working with students and others,
- c. Planning and managing the teaching and learning process,
- d. Monitoring and assessing student progress and learning outcome
- e. Reflecting, evaluating and planning for continous improvement.

. Milanovich (1986), being an effective vocational teacher today means having knowledge and/or experience in four areas: (a) a specific skill area; (b) instructional planning, implementation, and



evaluation; (c) classroom and laboratory management; and (d) occupational experience

Muclas Samani (2006). New South Wales teacher's competence:

- a. Know their subject content & how to teach that content to students.
- b. Know their students & how they learn
- c. Plan, assess & report for effective learning.
- d. Communicate effectively with their students.
- e. Create & maintain safe & challenging learning environments through the use of classroom management skills.
- f. Continually improve their professional knowledge & practice.
- g. Actively engaged members of their profession & the wider community.

Vocational Teacher Competence in Slovenia:

- a. Cooperation/interaction/team work. Good relationship with all social partners, to communicate and interact at many different levels and co product the learning process with all partners
- b. Project and development work. Daily participate in different projects and development work which should include cooperation with different social partners nationally and internationally
- c. Continuous learning. a teacher must have the ability and motivation for self-evaluation and reflection
- d. Creation of learning environment for individuals and groups and facilitating learning process. to create and develop save, supportive, flexible and innovative learning, environment for individuals and groups
- e. ICT. Integrate information and communication technologies to enhance student learning
- f. School administration. Supposed to be up to date on school administration processes, national education regulations and main national and international documents for vocational education development and to implement them into his work
- g. Other personal characteristics of teachers. supposed to be communicative, sensible and motivated enough to observe and lead constructive dialogue with his students in purpose to find best options for supporting their personal development
- h. Competences of school community and management

The TT-TVET Trans-national Standards for TVET Teacher Education (*Spöttl, Kämäräinen, and Dittrich, in, 2008*). The curricular emphases of the educational sciences during teacher training are:

- a. Scientific qualification in a specialist science;



**b. Vocational educational qualification in the fields of**

1) Education and pedagogics

Justification and reflexion of education and pedagogics in institutional processes.

2) Profession and role of the teacher

Professionalisation of teachers; dealing with conflicts and decision making situations linked to the profession.

3) Didactics and methodology

Design of instruction and learning environments.

4) Learning, development and socialisation

Learning processes of young people in school and in companies.

5) Motivation for performance and learning

Motivational basics of the development of performance and competencies.

6) Differentiation, integration, promotion

Heterogeneity and variety of conditions in schools and companies.

7) Diagnostics, assessment and counselling

Diagnosis and support of individual learning processes; performance measurement and assessment of performance.

8) Communication

Communication, interaction and conflict management as basic elements of teaching and education.

9) Media education

Handling of media in terms of concepts, didactics, and practical aspects.

10) School development

History of the educational system; structures and development of the educational system and the development of the individual school.

11) Educational research

Aims and methods of educational research; interpretation and application of the results.

Quality indicators and shaping measures as a basis for standard-setting in TVET teacher education ((*Spöttl, Kämäräinen, and Dittrich, in, 2008*).

a. Standards for lecturers' activities (in TVET teacher education) as support for teachers' practice in TVET

b. Standards for supporting students and their learning processes within TVET teacher education



- c. Standards for evaluation (of curricula) and for assessment (of students' achievements)
- d. Standards for developing curricula and learning contents
- e. Standards for developing methods for instruction and training
- f. Standards for developing the organisational frameworks for learning environments

4. Hangzhou Declaration (2004)

- a. TVET should be developed into an internationally acknowledged scientific community;
- b. Sustainable, reproductive and innovative national scientific systems be developed and integrated into national systems of innovation;
- c. International exchange of learners and educators be accelerated;
- d. The expertise in pedagogy of TVET should be linked to the vocational disciplines and to integrative perspectives on school-based and work-based learning;
- e. An improvement in vocational skills for employability and citizenship can only be realized if there is an improvement in the quality, effectiveness and relevance of teaching, and that
- f. An effective interaction between teacher/trainers and learners lies at the centre of quality TVET.

5. Teacher Training in Spain. "The Functions of Teachers" (2/2006: 17183) which are specified under Article 91 of the Education Act 2/2006 May 3, of Education.

- a. Planning and education of all areas, subjects, and modules that have been entrusted to them.
- b. Evaluation of students' learning process, as well as evaluation of educational processes.
- c. Guardianship of students, direction and orientation of their learning, and their support in their educational process in collaboration with families.
- d. Educational, academic, and vocational orientation of students, in collaboration with specialized departments or services.
- e. Attention to students' intellectual, affective, psychological, social, and moral development.
- f. Promotion, organization, and participation in complementary activities, inside and outside the educational enclosure, programmed by the school.
- g. Contribution to the development of schools' activities in a climate of respect, tolerance, participation, and freedom in order to promote the values of democratic citizenship within students.
- h. Periodic report to families of learning process of their daughters and sons, as well as to provide guidance to the families of how they can cooperate.
- i. Coordination of educational activities, management, and direction that have been entrusted to them.





- j. Participation in the general activity of the school.
  - k. Participation in the evaluation plans determined by educational Administrations or schools.
  - l. Research, experimentation, and continuous improvement of corresponding learning processes.
0. On the other hand, most of the studies define the role of teacher training according to four competency fields (Bunk, 1994; Liepmann, 1992, cited by Ferrández *et al.*, 2000):
- a. Technological competencies
  - b. Teaching competencies (psychopedagogical)
  - c. Work competencies
  - d. Social competencies
1. Bandung Declaration on TVET Teacher Education (2008). Structure university-based TVET teacher education studies based on four pillars, namely:
- a. vocational discipline including work process, curriculum and qualification analyses,
  - b. vocational pedagogy / educational sciences,
  - c. a second subject studies in cross-cutting key competences to support the specialisation in vocational disciplines,
  - d. research competences in vocational disciplines/vocational pedagogy including a thesis at the end of the study
2. Yu ([jszg@bnu.edu.cn](mailto:jszg@bnu.edu.cn)) Study on Establishing National Standard of Vocational Teachers' Training in China, describe two competence of Vocational Education Teacher:
- a. The First Standard of the Specialization for Secondary Vocational Teachers: Professional field
  - b. The Second Standard of the Specialization for Secondary Vocational Teachers: Teaching Field (the Sino-Australian cooperation research project "the competence standard for the secondary teachers") :
    - 1) Professional Ethics and Conduct
      - (a) Model professional and ethical behavior
      - (b) Teach professional ethics
    - 2) Industry Liaison
      - (a) Conduct industry liaison
      - (b) Provide training services for industry
    - 3) Curriculum Design
      - (a) Design and develop teaching and learning programs.
      - (b) Design and develop teaching / learning materials



- (c) Review and evaluate teaching and learning programs
  - 4) Teaching and Learning organization and Conduct
    - (a) Plan training sessions
    - (b) Organize and deliver teaching and learning activities
    - (c) Evaluate teaching effectiveness
  - 5) Assessment
    - (a) Plan and organize assessment activities
    - (b) Develop assessment tools
    - (c) Conduct assessment
  - 6) Communications and Cooperation
    - (a) Communicate effectively with students and peers
    - (b) Work effectively in a team
  - 7) Occupational Health and Safety
    - (a) Ensure a safe teaching and learning environment
    - (b) Conduct Occupational Health and Safety Education
  - 8) Services to Students and Welfare Management
    - (a) Manage students in the teaching and learning environment
    - (b) Provide vocational guidance service
  - 9) Professional Development
    - (a) Improve professional knowledge and practice
    - (b) Research teaching practice
3. the Victorian Institute of Teaching (VIT) describe The eight Professional Standards are:  
Professional Knowledge:
  1. Teachers know how students learn and how to teach them effectively
  2. Teachers know the content they teach
  3. Teachers know their studentsProfessional Practice:
  4. Teachers plan and assess for effective learning
  5. Teachers create and maintain safe and challenging learning environments
  6. Teachers use a range of practices and resources to engage students in effective learningProfessional Engagement:
  7. Teachers reflect on, evaluate and improve their professional knowledge and practice
  8. Teachers are effective members of their profession
4. Oklahoma Panhandle State (2008). Candidate vocational education teacher attributes:  
Knowledge
  1. General areas of liberal arts and sciences



2. Target subject area(s)
3. Pedagogy
4. The manner in which all students learn and develop
5. Types of diverse learners
6. Developing multiple assessment measures
7. Sources and uses of technology

#### Skills

- a. Classroom and behavior management
- b. Methods and advantages in collaboration
- c. Multiple methods of communication
- d. Design and use of effective instructional strategies that include all student populations
- e. The use of technology for teaching and learning.
- f. Assessment designed to evaluate student learning and instructional effectiveness

#### Dispositions

1. Good work habits
  2. A positive attitude and love of learning
  3. Confidence in their own knowledge and skills
  4. Honesty and trustworthiness
  5. Self-reliance and problem-solving behavior
  6. An appreciation and empathy for the worth and diversity of all humans
  7. An awareness of ethical, political, social, and environmental issues and obligations.
5. New Mexico Teacher Competencies for Licensure Levels I, II, and III Assessment Criteria:
- a. The teacher accurately demonstrates knowledge of the content area and approved curriculum
  - b. The teacher appropriately utilizes a variety of teaching methods and resources for each area taught.
  - c. The teacher communicates with and obtains feedback from students in a manner that enhances student learning and understanding.
  - d. The teacher comprehends the principles of student growth, development and learning, and applies them appropriately
  - e. The teacher effectively utilizes student assessment techniques and procedures
  - f. The teacher manages the educational setting in a manner that promotes positive student behavior and a safe and healthy environment.
  - g. The teacher recognizes student diversity and creates an atmosphere conducive to the promotion of positive student involvement and self-concept
  - h. The teacher demonstrates a willingness to examine and implement change, as appropriate.



- i. The teacher works productively with colleagues, parents and community members.
6. North Carolina Teacher Evaluation Process (2008). A New vision of Teaching
- The different demands on 21st century education dictate new roles for teachers in their classrooms and schools. The following defines what teachers need to know and do to teach students in the 21<sup>st</sup> century:
- a. Leadership among the staff and with the administration is shared in order to bring consensus and common, shared ownership of the vision and purpose of work of the school. Teachers are valued for the contributions they make to their classroom and the school.
  - b. Teachers make the content they teach engaging, relevant, and meaningful to students' lives.
  - c. Teachers can no longer cover material; they, along with their students, uncover solutions. They teach existing core content that is revised to include skills like critical thinking, problem solving, and information and communications technology (ICT) literacy.
  - d. In their classrooms, teachers facilitate instruction encouraging all students to use 21st century skills so they discover how to learn, innovate, collaborate, and communicate their ideas.
  - e. The 21st century content (global awareness, civic literacy, financial literacy, and health awareness) is included in the core content areas.
  - f. Subjects and related projects are integrated among disciplines and involve relationships with the home and community.
  - g. Teachers are reflective about their practice and include assessments that are authentic and structured and demonstrate student understanding.
  - h. Teachers demonstrate the value of lifelong learning and encourage their students to learn and grow.

From the various formulations of competence above it appears that vocational education has different characteristics with general education, so they need a different competence. In education policy context, redefining vocational teacher competence is importance to be guiding for planning, selecting, certification, Licensing, remunerating, promoting, improving management, performance appraisal, professional development, and others. In preparing vocational teacher context, redefining vocational teacher competence is importance to design effective and relevant education curriculum and learning system. There are two steps to formulate vocational teacher competence:

1. Formulate general competence of vocational education teachers. In this context, we can refer the 21st century skills (Fig. 4). From Fig.4 we know that in the 21st century we need a human resources have life and career skills; learning and innovation skills; information, media, and technology skills, and mastery in core subject. Education has support standards and assessment; curriculum and instruction, professional development, and learning environment.

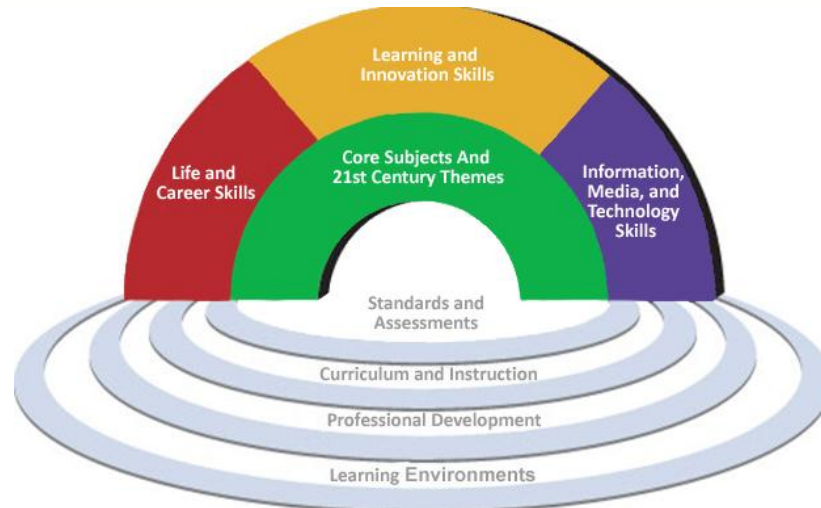


Fig. 4. 21<sup>st</sup> Century Skills (<http://www.21stcenturyskills.org>)

2. Formulated specific competence of vocational teacher. We need a needs assessment to define vocational teacher competence. We can do with philosophical approach, introspective approach, DACUM approach, functional approach, or task analysis.

### III. CONCLUSION

Vocational education have a different characteristic with general education, so they need a different formula about teacher competence. Redefining vocational teacher competence is importance to the make right judgment in educational policy and curriculum design for vocational education teacher candidate.



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EI-01-015

## THE IMPROVEMENT OF LEARNING INTEREST AND MASTERY ON WOODEN TRUSS PLANNING USING *TEAM ASSISTED INDIVIDUALIZATION* LEARNING METHOD

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**ABSTRACT :** *This present study aims to determine: How the application of cooperative learning methods TAI Type (Team Assisted Individualization) can explain the increase both interest and mastery of Wooden Truss Planning competency On Wood Structures Subject. The Variables of this study were the student's interest in learning process and competency mastery. This study was conducted in two phases, namely (a) the initial observation phase; and (b) the stage of action implementation. The implementation of the action was conducted in four cycles: (a) planning the action, (b) the implementation of the action, (c) observation, and (4) reflection. The study was designed in cycles until the performance indicators were achieved. The results of the study showed that the Application of Cooperative Learning Methods TAI Type (Team Assisted Individualization) on Wooden Truss Planning on Structure Wood Subject lead to the increasing interest and mastery of competencies through two cycles. The improvement was indicated by those whose score > 70 were 21 % in the first cycle and increased to 85% in the second cycle which can be categorized as achieving learning achievement indicator. The improvement in students' learning interest in the first cycle was 30% which was categorized in high category, 48% in less high category, 14% in the low category and only 8% in the very high category. In the second cycle, there were some changes; mostly 53% in the high category, 40% in the very high category, while only 7% in the less high category. This model can be applied to the wood structure subject in the implementation of wooden truss planning assignment and not to mention on subjects which have similar learning characteristics.*

**Keywords:** *Team Assisted Individualization, Cooperative Method, Learning Interest and Competencies*

### I. INTRODUCTION

Learning process in the class is an integrated process between the lecturer -student and its supporting factors. Good communication between students and lecturers offer great assistance during the process of learning and understanding the learning material. Learning process is always aimed at realizing the students' student competency comprehensively. Students – centered learning is expected to enable students to master necessary competencies in the learning subjects. In order to do so, teachers must realize that students require continuous and sustainable training or practice.

The wooden structure subject on the curriculum 2012 is a combination of wooden structures I and II with 3 credits. The structure of wood subject has a comprehensive understanding in analyzing the real problems in the field of wood construction. The realization of this competence is the final task of planning the structure of a wooden building frame that is the wooden truss. This characteristics of this task is comprehensive which includes all learning material that has been given during the learning process. Therefore, during the implementation of this assignment, students should apply the whole of the learning material to finish the assignment. Based on the reflection on the learning process that has been





conducted on the subject of the wooden structure, it can be concluded that the competence of students was less maximum in the wooden structures subject. The less maximum students' competence can be indicated from the results of tests. Based on the results of the test, most of the students did not achieve the learning mastery well. Other indicators show that the results of the students' assignment evaluation that have been performed, students' learning mastery was also less maximum. One of the indicators was the time of assignment submission was frequently late.

Based on the considerations above, it is necessary to develop a learning method which involves the participation of the entire students so that learning and teaching is not dominated by any particular student. One of the methods that is able to involve the participation of the student is cooperative learning. Cooperative learning method focuses more on the process of learning in groups, instead of doing anything with the group. The learning process in the group will assist students to find and develop their own understanding of the subject matter which can not be found in conventional methods.

One of the alternative teaching methods that may be applied to improve students' learning outcomes is the T.A.I. (Team Assisted Individualization). Methods T.A.I. (Team Assisted Individualization) is a learning method which puts students in small groups led by a group leader who has a better knowledge than the other group members. Difficulties experienced by students can be solved together with the group leader and teacher's guidance. The success of each individual is determined by the success of the group, good social interaction skill is necessary among all members of the group. One of the advantages of the method T.A.I. (Team Assisted Individualization) is that can provide opportunities for students to teach each other (peer tutoring) and provides mutual support. This group can also improve interaction between race, religion, ethnicity, and can ease the classroom management of the classroom because the presence of one person of high academic ability in each group, teachers get an expert assistant for each member of the group.

Learning is an activity that brings about changes in individuals. A person's learning activities require a person's outcomes or achievements, as corroborated by Roestiyah (1986) that learning achievement is a result achieved a person experiencing a learning process in the form of habituation, knowledge or attitudes. Learning requires creativity and innovation its process. These innovations require changes in paradigm of teaching into learning, a change in a productive thinking becomes reflective thinking. This means that the understanding the competence is not just knowledge (demonstrating the knowledge) but more on the ability / ability to do. These are based on the principle of learning which are the four principles,



namely learning to know, learning to do, learning to live together and learning to be. Therefore, this case implies that learning should implement learning to know, learning to be able to do, learn to work together to obtain something and learn to become something that is learned.

Cooperative learning basically aims at teaching students about the skills of cooperation and collaboration. This cooperative aspects will help students to develop cooperative behavior and a better relationship between students and assist students in cooperative learning. Cooperatif Learning by Stone (1990) is a method of learning which provides students to cooperate with each other to understand the significance of the learning subject and in actively completing the task. Cooperative method is expected to improve the quality of learning process, because the the students work together on the assignment, share the knowledge with friends who are more capable, solve problems in a group, instilling responsibility together and develop social life. Learning activity is expected to be further improved through learning in small groups to develop social skills, individual skills and improve learning kelitas.

Cooperative learning approaches (cooperative learning) is the concept of learning that help teachers take advantage of small groups of students working together to achieve the goals of learning, and enables students to maximize their learning. Cooperative learning can develop academic cooperation between students, form positive relationships, develop self-confidence, as well as improve academic skills through group activities. In cooperative learning, there is a positive interdependence among students to achieve learning objectives. Each student has an equal opportunity to succeed. Student-centered learning activities in the form of discussion, do the assignment in a group, help each other and support each other in solving problems. Through effective learning interactions students more motivated, confident, able to use higher-level thinking strategies, and able to build interpersonal relationships.

Cooperative learning model allows all students to master the material at relatively the same level of mastery. Johnson and Johnson (1984) and Hilke (1990) suggests the characteristics of cooperative learning is; (1) there is interdependence of individual, (2) can be justified individually, (3) heterogeneous, (4) shared leadership, (5) share responsibility, (6) presses on the task and togetherness, (7) forming social skills , (8) the role of the teacher / lecturer observe student learning / student, (9) the effectiveness of learning depends on the group. Learning occurs in small groups (3-4 members), heterogeneous regardless of the differences in academic ability, gender, race, or other.



Methods T.A.I. (Team Assisted Individualization) is one type of cooperative learning methods in which groups are individual - assisted. This method was created and developed by Slavin Slavin create and develop this model for several reasons. First, this method combines the advantages of cooperative and individual learning program. Second, this method emphasizes on the social effects of cooperative learning. Third, this method is conceived to solve the problems in the teaching program, for example in terms of students' learning difficulties individually.

The implementation of Team Assisted Individualization in the classroom is that students are placed in small heterogeneous groups (4 to 6 students per group) and subsequently followed up by providing individual assistance to students who need them. Before the group was formed, students were taught how to work together in a group. Students were taught to be a good listener, able to deliver information to a group of friends, discuss, encourage other friends to work together, respect the opinion of other friends, and so on. Each member in the group has a similar task. Because the focus of this method is the success of cooperative learning groups, it is the students who are good partly responsible for helping someone who is less knowledgeable in the group. Thus, students who are good can develop the capabilities and skills, while students who are less knowledgeable will be helped in understanding the learning problem (Suyitno, 2002: 9).

## **II. METHOD**

This study was conducted at the Department of Civil Engineering, Semarang State University. The subject of research is the students of Construction Vocational Education who took wood structure subject. Variables of this study were student interest and competence in the subject of Wood Structures with the implementation of cooperative learning methods Type T.A.I. (Team Assisted Individualization).

The study was Classroom Action Research with the design from Kemmis and McTaggart (Depdiknas, 2004), the implementation of treatment in the Classroom Action Research consists of four steps: (1) the action planning; (2) implementation of the action; (3) observation; and (4) reflection.

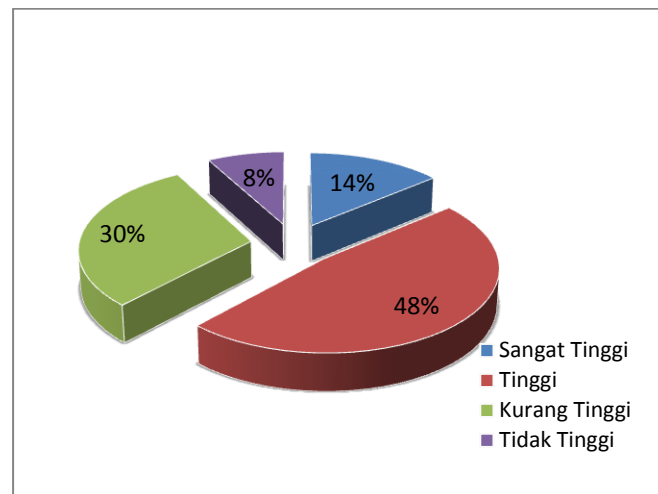
## **III. RESULTS AND DISCUSSION**

The results of the study describe the implementation of Team Assisted Individualization Method that focused on the components of students' interest and mastery of competencies in planning wooden truss assignment. Students' mastery of competencies was measured through the mastery of concepts including determining the dimensions of the wood,

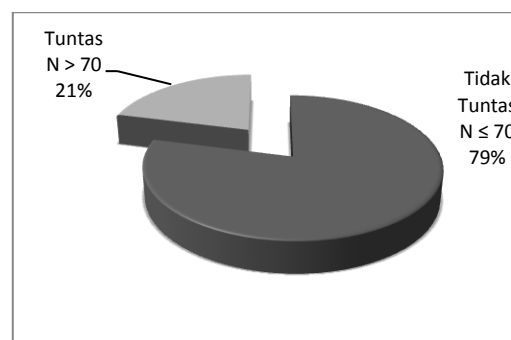
the accuracy of determining the dimensions of wood, fluency in answering and timeliness of completion.

Figure 1 shows the student's interest in wooden structure subject in cycle I. These results provide an explanation that 30% of the students were in the high category, 48% were in the category of less high, 14% were in the category is not high and only 8% was in the category of very high. High interest in learning was less visible on all aspects of attention, relevance, confidence and satisfaction. Meanwhile, in the category of high that no more on the aspects of self-confidence, satisfaction and relevance.

Meanwhile, in the first cycle, the learning outcomes overall value obtained were still below standard, namely that scored above 70 only amounted to 21% and most of the 79% gain value  $\leq 70$  as shown in Figure 2. This shows the level of achievement indicators mastery learning have not been fulfilled. These results do next as a reflection on the conduct of the cycle II



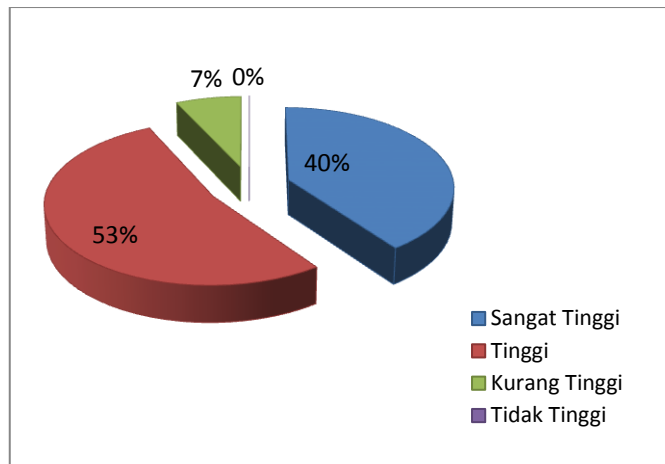
**Figure 1.** Students' Interest in Learning (Cycle I)



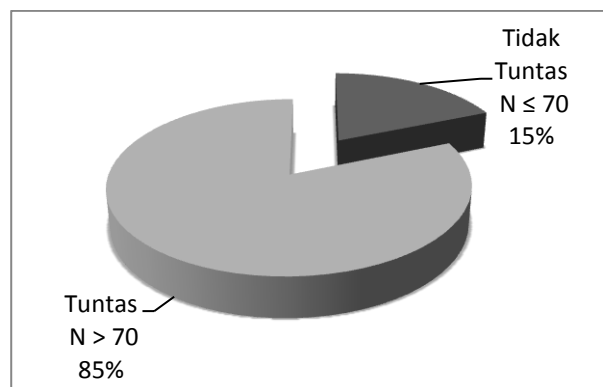
**Figure 2.** Learning Mastery (Cycle I)

Figure 3 shows that the results of students' interest during the implementation of learning in the second cycle with the application of that method after reflection, explaining that the majority of 53% in the high category and 40% in the category of extremely high, while only 7% in the category of less high and to the category of high no no (0%). High interest in learning are less visible on aspects of relevance, confidence and satisfaction.

Meanwhile, based on the results of research on silkus II explained that the level of mastery of competencies in Cycle II as a whole has met the indicators of success where 85% gain score more than 70 and only a small proportion amounting to 15% who get score less than 70, as shown in Figure 4 ,



**Figure 3.** Students' Interest in Learning(Cycle II)

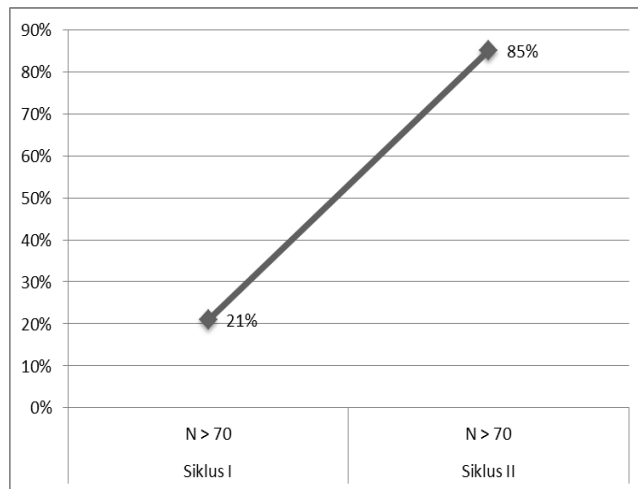


**Figure 4.** Learning Mastery(Cycle II)

Based on the results of the reflection on the first cycle, the improvement was conducted on the learning cycle II especially on optimizing the group work. Approaches were made during the implementation of assistance to grow the awareness and understanding from the students about the importance about the learning process and results. TAI method results in a cooperation among members of the group. Consequently, the conducive communication,

mutual empathy, respect and help between members were established in the learning process. This conducive learning atmosphere is expected to further induce the growing interest of the students in becoming better in terms of attention, confidence, relevance and satisfaction. Furthermore, the growing interests is expected to increase the level of mastery of competencies, as shown in Figure 7.

This is indicated by an increase in the percentage of those who gained score more than 70. Those who gained scored more than 70 was 21% on the first cycle, then it increased into 85% in cycle II and have met the learning mastery indicators, as shown in Figure 5.



**Figure 5.** Learning mastery Cycle I dan II (Score > 70 )

Figure 5 above shows that there has been an increase in terms of mastery of competencies. The number of students achieving learning mastery with the score > 70 of the first cycle was 21%. The number increased on cycle II to 85%, this indicates that the Team Assisted Individualization can improve the academic and non-academic ability. The Team Assisted Individualization is more integrated as an embodiment of the competence improvement by improving cognitive, affective, and psychomotoric aspects simultaneously. It is also in accordance with the four pillars of education declared by UNESCO, namely learning to know, learning to do, learning to be and learning to life together.

The four pillars result in that learning should be based on the overall components of the four pillars, so that the learning objectives can be realized. Team Assisted Individualization method which was applied in two cycles in the study were able to explain the students' increased interest and mastery of competencies. This method provides an opportunity for students to appreciate the ability to cooperate with each other in the learning process and will provide reinforcement to the relevance, confidence and satisfaction on themselves. Reinforcing the students' learning interest will further provide reinforcement to



the mastery of competencies of the material that is implemented the task of planning the wooden truss.

#### **IV. CONCLUSION**

The study concluded that the Application of Team Assisted Individualization Method on the wooden truss planning on Wood Structure subject was able to explain the increased interest and mastery of competencies during two cycles. This is indicated by an increase in the percentage of those who gained score more than 70. In the first cycle, those whose score was more than 70 were 21%, this number increased into 85% in cycle II and have met the indicators of learning success

Reinforcing the students' interest in learning in the first cycle is 30% in the high category, 48% in the category of less high, 14% in the category is not high and only 8% in the category of extremely high. In the second cycle, the changes are mostly 53% in the high category and 40% in the category of extremely high, while only 7% in the category of less high

Based on the results and the conclusions it is advisable to implement the Team Assisted Individualization on the wooden structure subject. This model can be applied as well as on subjects that have characteristics which is a group assignment.

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## OPTIMIZATION OF STUDIO LEARNING SYSTEM FOR ARCHITECTURE STUDENTS

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**ABSTRACT:** *The process of architectural education is still resting on studio learning model. This learning model adopted a model of education in the era of Beaux-Arts. This model was originally educate students who are considered to have the talent in drawing, painting, sculpture and architecture. Architectural Studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified. Application of studio learning system in Architecture Students of Universitas Negeri Semarang (UNNES) implemented in the form of Architectural Design Studio Subjects, starting the first semester to VI. Implementation courses studio until 6 semesters with a series of stages Semester Lesson Plan (RPS) which is adapted to the weight of the competence and design cases. The issues are how much influence the learning process of the studio system in enhancing the competence of architecture students. Some related variables such as: curriculum, materials, human resources and facilities. By optimizing the studio learning system, every architectural students are expected to follow the course properly and achieve the targeted learning outcomes.*

**Keywords:** *learning, studio, students, architecture*

### I. INTRODUCTION

Study Program of Architecture Engineering is under the Department of Civil Engineering, Faculty of Engineering, Semarang State University (UNNES: Universitas Negeri Semarang), established in 2001 by decree of the Rector of the UNNES. This learning process of study program until Academic Year in 2003. Based on Decree of General of Higher Education Ministry of National Education, Republic of Indonesia in view of the licensing process has not been approved, Study Program of Architecture Engineering UNNES obliged to follow a joint program with the nearest state university institutions, in this case with Faculty of Engineering, Gadjah Mada University in Yogyakarta

Furthermore, under the Decree of the Ministry of National Education, Republic of Indonesia Number: 89 / D / O / 2010 dated July 9, 2010 of the Operating Licence Study Program Architecture Engineering opened with the status of study program of Architecture Engineering under the auspices of the Department of Civil Engineering, Faculty of Engineering, UNNES. Architecture Engineering established and organized in the framework of educating the nation and improve the welfare of the Indonesian people, especially in the scientific field of architecture, according to the foundation of the Republic of Indonesia, Pancasila and the 1945 Constitution and Law No. 20 Year 2003 on National Education System, and Government Regulation No. 19/2005 on the National Education Standards as the basis for the implementation of law and reform of the national education system. Thus honesty, openness, and concern for the community as well as responsive and environmentally sound must be contained in the concept and implementation of education.





The process of architectural education is still resting on learning model studio. This learning model adopted a model of education in the era of Beaux-Arts. This model was originally educate students who are considered to have the talent in drawing, painting, sculpture and architecture. Architectural Studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified. Application of studio learning system at Architecture Students of UNNES implemented in the form of Architectural Design Studio Subjects, starting the first semester to VI. Implementation courses studio until 6 semesters with a series of stages Semester Lesson Plan (RPS: Rencana Pembelajaran Semester) which is adapted to the weight of the competence and design cases. The issues are how much influence the learning process of the studio system in enhancing the competence of students of architecture. Some related variables such as: curriculum, materials, human resources and facilities.

Adicpto (2002) states that the architectural education system has an uniqueness when compared with the education system in other fields. Architectural education system inherited from the past are still relevant today. Relevance is evident is the apprenticeship system in practical work and in the studio which is a legacy of education system of Beaux-Arts. While learning by doing by making models or work on assignments in such a basic workshop inherited from the Bauhaus school.

One of the process of architectural education relies on studio learning system by adopting a model of education in the era of Beaux-Arts, founded by Mazarin Kaqrdinal 1648. In this model explained earlier educate students who are considered to have the talent in the field of drawing, painting, sculpture and architecture. Students work in the studio to accompany the artists chosen as Master to become his patron. They learn to someday be considered capable of standing alone. Measures of success is when a student won the competition regularly held. Architectural design studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified.

According to Salama (2001), the architectural studio is the outcome of a wide range of knowledge that is integrated in the activities of designing which is guided by a tutor who professional from practitioners. Studio model is expected of the students can obtain information on how the real conditions and problems that occur in the process of designing in the community. It is capable of forming pride in the profession see the tutor as the spearhead of a successful educational process architecture, process this success greatly influenced the extent of the interaction is well established and the duration of coaching in the studio. The Tutor should be able to be a facilitator and stimulator of creativity of the students in the process of designing.

Arikunto (1980) menjelaskan bahwa pengajaran lebih menunjuk pada suatu kegiatan yang mengandung terjadinya proses penguasaan, pengetahuan, keterampilan dan sikap oleh subyek yang sedang belajar. Kebutuhan manajemen pengajaran desain berhubungan langsung pada perwujudan hasil karya desain arsitektur oleh mahasiswa. Untuk mewujudkannya tidak hanya bakat tetapi membutuhkan\ cara berpikir desain melalui pelatihandi studio arsitektur. Studio sebagai



wadah kegiatan, melatih mahasiswa untuk mempelajari, mempraktekkan visualisasi dan representasi, mempelajari bahasa baru serta dibina berpikir secara desain. Pelatihan tersebut memperhatikan peran pembimbing selain dosen sebagai Pengampu mata kuliah. Keterlibatan bersama antara seluruh elemen pembelajaran(dosen dan mahasiswa)dalam sebuah studio.

Arikunto (1980) explained that teaching is more pointed on an activity that contains the process of mastery, knowledge, skills and attitudes by the subjects being studied. Teaching management needs of the design is directly related to the realization of architectural design work by the students. To realize not only the talent but needs \ thinking the design through training in studio. Studio as a basis for activities, to train students to learn, practice visualization and representation, learning new languages and fostered thinking design. The training supervisor at the role other than as a lecturer. Joint engagement between all elements of learning (lecturers and students) in a studio.

According to Susilo (1998), the studio is a place of study formed from the Latin word as *studere*, which means to pursue and in English, meaningful study of learning. Because the study was to pursue the real sense, the studio is not just a place to learn solely. Persevere means thinking with variations in combination with philosophy, science and technology, even art. By simulative various problems of real life tested are identified, analyzed, prepared in accordance priority rating, synthesized as an alternative solution following stages according to the evaluation cycle processes based on the input-output system is methodologically and thematically.

Studio learning system is a method of learning that should be conducted in a professional, effective, and efficient so that implementation efforts are undertaken breakthroughs (improvisation) in order to deliver the best results. There is a diversity of studio teaching methods, depending on the purposes of each college organizers. However, there are some corridors: (1) Comparative study design through a natural environment to enrich the knowledge in designing location support (through outdoor activities; (2); Modelling studio architectural design that integrates with course support as accumulation efficiency in the practice of critical thinking which is lifelong learning; (3 ) aconstructive alternative learning architectural studio that gives freedom to the students so that evoke creativity optimally; (4) Final Project with a non studio allows advantages in favor of the freedom of students to independently practice managing time and thinking responsibly (IT, software) ; (5) Studio contextual have the potential to support learning in the process of designing the architecture through literature, criticism, research, and solutions to problems in actual and accurate (APTARI, 2009)

## **II. METHODS**

This research used the exploratory method in collecting and analyzing data. Exploratory study aims to explore and understand information and facts about the phenomenon under study and the center of attention because it is still little known (Kuntjojo, 2009). Explorative method is based on the facts that are specific views, then do the mapping and categorizing. This method is also supported by field research to strengthen analysis. In this research,



exploratory methods to see how the design studio learning system by identifying the level of effectiveness and optimal results.

### **III. DISCUSSION**

#### Profile of Graduates of Architecture Engineering UNNES

Profile of Graduates of Architecture Engineering UNNES are expected to work and absorbed in some areas of employment: (1) Academics in the field of Architecture; (2) Professional Architect / Architectural Consultants; (3) Contractor / Managing Buildings; (4) Actors of Building industry; (5) Government / bureaucrats; (6) Appraisal in Construction; (7) Designer art in the field of Handy Craft, Furniture, and Interior Elements.

#### Competencies of Graduates of Architecture Engineering UNNES

Competence of graduates is divided into a core competency and supporting competency, each of which has a fairly good level of competitiveness.

##### a. Key Competencies

- 1) Understanding the basic knowledge of architecture with intelligent, especially hooked up with the theory, history, art, technology, and other human sciences.
- 2) Ability to create architectural designs, interior, landscape, and environmental settlement / urban by observing the relationship between people, buildings and caring for the environment sustainable.
- 3) Ability to intelligently understand the structural design, construction, and building systems and specifications of materials along with user code following the development of science, technology and environment-friendly.
- 4) Ability to act as planners, implementers, managers of building / built environment, and understand the laws / regulations institution building, as well as care and high responsibility, in practice the code of ethics profession to maintain the quality of a good environment for the survival of the community.
- 5) Be able to apply and develop the knowledge and expertise in both conceptual and application architecture that is tolerant of problems and a growing need in the community.

##### b. Supporting Competencies

- 1) Ability to convey ideas and concepts with the international language of polite, intelligent, and democratic and has a breadth of knowledge related to architecture and the built environment.
- 2) Able to be estimator and financing arrangements (cost control) as well as project management is honest, intelligent and responsible technological growth and material buildings, as well as having high integrity to the assignment and profession.



- 3) Take control and are able to apply computer graphics, ranging from 2-dimensional and 3-dimensional, as well as animation, to support the smooth implementation of the tasks / roles professionalism
- c. Other Competencies
- 1) Understand the various methods of research and scientific writing, and able to provide an appreciation of the work of architecture and the built environment, intelligently and democratic
  - 2) Ability to design intelligently and creatively to lay out graphics and create aesthetic interior elements with a variety of media that are environmentally friendly.
  - 3) Ability to create mockups / mock-up design with good design results.

#### Subjects-based Studio in Architecture Engineering UNNES

In Architecture Engineering UNNES, subjects-based studio are Architectural Design Studio and Architectural Final Project. The subjects are to be a "core" or learning core architecture applied conditional retrieval system according to the specified minimum value. The distribution of these courses in the semesters are:

**Table 1.** Distribution of Subjects-based Studio

No	Subjects	Credits	Semester
1.	Architectural Design Studio1	4	1
2.	Architectural Design Studio2	4	2
3.	Architectural Design Studio3	4	3
4.	Architectural Design Studio4	5	4
5.	Architectural Design Studio5	5	5
6.	Architectural Design Studio6	5	6
7.	Architectural Final Project	7	8

Source: Profile of Architecture Engineering UNNES, 2013

Subjects-based Studio carried out in 16 meetings including the Middle Semester Exam as a middle evaluation stage. Unless Architecture Final Project are included in the thesis university system. Each meeting is held for 50 minutes per credits. Technically, Architectural Design Studio 1 s / d 4 graphics using the technique of drawing by hand (manual graphic), while the Architectural Design Studio 5, 6 and Final Project Architecture using computer graphics techniques.



manual graphic

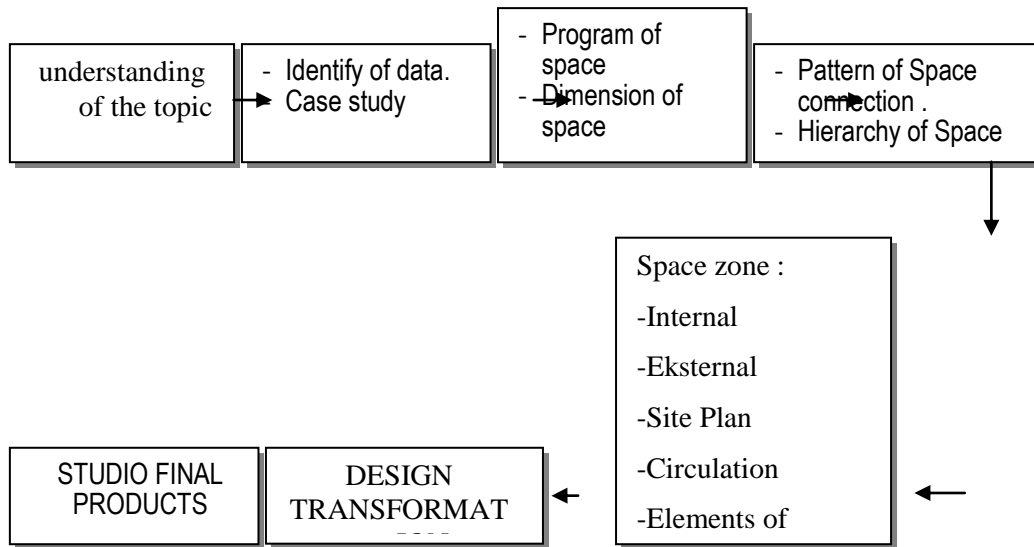


computer graphic

**Figure 1.** Graphic methods in studio

The use of the graphics system manually in semester 1 s / d 4 has the purpose to provide an experience that integrates design concept understanding and gross motor skills of participants studio. It also encourages the creativity of participants in the pouring studio best sketch capabilities without relying entirely on computer graphics. This is important, because the tendency of each participant studio for clicking "copy-paste" the object or image material is not merupakan yag their pure act. After this experience gained, the 5th semester and later can use the computer as a tool for designing appropriate concept study set.

The steps in Architectural Design Studio in Architecture Engineering UNNES is as follows.



**Figure2.**The steps in Architectural Design Studio

Each lecturers accompany the studio learning process which is divided into several groups according to the locations that have been set. The process takes place in a place with the assistance provide input or comment on the design process, Phase assistance is implemented in accordance reference Semester Lesson Plan each meeting.

Rate the evaluation phase is through the middle of the performance-based portfolio, namely the assignment of groups and individuals with writing Platform for Architectural Planning and Design. While the final assessment by the completeness and conformity procedures set the image as well as the final aesthetics of the design development: concept design, site plan, building floor plans, elevations, cuts, perspective exterior and interior, architectural details, as well as mock mass composition of the building.

At the stage of design development / design of the participants carrying out the process of Final Project Architecture in the studio with a "quarantine draw", by following the prescribed rules:

- a. The whole process of the development stages of the design / design is done in the studio.
- b. Participants are required to complete a studio presence that has been provided 2 times Presence breakfast and lunch.
- c. The timing of the final studio from 08.00 - 16.00.
- d. If unable to attend for any reason shall inform the organizing committee.
- e. Participants who leave the room must fill in the sheet presence that has been provided.
- f. Implementation of Mentoring can be done in the studio and the student must fill "SiTedi" (page <http://skripsi.unnes.ac.id>).
- g. Participants are strictly forbidden smoking studio or bring liquor into the studio.
- h. Participants are strictly forbidden to interfere with activities outside the studio.

- i. Participants studio during the execution of the final studio dressing is not allowed to use the shorts, T-shirts, flip-flops and must keep ethics.
- j. Participants studio must maintain the cleanliness and beauty studio space and security.
- k. If deemed necessary and approved by the organizing committee exam Final Project Assessment Architectural Final Project through an evaluation mechanism through final test of the project that has been generated by the participants of Architectural Final Project consists of two phases: the preparation phase and Phase Development of Platform for Architectural Planning and Design / design through studio. The second stage of the evaluation process to determine the final value of a Final Project Architecture, with the weight of each stage are as follows:
  - a. Platform for Architectural Planning and Design= 30%
  - b. Design development = 70%

The details of each stage of the assessment can be seen in the table following the final project assessment system:

- a. Platform for Architectural Planning and Design assessed with the following details:
  - 1) Understanding Project Title embodied in Space Program: 5%
  - 2) Site Approaches : 10%
  - 3) Application of Structural and Building Construction Technology: 5%
  - 4) Building Appearance: 10%
- b. Design development assessed with the following details:
  - 1) Design Concept : 10%
  - 2) Situation + Site plan and floor plan: 15%
  - 3) Views and Sections: 15%
  - 4) Architectural Details: 5%
  - 5) Perspective exterior and interior: 10%
  - 6) Structure Construction and Building Systems: 5%
  - 7) Model and Visual Presentation: 10%



**Figure 2.** Final Test of Architectural Final Project



#### IV. CONCLUSION

Based on the results of research, learning systems architectural design studio is more optimal and increased performance. Performance control lecturers and professors of the classes are also excellent views of the optimal results are obtained. For more optimizing studio results, it is necessary to increase the quantity and quality of the studio with the support of more adequate infrastructures as needed activity.

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EI-01-003

## APPLICATION OF ANALYTICAL HIERARCHY PROCESS (AHP) METHOD FOR TEACHERS PERFORMANCE EVALUATION VOCATIONAL HIGH SCHOOL (SMK)

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**ABSTRACT :** A system that can evaluate performances of teacher in each teaching period is not available yet, so there is have not a benchmark for assessing the performance of teachers SMK Pekanbaru who deficient performance on teaching abilities. The designed system in this study is use to ease school side to evaluate the performance of teachers and use to be determine the best teachers in teaching process. This study applying Analytical Hierarchy Process Method for Decision Support System and System Development Life Cycle (SDLC) for research method. On implementation phase used Object Oriented Programming (OOP), Database Management System, Unified Modeling Language (UML) used to be modeling program module. In the manner of applying Decision Support System using Analytical Hierarchy Process (AHP) able to accelerates school side in making decision determining of best teachers. And by existence of computerized information system, processing data of evaluations teacher performance in generating the information will be more accurately on time, as well the design of database system capable to store the data which used to evaluate the performance of teachers, will be ease in accessing the data.

**Keywords:** Decision Support Systems, Analytical Hierarchy Process Method, Teacher Performance Evaluation, Object Oriented Program, Database Manajemen System

### I. INTRODUCTION

In an effort to educating the nation, teachers are also referred to as an educator occupies a very important position. With the professionalism of a teacher as well as a close relationship with the students, the teacher is instrumental in creating a conducive learning environment. Ability of teachers to teach required always to increase in line with the progress of science and technology so that the activities of teaching and learning interactions more alive. Likewise in performance management, evaluation of learning has a very strategic position, as a result of the evaluation activities can be used as input for improvement of learning activities. Every teacher must be rated performance so that it can be seen the extent to which the process and the work of the teacher concerned in carrying out professional duties. During this time, the performance evaluation of teachers tended mostly done by his superiors (the school principal or superintendent of schools), while students rarely engaged to assess teacher performance. Performance assessment of teachers by students is a technique to identify the teacher performance appraisal, which until now its existence is controversial. On the one hand, there are some people who argue that involve students to measure teacher performance is not quite right. In contrast to the principal or superintendent of schools that are already equipped with the knowledge and skills of how teachers should teach, while students are considered less or even not at all have the maturity and expertise to make judgments about teachers' teaching styles. In addition, they assume that students are more likely to measure the popularity of the ability of teachers themselves.

Research result(Mufizar & Nurjayanti, 2015)Teacher is a unity in teaching and learning activities that help students to achieve good learning. Teacher performance appraisal is an analytical



process in order to produce good teaching. The quality of teaching and academic standards need to be evaluated and improved because education is very important to us all. Teacher performance appraisal is a process of analysis in order to produce good teaching. Then the decision support system is built by adding the criteria so as to reduce the level of subjectivity, and the impact on teacher performance assessment results become more accurate and precise.

Decision making among multiple alternatives is one of the complex thing, because the decision makers are faced with several criteria in giving priority to some alternatives. Decision makers usually use intuition and subjectivity only. The approach of Fuzzy-Analytic Hierarchy Process (Fuzzy AHP) is one method that can address this issue. Because this method can lead decision makers to assess each criteria / alternatives predetermined. The results in this study of 63 alternative gained three proceeds rated by their respective weights: weight gain priority 83.9797, 83.9233 second and third priority weights 83.8288, consisting of 4 criteria and 16 sub-criteria.(Alwi, 2015). In the decision-making process that involves lots and lots of alternative criteria, Analytical Hierarchy Process (AHP) is often used as a method of solving the problem. Decision-making is done by providing value perception as weighted by a decision maker or an expert. Implementation is an activity that has three important and essential elements in the run. Teachers are those who teach in schools in technological developments at this time every people often experience problems in completing the work, and therefore the method of AHP to ease in completing the work. Analytical Hierarchy Process (AHP) is an activity to discover and develop a range of alternative actions are possible. Teacher performance assessment methods Process Analytical Hierarchy (AHP) to facilitate employee work properly and optimally. Award criteria for determining teacher performance appraisal can help in making decisions to determine the performance of teachers who excel(Artika, 2013).

Analytic Hierarchy Process (AHP) is one of the popular decision support systems for multi-criteria decision making problems. The AHP has different theories for prioritization, consistency evaluation and consistency improvement, a review of which is presented in this study before diving deep into the core contribution. Consistency evaluation is one of the key computations while using the AHP.(Khatwani & Kumar, 2016).This article presents a literature review of the applications of Analytic Hierarchy Process (AHP). AHP is a multicriteria decision-making tool that has been used in almost all the applications related with decision-making. Out of many different applications of AHP, this article covers a select few, which could be of wide interest to the researchers and practitioners. The article critically analyses some of the papers published in international journals of high repute, and gives a brief idea about many of the referred publications. Papers are categorized according to the identified themes, and on the basis of the areas of applications. The references have also been grouped region-wise and year-wise in order to track the growth of AHP applications.(Vaidya & Kumar, 2006)

The education required for the operations effectively and efficiently to maintain the level of quality service to the students and the community. For schools who want to improve service and quality in its operations it is time to switch from a manual system to the information system. The

shortcomings of the use of the manual system is to use a manual system then the operations will often be delayed or constrained by both time and error techniques of writing and presentation of information desired. Therefore, it is necessary to implement changes in their operating costs. Such changes may include a change in a system that can simplify and streamline activities in the implementation or presentation of information systems such as decision-making performance evaluation in schools. So it is very appropriate Decision Support System is used to assist decision-making performance evaluation of teachers to be more accurate and easier.

## II. RESEARCH METHODS

An AHP questionnaire based on the hierarchy structure was designed to evaluate all possible sets of pairwise comparisons in the proposed hierarchy. As indicated by Shapira and Goldenberg (2005), the pairwise comparison procedure is the cornerstone of AHP. To generate effectiveness comparisons, a detailed instruction for Delphi panel are provided for using the 1-to-9 scale (Table 1)(Tang, 2011).

**Table 1.** Scale used in AHP pairwise comparisons (Tang, 2011)

Intensity of importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	An activity is strongly favored and its dominance demonstrated in practice
9	Very strong importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Absolute importance	When compromise is needed
Reciprocals of above nonzero	If activity I has one of the above Nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	

### Consistency check

Following the creation of the eigenvector matrix of the AHP, its consistency needs to be evaluated.

The required level of consistency is evaluated using the following index :(Kazakis, Kougias, & Patsialis, 2015)

$$CR = \frac{CI}{RI}$$

where:

CR : the consistency ratio

CI : the consistency index

RI : the random index

Substitute components into criteria and make the pair wise comparison matrix. These matrix are used to determine the relative importance of each alternative in each criteria, then do normalize all data in matrix by totaling the numbers in each column and dividing them with their sum to get the normalize score. After that computes eigen value and do consistency test for all criteria in hierarchy level. We did calculating eigenvector of each pair wise comparison matrix, estimate the consistency index (CI) by adding column from the matrix and multiply the result vector by vector of priority and the last was calculate the consistency ratio (CR), the criteria will be accepted consistency if  $CR < 0,1$ . (Indra, Cahyaningsih, & Catur, 2015). Hence, each question requires an answer with Alphabetical (SS, S, N, TS); (SS = Strongly Agree, S = Agree, N = Neutral, TS = Disagree)(Indra et al., 2015)

### III. RESULTS AND DISCUSSION

The object of research is the Vocational High School or vocational school in Pekanbaru. AHP method is applied in the application of performance evaluation of teachers at vocational schools Pekanbaru City case studies that they support the school in evaluating the performance of teachers and determine the best teachers in accordance with desired by the school. Here is the process AHP method to be implemented. The first step establishes the problem, criteria, sub-criteria (if any) and alternative

- The problem is determining the best teachers and evaluate teacher performance.
- The criterion is the discipline teacher teaching time, the appearance of teachers in teaching, managing the learning process in class, teacher communication with students, mastery of the subject matter, being a role model and motivate students.

**Table 2.** Criteria and Weights

NoCriteria	Criteria	Rating	Weights
1.	Discipline Teachers Teaching Time	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1
2.	Appearance Teacher In Teaching	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1
3.	Classroom Management Process	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1
4.	Communication Teacher With Student	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1
5.	Mastery Learning Materials	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1
6.	Being a role model and Motivating Teachers	Strongly Agree	4
		Agree	3
		Neutral	2
		Kurang	1

Criteria and weights table is a table of criteria and weights used in decision support systems Vocational School teacher performance evaluation. Weight Value or interval of values obtained from the pairwise comparison scale values, interval values used 4 to 1, in which the interests of grades 4 is a very good assessment, good value 3, 2 and 1 less enough.

1. Make a pairwise comparison matrix for criteria
2. The step here is to make paired comparisons or provide weighting and compared in pairs in accordance with the criteria given.

**Table 3.** Pairwise Comparison Matrix

Criteria	Discipline	Appearance	Management	Communication	Material	Motivation
Discipline	1	4	2	2	1	4
Appearance	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$
Management	$\frac{1}{2}$	2	1	1	$\frac{1}{2}$	2
Communication	$\frac{1}{2}$	2	1	1	$\frac{1}{2}$	2
Material	1	4	2	2	1	3
Motivation	$\frac{1}{3}$	$\frac{4}{3}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	1

3. Determine the Value of pairwise comparison matrices

This step is done by changing the value in pairwise comparison matrices into decimal form and adding up the column, the column was summed Then after further divide the elements of each column with the number of the column in question.

**Table 4.** Value Pairwise Comparison Matrix

Criteria	Discipline	Appearance	Management	Communication	Material	Motivation
Discipline	1,00	4,00	2,00	2,00	1,00	4,00
Appearance	0,25	1,00	0,50	0,50	0,25	0,7
Management	0,50	2,00	1,00	1	0,50	2,00
Communication	0,50	2,00	1	1,00	$\frac{1}{2}$	2,00
Material	1,00	4,00	2	2	1,00	3,00
Motivation	0,58	1,33	0,50	0,50	0,33	1,00
Total	3,58	14,33	7,00	7,00	3,58	11,75

Total obtained from the sum of rows on each column:  $(1+0.25+0.5+0.5+1+0.33=3.58)$  etc.

4. Calculate the normalized eigenvector

To calculate the eigenvalues normalized vectors, performed by summing each line is then divided by the number of the criteria.

**Table 4.**normalized eigenvector

Criteria	Discipline	Appearance	Management	Communication	Material	Motivation
Discipline	0.279	0.279	0.286	0.286	0.279	0.255
Appearance	0.070	0.070	0.072	0.071	0.070	0.064
Management	0.140	0.140	0.143	0.143	0.140	0.170
Communication	0.140	0.140	0.143	0.143	0.140	0.170
Material	0.280	0.279	0.286	0.286	0.280	0.255
Motivation	0.093	0.093	0.071	0.071	0.093	0.085
Total	1.00	1.00	1.00	1.00	1.00	1.00

Value 0280 is the result of the division of Table 4.4 = 1 / 3.58. Value 0277 is the result of the division of the sum of the line criteria / 6 etc.

#### 5. Calculate Ratio Consistency

Calculate the consistency ratio is performed to determine whether the assessment criteria comparison backwardly consistent.

Determining Maximum Value Lamda ( $\lambda_{max}$ )  $\lambda_{max} =$

$$(3.58 \cdot 0.2773) + (14.33 \cdot 0.0693) + (7 \cdot 0.1457) + (7 \cdot 0.1457) + (3.58 \cdot 0.2773) + (11.75 \cdot 0.0845) = 6.014771$$

- Calculating Consistency Index (CI)

$$\begin{aligned} CI &= (\lambda_{max} - n) / (n - 1) \\ &= (6.014771 - 6) / (6 - 1) \\ &= 0.002954 \end{aligned}$$

- Calculating Ratio Consistency (CR)

$$\begin{aligned} CR &= CI / RI \\ &= 0.002954 / 1.24 \quad (\text{total } n = 6, \text{ then value } RI = 1.24) \\ &= 0.002382 \end{aligned}$$

The above step is to determine the consistency of pairwise comparisons between elements criteria. Ratio of consistency resulting from the calculation is 0.002382. Because the value  $CR < 0.1$  then the ratio of the consistency of these calculations are consistent and acceptable. After making the weighting criteria and get a result, then do the weighting for each of the existing criteria.

#### 6. Input Values Based Teacher Questionnaire



Here are the steps for Input Value Master is Having obtained the teacher value and then the next step is to calculate the average value of all the questionnaires that have been obtained.

**Table 5.**The Average Teacher

Teacher name	N- Discipline	N- Appearance	N- Management	N- Communication	N- Material	N- Motivation
Zulkifli	2,80	3,20	3,10	2,60	3,50	3,10
Mazyuni Wita	3,50	2,70	3,10	3,40	3,40	2,80
Raflinor	2,25	3,25	2,75	2,50	3,25	3,50
Dewi Susanna	3,75	3,40	3,10	2,90	3,30	3,10
Sri Lestari	3,10	2,80	2,90	3,20	3,40	2,50
Ermazulianis	2,90	3,30	3,10	2,75	3,25	2,90
Mhd. Nasrullah	2,50	2,80	2,90	3,10	3,50	2,90

Once the value of the average teacher is obtained then the next step is to process these values with the AHP.

## 7. Counting Results

Results obtained from the eigenvalues vector multiplication value criteria with the teacher, and the result of multiplying the vector eigen value criteria with teachers each row then summed. The calculation result tertinggalah into the final calculation and is the best teacher.

**Table 6.** Final Calculation Results.

Teacher name	N- Discipline	N- Appearance	N- Management	N- Communication	N- Material	N- Motivation	Weig ht	Score
Zulkifli	2,80	3,20	3,10	2,60	3,50	3,10	0,277	3,062
Mazyuni Wita	3,50	2,70	3,10	3,40	3,40	2,80	0,069	3,285
Raflinor	2,25	3,25	2,75	2,50	3,25	3,50	0,146	2,812
Dewi Susanna	3,75	3,40	3,10	2,90	3,30	3,10	0,146	3,327
Sri Lestari	3,10	2,80	2,90	3,20	3,40	2,50	0,277	3,097
Ermazulianis	2,90	3,30	3,10	2,75	3,25	2,90	0,085	3,049
Mhd. Nasrullah	2,50	2,80	2,90	3,10	3,50	2,90		2,978

From the above results, the Goddess Susanna scores highest with a score of 3.327376 and is the best alternative, so Dewi Susanna worthy choice best teachers because it has the highest value. And the following table is a table evaluations of each teacher.

**Table 7.** Calculation Results Final

Teacher name	Evaluation
--------------	------------

	Max Score	Description	Min Score	Description
Zulkifli	3,50	N-Material	2,60	N-Communication
Mazyuni Wita	3,50	N-Discipline	2,70	N-Appearance
Raflinor	3,50	N-Memotivation	2.25	N-Discipline
Dewi Susanna	3,75	N-Discipline	2,90	N-Communication
Sri Lestari	3,40	N-Material	2,50	N-Memotivation
Ermazulianis	3,30	N-Appearance	2,75	N-Communication
Mhd. Nasrullah	3,50	N-Material	2,50	N-Discipline

### Implementation of the system

Form the weighting of the criteria can be seen in Figure 1 below ins. gives a weighting according to the Form menu weighting of the criteria used by the admin to manage, process and requirements, weighting the value entered by an expert in the art

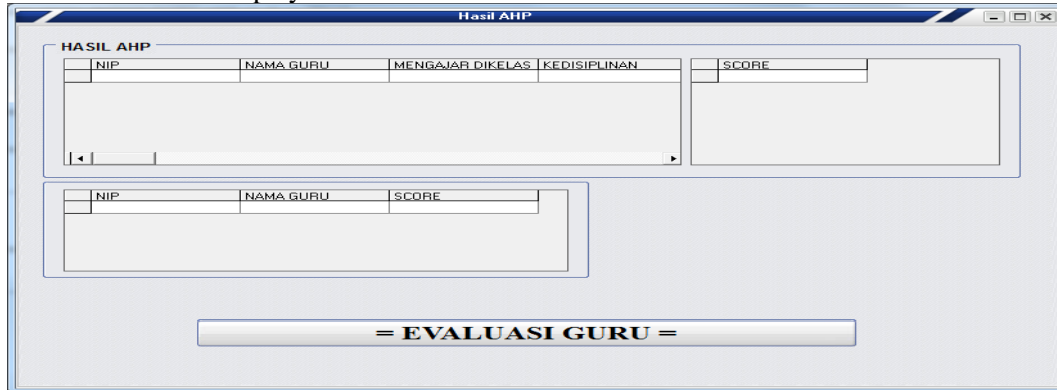
Figure 1. Form Weighting Criteria

This form is intended to select an alternative that will be calculated based classrooms where teachers teach.

Figure 2. Form Select Alternatives



This form aims to display the final calculation result of the calculation SPK has been done.



NIP	NAMA GURU	MENGAJAR DI KELAS	KEDISIPLINAN	SCORE

NIP	NAMA GURU	SCORE

**= EVALUASI GURU =**

Figure 3. Final Results

#### IV. CONCLUSION

Based on these results it can be concluded as follows: with a system of performance evaluation of teachers at each period of study at Vocational High School, can help the school to determine the best teachers and evaluate the performance of teachers and their decision support systems using Analytical Hierarchy Process (AHP), so that it can process the criteria for assessment in the evaluation optimal performance of teachers.



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## USEFULNESS OF DRILL AND PRACTICE STRATEGY FOR EDUCATION OF PRE-SERVICE VOCATIONAL TEACHER

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**ABSTRACT :** *This article aims to: 1) explain the rule of drill and practice implemented in apparel study program of pre-service vocational teacher education, 2) describe the enhancement of students' learning achievement in ability of women's flat pattern making through drill and practice strategy, and 3) find out advantages and disadvantages of drill and practice strategy in this setting context. This is a classroom action research held in the Apparel Pre-service Teacher Education Programs, State University of Surabaya in 2015. The research subject 55 students. Data collected by test, observation, and questionnaire, and analyzed by descriptive analysis. The result state: 1) preceded first by a pre-test to find out students' initial ability and time duration taken to make women's flat pattern, and then drill and practice strategy implemented repeatedly with time reduction at each stage thereby achieving mastery both ability, accuracy and time spent, 2) Drill and Practice strategy succeed to improve student learning achievement of the woman flat pattern making, and 3) advantages of drill and practice, it is very appropriate to be applied to the mastery women's flat pattern making ability, to train student's psychomotor skills in a relatively short time, the students know the development of their abilities, cultivate the spirit of learning and work. While its disadvantages, it is required greater control of the lecturer and greater dependence on the role of the lecturer. Students may just be memorizing the material and that can cause problems for them later on when trying to accomplish more complex tasks and learn more advanced lessons.*

**Keywords:** *Drill and Practice strategy, Education of Pre-service vocational Teacher, Apparel Education Study Program.*

### I. INTRODUCTION

Teacher is the single most important variable in school effectiveness (Andersen, Barrick, & Hughes, 1992: 1). Future teacher, described as pure water, which clarifies (Kemdikbud, 2013). Teacher is one type of soft profession. To achieve a successful education, the central goal is teachers and teacher education institutions (Zamroni, 2000). Teacher education plays a crucial role in the preparation of teachers, not only enhancing their understanding and skill but also increasing the likelihood of their staying in the profession (Darling-Hammond, 2000; Roth, 1999).

The regulation of Indonesia's national education ministry, number 16, 2007 state that teacher must master four competency standards: pedagogical, professional, social, and personality competencies (Permendiknas, 2007). The four competencies is taught since the prospective graduates were in the pre-service teacher education program. Students not only master pedagogical material, but also master the subject material, as the embodiment of professional competence. Mastery teaching materials is a key competence areas of study. As a learning content, teaching material is the main thing to be taught to students. Moreover, teaching materials in the field of vocational education requires students to master the psychomotor as well.

A vocational education and training (VET) teacher should have: (1) cross-linked pedagogical content knowledge, (2) prior theoretical knowledge, which the student uses to analyze pedagogical situations and to implement appropriate strategies, (3) methods to apply theoretical knowledge and (4) pedagogical competence (Barabasch & Watt-Malcolm, 2013: 165). The apparel study program is part



of pre-service vocational teacher education It produces educators in the VET field of apparel and fashion management, whose strong personality and professional in the field of apparel education, so that they can compete and collaborate in meeting the needs of society (Hidayati, 2015). One of the competencies that must be mastered by student of apparel study program is basic flat patternmaking. To facilitate to mastery this skill, required an appropriate strategy that match with the material characteristics. Ability of basic pattern making included in the category of a basic level of competence and desperately needed accuracy. Therefore an appropriate strategy, such as Drill and practice, can be applied.

Drill and Practice is an instructional strategy developed and used for much of the history of schools and schooling. Many people feel the practice is out of date and not appropriate for meaningful learning to take place. On the other side of the argument, people that still support the idea of drill and practice as an effective teaching methodology suggest that repetition is necessary for the brain to 'wire' itself appropriately (Mkaufman, 2008). Drill and practice is a behaviorist aligned technique in which students are given the same materials repeatedly until mastery is achieved. In each iteration, students are given similar questions to answer or activities to perform, with a certain percentage of correct responses or actions moving the student to the next level of difficulty (<http://www.ion.uillinois.edu>, 2015)

Emergency Nurses Association (2014: 7) state that as an instructional strategy, drill & practice is familiar to all educators. It promotes the acquisition of knowledge or skill through repetitive practice. It refers to small tasks. Drill-and-practice, like memorization, involves repetition of specific skills. To be meaningful to learners, the skills built through drill-and-practice should become the building blocks for more meaningful learning.

The purpose of drill and practice: 1) help learners to master materials at their own pace, 2) Drills are usually repetitive and are used as a reinforcement tool, 3) Effective use of drill and practice depends on the recognition of the type of skill being developed, and the use of appropriate strategies to develop these competencies, 4) There is a place for drill and practice mainly for the beginning learner or for students who are experiencing learning problems, 5) Its use, however, should be kept to situations where the teacher is certain that it is the most appropriate form of instruction.

Drill and practice uses repeated exercises and individual feedback to master a specified learning objective. It is used to master basic skills and improve speed or accuracy (Tomei, 1998). It is the one level up from direct instruction. Though it might seem that this technique is even more rote in nature than direct instruction, the implication is that something has already been learned, or at the very least been presented, and now the emphasis is on repetition to hone the skill or provide a strong link to the information to improve remembering it. (Education, 2011). While drills are associated with a regimented style of instruction, they do have a place. Drills are used successfully when teaching students technique. Students benefit from practice because they are able to apply knowledge through interaction. Students connect with the material when they work with texts and concepts beyond a one-



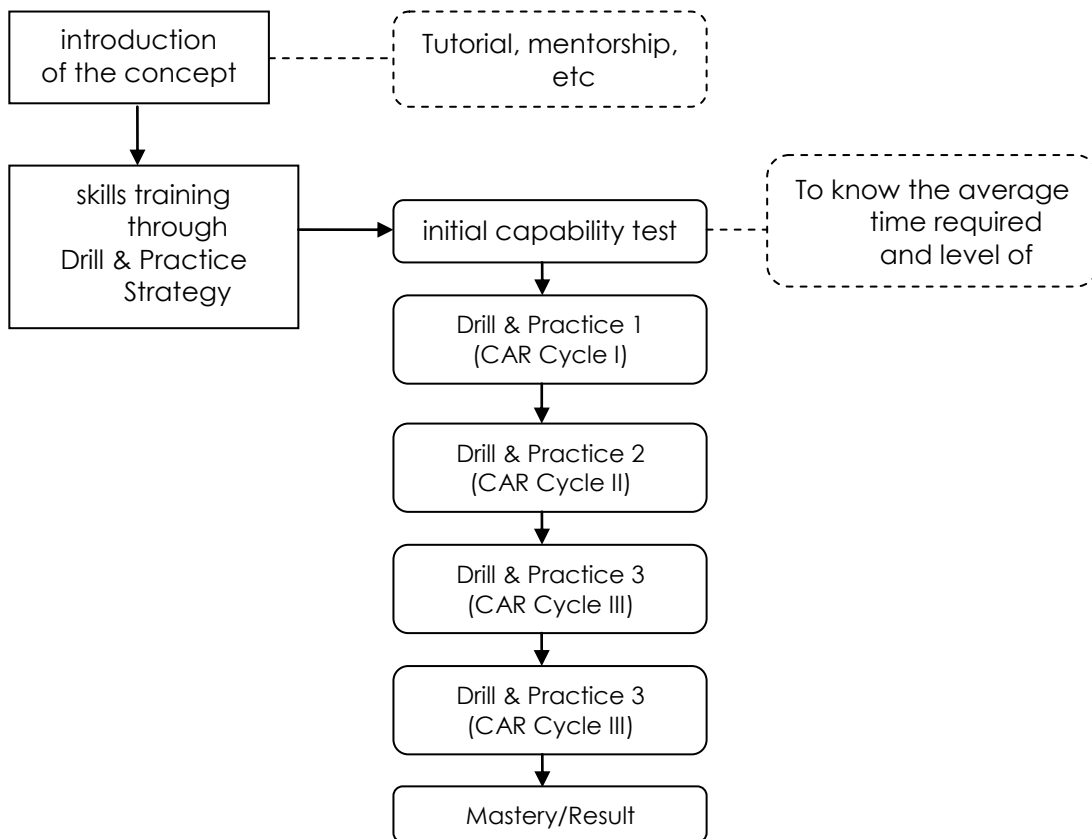
time exposure. When students practice using the knowledge through application, they connect with information on a deeper level (Mohammed& Media, 2016).

## II. RESEARCH METHOD

This is a Classroom Action Research consisting 4 cycles, based on how many times the drill and practice done. Each cycle consist of 4 steps: 1) Planning, 2) Acting, 3) Observing, and 4) Reflection. The subject research is 55 students divided in two classes. This strategy of learning was implemented in the Patternmaking subject, Apparel Teacher Education study program, State University of Surabaya in first semester of 2015. Data collected by test and questionnaire, and analyzed by descriptive analysis.

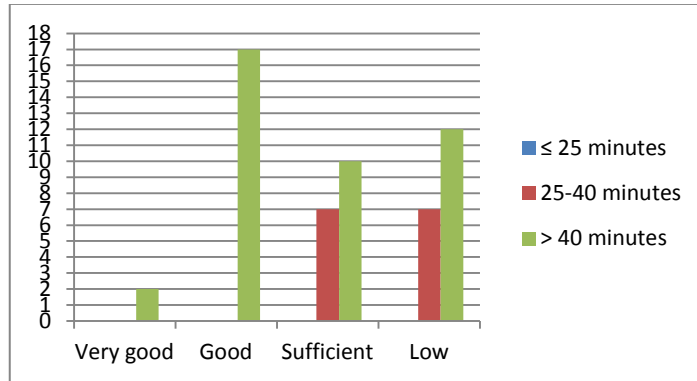
## III. RESULT AND DISCUSSION

1. The Procedure of Drill & Practice implementation on Patternmaking Subject here , is shown below:



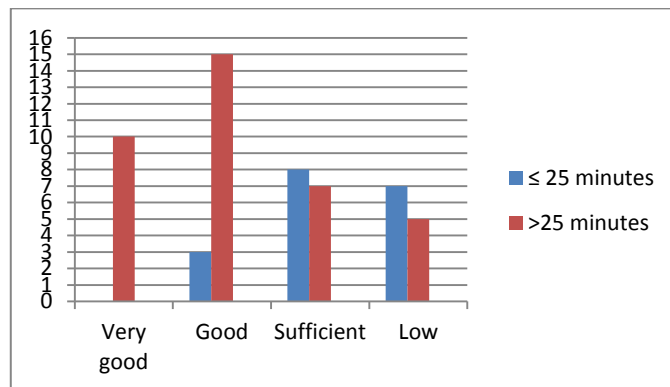
2. Students achievements

a. The initial capability test is to get information about the time required (average time) in basic flat patternmaking and level of students ability before drill and practice. The result is shown below:

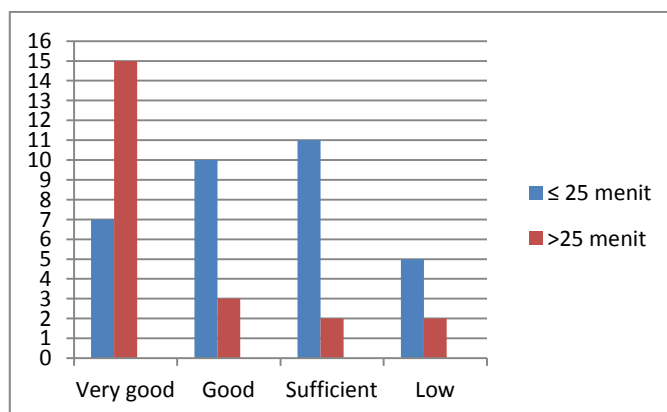


**Diagram 1.** Students' ability and time required

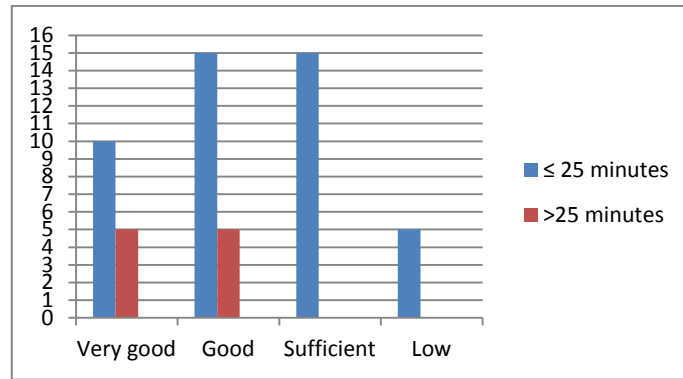
b. Based on the result, the time limit divided into 3 categories and the ability divided into 4 categories. Therefore, in the first until fourth step/cycle of drill and practice, researcher set time limits between  $\leq 25$  minutes and  $> 25$  minutes. The result is shown below:



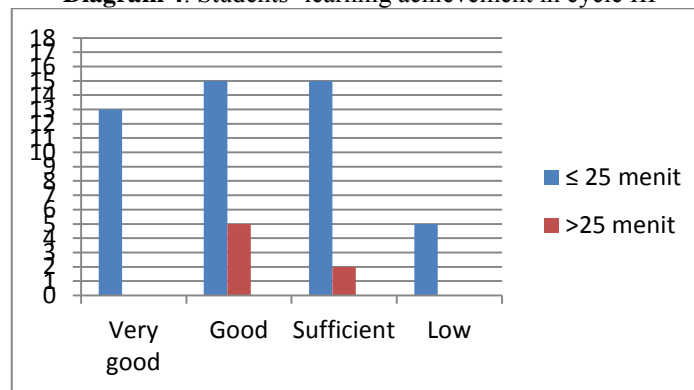
**Diagram 2.** Students' learning achievement in cycle I



**Diagram 3.** Students' learning achievement in cycle II



**Diagram 4.** Students' learning achievement in cycle III



**Diagram 5.** Students' learning achievement in cycle IV

The comparison of the result from the four cycles above, identified that there is enhancement of students' learning achievement in the ability of woman flat pattern making through drill and practice strategy. In the 4<sup>th</sup> cycle there was 13 students in very good category, 15 students in good category and 15 students in sufficient category, or in other words there was 78% reach the expected points and time limits. The cycles stopped in the 4<sup>th</sup>, because it has been exceeded, the limit of classical learning mastery (75%). It can not be denied, in this study still leaves 22%, or 7 students did not reach time limit and 5 students did not reach both ability and time limit. This required repetition cycle, to achieve mastery in total

Based on the questionnaire, students consider about the advantages of drill and practice. There are: 1) It is very appropriate to be applied to the mastery of women's flat pattern making ability (100%), 2) It train student's psychomotor skills in a relatively short time (80%), 3) The students know the development of their abilities (100%), and 4) It cultivates the spirit of learning and work (100%). Besides its advantages, drill and practice strategy has some disadvantages, they are: 1) It is required greater control of the lecturer and greater dependence on the role of lecturer (85%), 2) Students may just be memorizing the material (100%) and that can cause problems for them later on when trying to accomplish more complex tasks and learn more advanced lessons (80%).



#### **IV. CONCLUSION**

Drill and Practice strategy in this context, succeed to improve student learning achievement of the woman (basic) flat pattern making. we were able to take advantages and disadvantages of drill and practice. Highlights of the implementation of this strategy that there is no one else learning strategies are most effective. Each type of strategy has the merit and shortcomings. To apply one or several learning strategies, required a good understanding of the nature of the teaching material, the level of competence to be achieved, the characteristics of students, and even the capacity of teachers





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## PARADIGM OF INNOVATION AND MANAGEMENT OF TECHNOLOGICAL AND VOCATIONAL EDUCATION IN INDONESIA

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**ABSTRACT:** *In the globalization era, people face a heavy competition in every field, especially in employment. Improving educational field should become the highest priority to prepare qualified human resources who will be able to overcome various problems in the global competition. Developing education through democratization and decentralization in Technological and Vocational Education Management is the right choice to meet the challenges and competitions and as an effort to prepare professional workforce. Management of technological and vocational education is conducted through democratization of education by providing the widest opportunity for people to participate in education. The concept of democratization of education provides sufficient public space so that people can take an active role to participate in the implementation of education by determining the direction and policies, formulating strategies, goals, and objectives of education and are actively involved in the implementation education.*

**Keywords:** Paradigm, innovation, management, technological and vocational education

### I. INTRODUCTION

The impact of globalization cannot be avoided by every nation in the world. Globalization will strongly influence all aspects of human life in every inch of this world. Thus, it can be ascertained that human life patterns will change as the nature and characteristics of the globalization era. However, when the world is experiencing a new shift as what is happening nowadays, we have not been able to ensure the end points of the global developments. The world is experiencing an economic, science and technology development wave. This all shows an increase in the competitiveness between countries, and the increase in the world economic order interdependence (Sutrisno, 1990).

The world is in a fundamental transformation phase, and is looking for a new future world system and structure. This reason brings each nation to find a rigorous attitude in facing the changing world (Sutrisno, 1990). In the current circumstances, it is understandable how hard the challenges faced by the developing countries. While they are still in the process of developing their industries, they should face a new more severe challenge with respect to the presence of the information age and globalization era.

To be able to answer all challenges, it is important for the developing countries to develop creative and innovative human resources who are experts in science, technology, and communication. As a developing country, Indonesia certainly will face the same heavy challenges, especially in mastering science, technology, and communication (Arismunandar, 1990; Sutrisno, 1990).

At a certain time, people can learn on their own, but there are only a small number who reach the level of knowledge and ability as expected. Therefore, education is the most effective means



(Arismunandar, 1990). Based on the belief that education in schools is very important, the implementation of national education should be realized as the implementation of Law No. 20 Year 2003 on National Education System (UUSPN). The implementation of UUSPN determine the success in achieving the goals of national education as defined in the legislation.

It is expected that through the right implementation, the obstacles encountered in the implementation of national education can be overcome. Some of the examples of the obstacles in achieving national education goals are as follows: (1) There is still unhealthy common perspective on the existence of private education institutions although in UUSPN, it has clearly stated that there is no difference in the treatment of private educational institutions and public educational institutions, (2) There is inefficiency in the implementation of education operational system; the funding is still considered to be very limited although in fact the problem is on the unstrategic allocation, (3) The education staff payment system is not yet conducive to achieve national education goals, especially for education staff in private institutions while compared to the the mechanism of the labor market, and (4) Mass media (television, radio, newspapers, etc.), which is considered as an important element of education in the community, still has less ability in creating a conducive atmosphere to the mastery of science, technology, and communication.

Nowadays, many heavy challenges should be faced and the globalization will flow as the interactions between nations are intensified beyond geographical area and country boundaries. Competition between nations in various fields of life will be heavier. Meanwhile, we are facing various internal problems, such as economic crisis continued by social crisis, confidence crisis, continuous political turmoil, which still cannot be solved for more than sixteen years of the third millennium. Reformation era is marked by many changes in almost all aspects of national life. As a changing nation, Indonesia should face some challenges which never imagined before.

Thus, there are two major agenda should be done by Indonesia today. The first agenda is *a rescue* to overcome the crisis in order to save the nation from economic, social, cultural, and political deterioration. The second is *a recovery and development* to properly prepare human resources through technological and vocational education for the younger generation so that they will be able to face global competition now and in the near future; so as to realize a democratic, orderly, litigious, creative, adaptive, innovative, and competitive people (Syarief, 1999).

## **II. HUMAN RESOURCE DEVELOPMENT THROUGH TECHNOLOGICAL AND VOCATIONAL EDUCATION**

By considering various perspectives, human resources development through technological and vocational education is a national agenda which is very important and strategic for Indonesia to reach the progress in the future. Some rational arguments can be given as: First, the Teaching of technological and vocational education can be interpreted as an a human investment which has economic implications. In this sense, human resources is placed as one of production element, which



can contribute to economic growth. Therefore, human resources are also referred as "human capital" which can improve production process both qualitatively and quantitatively. According to Miller (1985: 51), vocational education is designed to act as bridge between school and work. The underlying assumption is that people who are prepared through vocational education will find employment and this can happen because the education is required to takes place in a productive and practical atmosphere. Vocational education, according Sonhadji (20012), has different characteristics from general education because vocational education is held to prepare the graduates in entering the workforce (education for work).

Second, technological and vocational education will bear the social layer in society which could be a driving force and pioneers for the society development and progress. Educated people will surely be able to master the knowledge and broaden the insight and vision to reach the future which in turn will be able to realize an advanced nation. Technological and Vocational Education is a tool for social mobility process to form an educated middle class that is critical, well-informed, and ready to enter the workforce in modern life. Educated middle class who were born through this education will strengthen the basis of the society social structure and also become a very important factor in the industrial development.

Third, Technological and Vocational education is an effort to increase public welfare. There is a positive correlation between the level of prosperity of a society with its educational status. People who have a relatively high level of education will have a relatively high prosperity. Here, education has economic effects, which is reflected in opening up opportunities and possibilities to get employment options in accordance with the educational status. With a good provision of Technological and Vocational Education, it is likely for the society to be able to access more jobs according to their expertise.

Therefore, the procurement and utilization of educational resources is needed to be done by the government, the community and/or family, as described in UUSPN 2003 Article 54 which states that the role of community in education include the participation of individuals, groups, families, professional organizations, employers, and community organizations in administering and controlling the quality of educational services.

Fourth, Technological and Vocational Education is a vehicle to build and enhance the dignity of the nation. A a high quality education will obviously create intelligent, qualified people, and superior nation with diverse of expertise. Intelligence, quality, skill, and excellence can deliver a nation into a dignified life. The dignity control a status which is characterized by: advanced, affluent, prosperous, which provide a certain quality. One of a nation dignity indicator is the quality of the nation as reflected in its educational degrees.

Therefore, it has not been too late to start creating a democratic educational system through technological and vocational education management to prepare qualified human resources in facing Asean Economic Community (AEC).



### III. PARADIGM OF TECHNOLOGICAL AND VOCATIONAL EDUCATION INNOVATION IN INDONESIA

The relevant paradigm in the context of the management of technological and vocational education discussed here is the democratization of education. Democratization of education presupposes the largest opportunities for people to participate in education. The concept of democratization of education provide sufficient space for public so that people can take an active role in the implementation of education through participation in determining the direction and policies, formulating strategies, goals, and objectives of education as well as getting actively involved in the implementation.

Democratization of education reflects the recognition of potential and the power of community to strengthen education, which is in line with Law No. 22 Year 1999 on Regional Government and Government Regulation No.25 Year 2000 on Government Authority and Provincial Authority as Autonomous Region. Democratization of education has become increasingly relevant in answering the demands of decentralization and regional autonomy. Decentralization of education, as well as the decentralization of government administration, is the transfer of part of central educational institutions authorities to the local educational institutions. Educational management which, at first, is concentrated at the central educational institutions, then, derived to the local educational institutions. The idea of decentralization in education is in line with the decentralization policy in the field of public administration which gives greater autonomy to the district/city to manage their own administration.

Decentralization of education must always be applied within the framework of national education as a vehicle to maintain the unity of the nation as well as to enhance the nation's competitiveness. Thus, the decentralization of education will not lead to disintegration. In such context, educational competence standards are defined nationally. Primary and secondary education graduates competence quality in all areas must be the same. The difference is only on the implementation process which adapt to local conditions (Salis, 2007). Decentralization of education will open up new perspectives which provide some important concepts in the provision of education such as Community-Based Education, School-Based Management and the Autonomous University.

The concept of Community-Based Education is evoked as a response to the economic crisis which brought a direct impact to education in Indonesia. Due to the economic crisis, the allocation of funds for the education sector is relatively inadequate and does not meet the real needs. The concept of community-based education has a dual purpose: (1) increase the empowerment of social institutions in the community which work in the field of education, and (2) collect available alternative financial resources in the community in order to provide educational services to the community. Important issues that could be elaborated, among others, is a matter of partnership between government and public (private) in education, in the form of matching-funds among various donors of educational activities. Dwiningrum (2011) stated that community participation in education include: decision-



making, educational implementation, educational outcomes advantage taking, and participation in educational evaluation. With the concept of community-based education, it is expected that public participation and cooperation among various social institutions is increasingly strong and powerful.

School-Based Management concept presupposes the granting of broad autonomy to the schools in organizing educational activities. In this case, the school is required to involve community participation in the management with reference to the national policy framework. School - Based Management is carried out so that the school can freely manage resources according to the priority of needs and responsiveness to the local needs.

Through School-Based Management, the school is expected to get more freedom in managing its resources and increasingly eager to create new innovation. In addition, the government through Directorate of Primary and Secondary Education introduces a new paradigm of vocational education on the 3 main shifts in outlook and behavior, namely: (1) from supply-driven to a demand-driven, (2) from academic oriented to job/occupational oriented, and (3) from the school-based program to dual-based program (Department of Education , 1999)

Decentralization policy formulated in the concept of community-based education and school-based management is intended to expand the educational opportunities for the community and to improve the efficiency and quality of education. However, it is more fundamental and principle to strengthen the social institutions which are directly related to the implementation of education at both regional and school level (Salis, 2007; Priowirjanto , 2001) .

Furthermore, it should be noted that the concept of *Zero*, as suggested by Shoemaker, Director of Ohio Vocational Education (in Hamalik, 1998: 61), are: (1) *Zero Reject* means accept all students who need Vocational Education, (2) *Zero Drop Out* means foster and develop an effective program so that all students can successfully learn, and (3) a *100 percent placement* means graduates job placement services are according to the program taken. This policy is in accordance with the policy of the Directorate of Vocational Education which states that vocational school capacity and quality is improved to meet the needs of the workforce .

To realize the reformative ideas, adequate preparation and measurable strategy are needed in addition to taking into account the varied local conditions. It demands social responsibility in the implementation of education. Active participation of community in the implementation of education should be based on the needs of the community, parents, community organizations, and local government (Dwiningrum , 2011) .

University Autonomy, which is in line with the concept of school and community-based management at higher education level has also been issued as a policy to give bigger autonomy to higher education institutions in managing education in order to build independence. University autonomy means manage all the resources such as human resources (teaching staff, administrative staff, and students ), financial resources (developmental budget, routine budget, and public funds) as well as physical resources (infrastructure assets and educational infrastructures) to develop programs



and activities which are suitable with the main missions. Thus, university has the power or authority in determining policies which is oriented to the development of science, institutions, and community environment.

Larger autonomy to higher education presupposes greater responsibility, as the saying "rights always come with responsibilities". Therefore, higher education autonomy must be followed by serious efforts to improve quality, to create innovation, and to continuously develop knowledge. The efforts should be done as a form of social responsibility to the public. So, the accountability is given to general public as the party who gets the advantages of education service and provides the education budget. The accountability is a nature because the existence of higher education depends on a number of "stakeholders" who have an influence on the flow of resources needed in the implementation of education.

The new paradigm of education is formulated in the concept of decentralization, community-based education and school-based management as well as university autonomy which will run well when it is supported by conducive policies, especially worth welfare and incentive system for the educational staff such as lecturers, and the availability and adequacy of educational infrastructure for learners to learn.

#### **IV. BUILDING QUALIFIED SYSTEM OF TECHNOLOGICAL AND VOCATIONAL EDUCATION**

The purpose of vocational education in Indonesia, especially the goals of vocational education (SMK) as described in PP No. 29 of 1990 Article 3 (2): (1) prepare students to enter workforce and develop professional attitudes, (2) prepare students to be able to choose a career, to compete with others and to develop themselves, (3) prepare students to be middle level employers who will satisfy the needs of business/industry, (4) prepare students to become productive, adaptive and creative citizens. Secondary vocational education focus on preparing students to work and to choose career as well as developing specific competencies which are appropriate with the areas of expertise (Billett , 2011; Rival & Sagala, 2010) .

To prepare the development of technological and vocational education, the strategic steps needed are as follows: First, improve the efficiency and effectiveness of technological and vocational education management at macro level (national and local) and micro level (school). It is very important to save the limited resource such as funds, manpower and infrastructure. This effort requires a strong commitment to policies and programs which are more focused on the goals and have high priority targeting, as measured by a direct impact of the education quality and equity.

Second, create institutions which give regions greater role and involvement in the implementation of technological and vocational education. Our nation is a great nation which has a large number of populations who stay in wide areas with great cultural diversities. Under such conditions, it is impossible to do centralized management approach. Therefore, the national education



management needs to be set into more decentralized one with regard to the concept of nationalism for the sake of national unity (Tilaar, 1992). Decentralization of education does not mean sacrificing national interests. On the contrary, it should strengthen national interests in accordance with Bhineka - Tunggal Ika principle.

Third, encourage community participation, including civil society organizations and business community as a government partner in the development and implementation of technological and vocational education. The history of education in our country shows how large a share of society in the development and implementation of Technological and Vocational Education. Business/industry needs to be more active in helping the implementation of technological and vocational education by providing a wide range of necessary amenities such as a place to practice and conduct internship as well as scholarships. Cooperation between business/industry and technological and vocational education can be realized through the exchange of experience and knowledge. Such cooperation will be mutually reinforcing, because the coherence between theory and practice is synergistically and harmoniously intertwined. Cooperation with business/industry should contribute significantly, both in terms of morality and financial.

Fourth, provide adequate learning facilities so that learners can grow and develop in healthy, dynamic, creative, and productive environment. Adequate quantity and quality of learning facilities should be prepared, such as: (1) Laboratory/workshop should be geared towards the development of science and technology, (2) Library should be developed according to the pattern which is in line with the development of information and globalization, and (3) other facilities such as sport center, places of worship, canteen and other facilities including school safety.

Fifth, create learning process atmosphere which can generate, grow and develop creativity and innovation as well as the interest and enthusiasm for learning. The learners should be encouraged to always ask and dare to express opinions. The atmosphere of learning should be fun so as to encourage the growth of motivation, interest and enthusiasm for learning and to develop creativity of learners. The spirit and passion of learners must be grown so that learning becomes a necessity. Reading interest and writing habits also need to be developed further because it can make the knowledge continue to evolve.

Sixth, grow students' love to science and technology in order to develop the science and technology. The prominent feature of a civilized science and technology are: a) creative, always compelled to look for something new; (B) always curious and explore the secrets of nature because nature is the source of knowledge; (C) logical and rational thinking and always tends to the truth because science can only be developed on the basis of truth and the awareness that science itself is not absolute and eternal, (d) prioritizes professionalism; (e) upholds the quality. Science and technology should be a breath of life and become part of students's culture in order to successfully navigate the information, communication, and industrialization era.

Seventh, grow fighting spirit, professionalism and insight of excellence to all components of





the school. Professionalism and excellence are the key insights that we have to be propounded as an effort to build a qualified human resources in the industrialization and globalization era. Therefore, learners need to be taught to do the best and not easily give up while facing difficulties. Thus, the fighting spirit will be part of life, character, and personality. The values can foster entrepreneurship and independence. Entrepreneurial graduates will be able to live their lives bravely and ready to create opportunities and employment, either for himself or for other people.

Eighth, Grow an economical, precise, orderly, diligent and discipline attitude. Those are the basic values which must be embedded within each school community because it is important in all era, especially in modernization era. Those basic values are not less important than instrumental values such as professionalism and science and technology. Therefore, the basic values teaching must be one of the main missions of the educational process (Supriya, 1998). But lately, the basic values do not get much attention and adequate portion in the curriculum and learning process .

Ninth, Grow moral and noble characters as the implementation of faith and devotion to God the Almighty. This is also the basic values which are very important in the modernization and globalization era. Through the learning process, moral values and noble characters should always be trained. Learning process should not only cover cognitive aspect but also cover affective and psychomotor aspects so that moral and character can be part of the learner personality (Arismunandar, 1990). Therefore, fostering students' faith and devotion (IMTAQ) can be done through: (a) the optimization and improvement of religious education effectiveness; (B) the creation of conducive school environment; (C) the integration of religious values in all subject matters; (D) the implementation of religious values in extra curricular activities; and (e) the cooperation between schools, parents and community (Supriya, 1998).

## **V. TEACHERS' QUALITY AND WELFARE**

The quality of technological and vocational education teachers must be continuously improved. Improving the quality of teachers can be done through in- service training and job training. In- service training activities can be carried out and developed through a variety of education and training, equality, and refreshment as well as subject matter teacher' organization discussion ( Yoto , 1998) . Along with the improvement of education quality improvement, the quality and welfare of teachers should be enhanced through industrial training or intership. Through industrial internship, they will gain new experiences and knowledge on the industrial developments (Ruijter and Utomo, 1989) .

With reference to Government Regulation No. 25 In 2000, province as an autonomous region is expected to improve the quality and welfare of teachers of technological and vocational education by taking into account the resources and potential in each region. The increase in teachers' welfare is expected to give an impact on morale, performance, and oyalty of teachers to the educational unit in which they served.



## VI. CONCLUSION

Educational democratization provides the widest opportunities for people to participate in education. The concept of educational democratization provides sufficient public space so that people can take an active role in the implementation of education by determining the direction and policies, formulating strategies, goals, and objectives of education, and actively involved in the implementation

Community involvement in education as part of educational democratization concept includes planning and decision-making, implementing, and evaluating the educational outcomes. Decentralization of education will open up new perspectives which provide some important concepts of education such as Community-Based Education, School-Based Management, and University Autonomy.

In the efforts to reform and develop technological and vocational education, the necessary strategic steps are: (1) improve the efficiency and effectiveness of technological and vocational education management at the central, regional, and unit level; (2) create regional institutions which have a greater role and involvement in the implementation of technological and vocational education; (3) encourage public participation including social institutions and business/industry as government partner in the implementation of technological and vocational education; (4) provide adequate learning facilities so that learners can grow and develop in a healthy, dynamic, creative, and productive environment; (5) create a learning environment which is able to generate, grow and develop creativity and innovation as well as interest and enthusiasm for learning; (6) grow students' love to science and technology; (7) teach fighting spirit, professionalism and insight of excellence to all components of the school; (8) train economical, precise, orderly, diligent and discipline attitude, and (9) grow moral and noble characters as the embodiment of faith and devotion to God the Almighty



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## THE IMPLEMENTATION OF INDUSTRIAL INTERNSHIP PROGRAM FOR TEACHERS OF AUTOMOTIVE PROGRAM TO ESTABLISH THE LINK AND MATCH PROGRAM

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**ABSTRAC:** *It has been a need for vocational high school students to get to know the industry. Through the Double Education System in the form of industrial internship, the teaching and learning process at Indonesian vocational high schools takes place at both the school and the relevant industry. With such a model of education, a link and match between the school and the industry is achieved. The success of the program depends on several factors, including the students' readiness. This when factorteachers have to isequip the developed at students in order to get ready for the internship program. Therefore, the teachers need to have an industrial internship experience. The present industrial internship program which is conducted through a qualitative research method on two vocational high schools that offer automotive program in Sidoarjo Regency, Indonesia, each of which is private and public school. The findings of the study is that the industrial internship program for the teachers is proven to be beneficial. The teachers are now able to teach the students on the industrial culture, work safety, discipline, as well as the knowledge and new development of technology in the industry.*

**Keywords:** vocational high school teachers, industrial internship

### I. INTRODUCTION

Vocational high school is seen by many as one solution to unemployment. This is in line with the vision of Directorate of Vocational Education and Culture, in that "...". As one implementation of th 1 to establish the so-called *SMKRujukan*"". *SMK Rujukan* is the vocational high school which is highly competitive and effective and which possesses wider access to knowledge. An effective school is defined as the one which performs better than other schools given similar support of inputs. The directorate states that the dimension of a highly qualified vocational high school comprises (a) leadership, (b) support of inputs, (c) efficient, and (d) quality of graduates determined by high performance in work competence, use of ICT, foreign language skills, entrepreneurship, and morality. Improvement of quality of education and workforce is carried out through education and training (Sutrisno, 2006), both of which are ways to produce workers with competences relevant with the needs of business and industry. In order to achieve that objective, the role of vocationa high school is vital. In relation with that, the improvement of quantity and quality of vocational high school is the sole requirement towards highly competent workforce who can also takes a role as an asset of development.

One unique characteristic of vocational high school is the existence of Double System of Education (DSE) as the implementation of "link and match" implemented across vocational high school in Indonesia in order to ensure the education in such school matches with the needs of business



and industry. DSE began to implement in 1994/1995 academic year (Sidi, 2003: 115), and from the time being there has been some fundamental changes in the system, culture, and actors of the education. For instance, students are now required to study not only at school but also at business or industrial place. Commonly, this internship-like program is carried out during the second year of vocational high school, while the first year students receive theoretical lessons at school which later is developed during the program. It is the responsibility of teachers of first year students to provide them with industrial experience or references as a preparation towards the program in the second year.

Another instance of the change in the education system after the DSE is that the curriculum of the school is frequently reviewed by the school and the industry. In this phase, the role of the school “principal is nothing more than impor His-Chi, 2008) for the sake of “link andrmed match” curriculum will more or less give impact to t according to Bush (2003: 78), should be involved in reforming the curriculum (Hersey-Blanchard’s Situational-GoalTheory).ThatTheoryway,teachers areandaware with Path changes made in the revised curriculum and, thus, adapt their teaching approach with the needs of the curriculum. In other words, teachers must adapt; they must undergo lifelong learning and equip themselves with updated knowledge, thus values of professionalism are achieved.

Bauer (2007: 151) concludes that most teachers of vocational high school and technology suffer from minimum application and contribution towards system of technology. System of technology is the core dimension of working skills; however, this is not the knowledge that they obtained during accomplishing their education program as vocational and engineering teachers. As a consequence, these teachers conduct their lessons based more on life practices and intuition rather than the theories. Meanwhile, the day-to-day work of teachers is vital to the development of their professionalism. Therefore, teachers need to be engaged in an in-service training.

An industrial internship program for vocational high school teachers are also beneficial to provide them with knowledge on ethics of work and profession aside from knowledge on rapid development of technology. Such internship program also gives a chance for them to engage in novel applied technology as the weakness of the technology taught in school is that it is unreal.

The internship program in industry is an atte which, in turn, are to apply in the teaching and learning process. It is stated in Law number 14 in 2005 on Teacher and Lecturer, Chapter 20, that to apply professionalism values in their work, teachers are to (a) design teaching strategy, implement a high quality teaching strategy, and assess as well as evaluate the result of learning; (b) to improve and develop their academic qualification and competence in a continuous manner following the development of science, technology, and art.

Billet (2011: 220) believes that the kind of materials delivered by a teacher to his/her students depends on his/her understanding and belief. This implies that if a teacher never takes an industrial internship program, the lessons he/she prepares for the class will not be in line with the development in the industry as his/her understanding cannot reach what has been developed in the industry.



Technology will always change, implying that teachers should be motivated to engage in a lifelong learning (Finsterwald, 2013) with a sole goal of becoming professional teachers (Avalos, 2011; Mitkovska, 2010). The industrial internship program is a program to develop teachers' professionalism which later in teaching strategies, and improve students".

Miller (1985: 31-36) asserts that industrial experience is ultimately needed for teachers as they, similar to students, must undergo a lifelong learning in order to become the real human. Therefore, the industrial internship system for vocational high school teachers needs a comprehensive and sustainable formula in its implementation. Field experiences obtained from such a program will refresh the teachers' knowledge taking place in the field with the kind of knowledge and experience that students need to have.

Lee (2011) conducts a research on an internship program on softwares towards 24 teachers. The result of the program is that those teachers are now able to develop their own computer-based education program through a cognitive internship that mainly talks about educational technology. In the research, an anonymous survey was distributed. From the survey, it is concluded that teachers feel satisfied during learning the Etoys program and are willing to use the program in their class, despite that fact that their computer skills are less than the standard of using the program. In the end, the research suggests that internship program for teachers develops their professionalism.

Furthermore, Bruijn and Leeman (2010) and Dickey (2008) also conduct a study on teacher internship program in terms of cognitive internship. The studies conclude that the cognitive internship is able to improve teach flexibility.

The internship program is carried out mostly in the form of trainings. Ruys, Kerr, and Aelterman (2011) once engage as many as 105 teachers in collaborative learning during a training program. The result shows that those teachers are able to implement the collaborative learning well. This study is in line with Tee concludes that guidance given during teachers significantly improves their pedagogic skills, their self development, and class organization.

Carayannis and Jorge (1998) in their study find that the industry needs to have skillful workforce that can adapt to the constant change of technology. In order to achieve the objective, the industry needs to carry out training programs aimed to all of its stakeholders, including teachers of vocational high school. In Germany, vocational high school represents the qualification which provides qualified workforce which is built together, thus the industry hold a part of responsibility in providing such a qualified workforce (Clark & Winch, 2007: 14-15).

The objective of the present study is to explore the industrial internship for vocational high school teachers of automotive program. The study is hoped to 1) describe the implementation of the program, 2) describe the impact of the program on the teachers, and 3) develop a theoretical framework abstracted from the collected data.

Based on the objectives aforementioned, the focus of the study is the implementation of industrial internship for vocational high school teachers of automotive program (a case study in SMK



Krian 2 as the representation of private vocational high schools in Sidoarjo Regency, Indonesia, and SMK *Negeri* 3 Buduran as the representation of public vocational high schools in Sidoarjo Regency, Indonesia). The two schools are chosen for the following reasons: 1) both manages a vocational program of Lightweight Vehicle Technique, 2) both have been certified with ISO 9001:2008, 3) both are accredited both “A have implemented the industrial internship program for their teachers, and 5) both have experience of conducting the program of Lightweight Vehicle Technique for at least 10 years.

## **II. RESEARCH METHOD**

The present study applies the multi-site qualitative approach. The decision of selecting the samples is through purposive sampling method. The subjects are selected with reference to two major categorization of vocational high school, namely, private (managed by a private organization) and public (managed by the government). SMK *Negeri* 3 Buduran is chosen as the representative of public vocational high schools, while SMK Krian 2 is chosen as the representative of private ones. The study is conducted between November 2015 to February 2016. Both schools have implemented the industrial internship program for their teachers, particularly those in the Automotive Program. The internship program is carried out in automotive industry, automotive workshop, and informal classes of automotive education. The data are collected through in-depth interview, documentation, and observation.

The data analysis is carried out since the data collection phase in the field and after the data are all collected, in line with Moleong (2007: 247), Iskandar (2013: 224), Miles and Huberman (1992), Creswell (2009: 190), and Bogdan and Biklen (1982). The data analysis is a carried out in the following three methods: 1) expert review, 2) continuous observation, and 3) triangulation.

## **III. FINDINGS AND DISCUSSION**

From the observation, in-depth interview, and documentation with the data triangulation, it is found that the industrial internship program has been truly implemented in the school subjects. In implementing the program, the schools work together with three parties, namely, automotive industry, automotive workshop, and informal classes of automotive education. The program attended by the teachers of both schools is proven to improve their work performance during the teaching and learning. By participating in the program, the teachers admit that they obtain new knowledge in the form of theories and praxis of automotive work, and the new knowledge is in accordance with the needs of the society, the Furthermore, the teachers obtain experiences of industrial culture which is different with they find in their schools.

Learning in the workplace is defined as industrial internship; so, industrial internship is work-based learning (Velzen, 2012). During the internship, the teachers receive direct guidance from instructors appointed by the company; in other words, this is peer-teaching with a sense of social cultural approach (Ruedaa, 2002).

During the industrial internship, teaching and learning process occurs. The teachers will obtain



experiences which can be used to improve their professional performance as teacher. For instance, the teachers can now design a better teaching strategy (Hoogveld, 2005). Industrial internship is a work-based learning that can improve the development, and class organization (Teemant, 2011).

The quality of teaching is a key factor in supporting an effective teaching and learning (OECD, 2011: 92). A better way of teaching will help the students to obtain better quality of learning (Parpala, 2007). The quality of teaching is determined by knowledge and skills. It is these knowledge and skills that the vocational high school teachers need to constantly update (OECD, 2011: 93), implying that a part of the time the teachers have in doing their work should be invested in undergoing an industrial internship program. The present study also finds that the teachers are unlikely to engage in the internship program as they feel too busy to do so, while this program is obliged to them as vocational high school teachers. Therefore, one way to encourage them to participate in the program, as stated by OECD countries, is by giving incentive (OECD, 2011: 93).

A professional teacher is required to possess the following qualities in him/herself: having a qualified degree according to his/her profession, having relevant education background with the one he/she is working on, having adequate communication skills, creative and productive, applying work ethics, having high commitment toward the profession, willing to continuously develop him/herself (Sidi, 2003: 38-39). In other words, a professional teacher is the one who always makes efforts to improve him/herself.

Teachers are professional educators whose main duties are to educate, teach, guide, direct, train, assess, and evaluate students' outcome performance is determined by the degree of which they accomplish their responsibilities based on certain work standards in a certain period of time for the sake of achieving the objectives of education (Barnawai & Arifin, 2012: 14). Schippers and Patriana (in Firdausi & Barnawi, 1994: 23) assert that one needs to develop a complete behavior of competence which grows from a lifelong process of education and training as well as received life experiences. The teachers feel that the industrial internship program is of their needs, thus demonstrating high interest and motivation toward the program. Having participated in the program, the teachers are able to develop learning process in accordance with their experience during the program, including team teaching, groupwork with each is assigned to different job, making all students actively participate in the process. This method is beneficial considering that the number of tools in the school's workshop.

The teachers can also apply the work safety procedure during the learning process as they learn from the internship program, not to mention applying the new technology in automotive industry. As a result, the students feel the new experience of learning activities, and they use the new automotive equipments such as scan tool. The teachers also feel more confident in conducting their class as they have learned new skills in the automotive industry relevant with their job.

The development of learning design by adapting the knowledge and experiences from the industry is proven to be beneficial for the students. During the learning process, transfer of knowledge





occurs from the alumni of the internship program to the students, such as how to conduct work safety in the industry and how to carry out the automotive works by applying the culture learned from the industry. This means that the teachers prepare the students to conduct an industrial work. This is particularly beneficial as once it come to the industrial internship for the students, they have only a little time to adapt themselves with the atmosphere of the industry. With the culture taught first during the teaching and learning at school, the students will adapt with the industry quickly, thus supporting th and the industry.

#### **IV. CONCLUSIONS**

Based on the findings and discussion aforementioned, several conclusions can be made as follow: 1) the industrial internship program is necessary, 2) the internship can improve the teachers' professionalism which atlaterschool, 3) the affect internship makes the teachers more confident in conducting their class, 4) the teachers feel that they already have adequate knowledge and skills to conduct their class which are relevant with the needs of the society, 5) the teaching and learning process at school is relevant with activities conducted by the industry, 6) the students are get used to learning activities which are in line with the activities of the industry, 7) the internship program prepares students with relevant competences as needed by the industry.

#### **V. SUGGESTIONS**

Based on the findings and discussion, the following suggestions are made for several related parties: 1) the automotive industry and workshops of well-known motor or cars brands need to offer an industrial internship program held frequently in every year, 2) thus giving opportunities for teachers to participate in care of the needs of teachers on the internship program by offering the program to the teachers, 3) the teachers should attempt to conduct teaching and learning process with the atmosphere close to the one in the industry in order to get the students used to the culture when they take the internship program later.



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## STUDIES ON THE IMPLEMENTATION OF ELECTRONIC BASED LEARNING TO IMPROVE THE QUALITY OF VOCATIONAL TECHNICAL EDUCATION

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**ABSTRACT :** Vocational education is formal education which aims to prepare students to enter the world of work and unable to cope with the changes. By implication, the implementation of learning vocational education can not be separated from the advances in technology and information-based or electronic. Advances in technology needs to respond carefully and precisely by the teacher so that it can be implemented electronically based learning in vocational education in engineering. The use of technology in learning in vocational education can contribute positively to the achievement of learning objectives, both learners and for teachers themselves . In order to improve the quality of technical vocational education, learning should be supported by efforts utilization of learning resources including electronic-based technologies. While reality shows that learning resources and learning tools that have been standardized, supplied and distributed by the government have not been optimally utilized by teachers, coaches and instructors. Various studies on electronic-based learning has been carried out and implemented in such learning instructional media application (application macromedia flash, adobe flash program, building knowledge adventure game), blended learning, e-book, and others. The results showed that the electronic-based learning can improve learning outcomes of students. The implication is able to improve the quality of vocational education in engineering.

**Keyword:** electronic-based learning, quality, vocational education

### I. INTRODUCTION

The development of education is now entering the era of technological innovation. These conditions require adjustments to the education system to the demands of the working world. Vocational education is one of the institutions in the formal education that prepares graduates to excellence and able to cope with changes in the working world. The implication, the implementation of learning in Vocational High School can not be separated from the advances in information technology or electronic-based.

Advances in technology needs to respond carefully and precisely by the teacher so that it can be implemented electronically based learning in vocational education in engineering. Learning should no longer be a tedious thing, as a few decades ago. Teaching materials can be presented with sounds and images are dynamic, not boring, as well as solid information. The use of technology in learning in vocational education can contribute positively to the achievement of learning objectives, both learners and for teachers themselves.

In order to improve the quality of technical vocational education, learning should be supported by efforts utilization of learning resources including electronic-based technologies. While reality shows that learning resources and learning tools that have been standardized, supplied and distributed by the government have not been optimally utilized by teachers, coaches and instructors.



## II. THEORITICAL REVIEW

### a. Quality of Vocational Technical Education

Vocational education is secondary education that prepares students primarily to work in a particular field. Vocational education is one kind of education in the national education system associated with the development of this type of work and the profession as well as the appropriate technological developments and the needs of the community. Vocational education carried out in educational institutions (formal) and outside educational institutions (non-formal).

The main objective the implementation of vocational education is to prepare students to work in the community and to continue to pursue higher education for qualified (Djojonegoro, 1998). That is to target men to have knowledge and skills adequate technique and become a productive human. According Djojonegoro (1998), vocational education is part of the educational system that prepares people to be able to work on one job group or an occupation than other fields. This means the subject areas studied more thoroughly than other subject areas as stock enter into the world of work.

The specific objectives, Vocational High School aims: (1) prepare students to work, either independently or fill jobs that exist in the world of business and industry as a middle-level manpower, according to the field and field of interest, (2) equip students to be able to choose a career, tenacious and persistent in competent and able to develop a professional attitude in the field of expertise that is in demand, and (3) provide students with science and technology to be able to develop themselves through higher education.

Competence of graduates of vocational education as a subsystem of the national education system according to Depdiknas (2003) are: (1) producing graduates who have the skills and mastery of science and technology to the field of the level of expertise appropriate to the needs of development, (2) producing graduates who have productive capability, producer alone, change the status of a graduate of an asset load status of an independent nation, (3) a producer of the driving perkembangan Indonesia competitive industry facing global markets, (4) producing graduates and a strong mental attitude to be able to develop themselves sustainably.

One of the main objectives in creating a vocational high school who is able to answer the demands of the era of free market competition. is to improve the quality, relevance and competitiveness include:

- a. Provide supporting facilities, libraries, laboratories or workshops.
- b. Increasing collaboration with business / industry.
- c. Develop information and communication technology which includes the development of computer labs and internet access.
- d. Reproduce textbooks, reference books and textbooks.
- e. Increase the average achieved national exam score, including the strengthening of the base, increase the number of test frequencies up to the implementation of the test.



- f. Develop a competency-based curriculum, including the implementation of the certification of competence national and international standard.

Quality of Vocational High School is determined at least by the quality of its graduates. Support teaching and learning activities as well so the tip of the spear. The criteria for determining the success of a vocational education institution is basically applying a double size that is in school and out of school succes succes. The first criteria include aspects of student success in meeting the curricular requirements already oriented to the requirements of the working world, the second being the criteria indicated by the success or performance of graduates after being in the real world of work. Education Quality can be judged on the quality of the educational product itself, namely human resources.

Quality human resources which is the one of the important capital of the progress of development of a nation. Industrial excellence of a country is determined by the quality of skilled workers directly involved in the production process that are at the forefront. Therefore, the reason for the importance of a skilled workforce is as follows.

- a. Skilled labor is a factor featured in the face of global competition.
- b. Application of technology be featured factor depends on a skilled workforce that is controlled and able to apply.

The success of the learning process can not be separated from the ability of teachers to develop learning-oriented and information technology increasingly rapid development. The intensity of effective student engagement in the learning process by developing appropriate learning basically aims to create learning conditions that allow students to learn actively and enjoyable so that students can achieve optimal learning and achievement. To develop effective learning, every teacher should have adequate knowledge about the concepts and ways of implementing an electronic-based learning.

- b. Electronic-Based Learning (E-Learning)

E-learning means learning by using electronic devices assistance services. In practice, e-learning using the services of audio, video or computer device or a combination of all three. In other words, e-learning is learning which in practice was supported by technological services such as telephone, audio, videotapes, satellite transmissions or computer (Tafiardi, 2005). According to Gilbert and Jones, e-learning is the delivery of learning materials through an electronic media such as internet, intranet / extranet, satellite broadcast, audio / video tape, interactive TV, CD-ROMs, and computer based training (Herman, 2010)

Learning with e-learning is an electronic-based learning, which can be used offline or online. Besides the internet facilities, e-learing also use hardware devices such as DVD / VCD, computer or laptop, can also line network to connect between students and teachers. By exploiting this, e-learning is often used in distance learning. Information and communication technology is something supportive to is recording, storing, processing, gets longer, radiate or transmit and receive information (Behan and Holmes, 1990).



Characteristics of e-learning include: 1) Utilize the service of electronic technology. Teachers and students, students and fellow students or teachers and fellow teachers can communicate with relative ease without being limited by the things that are protocol; 2) Utilize the power of the computer (digital media and computer networks); 3) Using the teaching materials is independent (self-learning materials) stored on a computer so it can be accessed by teachers and students anytime and anywhere if the person concerned need it; 4) Utilizing the learning schedule, curriculum, learning progress and results relating to the administration can be viewed at any time on the computer.

Utilization of information and communication technology in education in the form of computers and computer networks provide an opportunity for each learner weeks to access the learning material presented in interactive form. Utilization of this technology is expected to enhance the success of teaching and learning, decrease dropout rates, decrease absenteeism in classes and equity in educational opportunities that can reach all people from different layers that reside anywhere. Application of information and communication technology for the right to life or should be adjusted to the prevailing culture in the community. The diversity of life and culture require different technologies to provide educational services, including a computer with internet. Information and communication technology is the use of electronic equipment, especially computers, to store, analyze and distribute any information, including words, numbers and pictures. (Kadir, 2013: 13)

Benefits of e-learning, enables interaction between learners with the material or subject matter. Learners can share information or opinions about various matters relating to the development needs lessons or self-learners. In addition, teachers can put learning materials and tasks that must be done by the students in a particular place on the web to be accessed by learners. As required, the teacher can also provide opportunities for learners to access learning materials and specific exam questions that can only be accessed by students once and within a specific time range (Siahaan, 2001).

The requirements that must be considered to carry out learning activities based electronic (e-learning), namely: 1) the learning activities carried out through the utilization of the network ("network" is limited to the use of the Internet, can include a LAN or WAN), 2) Availability of service support learning which can be used by participants to learn, such as a CD-ROM, or printed material, and 3) availability of tutor support services that can help participants learn when experiencing difficulties (Etin, 2007).

The demands of learning in the future should be open and two-way, diverse, multi-disciplinary and related to the productivity and competitive. Submission of science to students based on information technology and telecommunications will eliminate the limitations of space and time that had been limiting world of education

#### c. Teacher's Role in Electronic-Based Learning (E-Learning)

The rapid development of technology requires teachers to be able to develop learning-oriented information and communication technology (ICT). Students need guidance from teachers and from parents in the process of learning with ICT support. Teachers must master the subtleties of ICT and to



facilitate children's learning effectively. The teacher's role as a conduit of information to be shifted to is not the only source of information, but only one source of information.

Information via the Internet, can be one of the keys to making the world of education in Indonesia has the same standards as other countries. By using the internet media, government and educational institutions have started implementing a learning that is effective enough to be applied to people who have problems with distance and time to get information, especially information in the world of education. One method that was implemented namely learning distance learning. Distance learning method is an alternative method to equal opportunities in education. The system is expected to address some of the problems caused by the limitations of qualified teaching staff. Distance learning method greatly assist students or people in learning things or new sciences with a more attractive and easier to understand. In accessing and utilizing these methods, the role of internet is very necessary, because via the Internet one can send files or upload files you want to be published and via the internet also one can access files that you want to search. In addition to distance learning methods, there are many other methods that are helpful in improving the quality of education, including the existence of available learning modules, online learning portal, and others.

If we reflect to other countries, the development of information and communication technology in Indonesia can be fairly underdeveloped. The role of government is expected to boost the growth and development of information and communication technology in Indonesia. The government is expected to generalize the development of information technology in all regions in the country. The government is expected to assist areas that delivery process information is still minimal and not just focus on regions or big cities as is the case at the present time, because in reality the role of the region in supporting the development of information technology and the development of education in Indonesia is very important ,

With the uneven spread of information technology will affect the educational development process. This is because the role of information technology in education is very important. With the information technology all kinds of knowledge and information can be received and obtained easily and quickly. In our lives in the future, information and communication technology sector is the most dominant sector. Anyone who master this technology, it will become a leader in the world.

To be able to take advantage of ICT to improve the quality of learning, there are three things that must be realized, namely:

1. Students and teachers should have access to digital technology and the internet in the classroom, school, and teacher education institutions.
2. There should be a quality material, meaningful, and cultural support for students and teachers.
3. Teachers should have knowledge and skills in using tools and digital resources to help students to achieve academic standards.





### III. STUDY RESULTS AND DISCUSSION

#### a. The Study on Research Result

The role of the teacher as a transmitter of knowledge to students to assist in the achievement of the vision and mission of the school. The teacher as a transmitter of something good, positive, creative and have the ability to develop learners. Given the strategic role of which is owned by a teacher, attempts to identify and develop the abilities and skills of teachers is very important to do. Teachers must be sensitive to the changes that occur in the form of advances in communications technology and information-based or electronic. A number of studies have shown that teachers who are able to apply innovative electronic-based learning is one important indicator of the quality of vocational schools.

##### 1. *Media Learning Building Knowledge Adventure Game*

Development of instructional media Building Knowledge Adventure Game tested on 30 students of class X SMK TGB show that the learning outcomes of students who pass as many as 25 students or 83.33%, meaning that the implementation of Building Knowledge Adventure Game media in learning is very effective. (Wijaya and Nurmi, 2015)

##### 2. *Learning Media Aurora 3D Presentation*

Application of instructional media Aurora 3D Presentation on Building Science learning with classroom action research conducted for 36 students with two cycles. The results of study in the first cycle has been completed shows that as many as 17 students (63%). In the second cycle that has been completed by 29 students (93%). Improving student learning outcomes of the first cycle and the second cycle by 30%. (Pradana and Nurmi, 2015)

##### 3. *Macromedia Flash Media Applications*

Implementation macromedia flash media application on learning Drafting done through action research class to 36 students with 3 cycles, suggesting that the learning outcomes of students has increased from cycle 1 students who complete 15 or 41.67% of students in cycle 2 which completed 17 students or 47.22%, and in cycle 3 students who complete 30 or 83.33%.

The study concluded that an increase in student learning outcomes using macromedia flash media application on the subjects of engineering drawings. (Insani and Nurmi, 2015)

##### 4. *Learning Media Aurora 3D Presentation*

Learning Media generated in this study is the instructional media using Adobe Flash CS6 on competency standards identify the science building is focused on determining the type of material the proper foundation for the building in accordance with the type of soil. Goal of this research is class X Architecture Engineering (TGB) in SMK Negeri 3 Surabaya.

The results of the validation performed by the media two validators show ratings by 73%, meaning a decent instructional media used by teachers in the delivery of the material. The trial results were 34 students in the form of learning outcomes, acquired as many as 29 students or 85% otherwise completed following the teaching and learning activities using learning media and as many as five



students or 15% otherwise not completed following the teaching and learning activities (Adiagharini and Nurmi, 2015)

### *5. Learning Blended learning*

Blended learning is a teaching strategy that utilizes internet technology (E-Learning) combined with face-to-face in the classroom. The implementation of blended learning students are expected to understand the material better and more active in participating in learning, so that it can improve student learning outcomes.

Class Action Research refers to the model Kemmis done to 33 students. The results showed that: (1) student learning before the application of Blended Learning that there are 10 students who completed or 30.30%, and 23 students who did not complete (2) in cycle 1, there were 24 students who completed or 72.73%, and in cycle 2 there were 29 students who completed or 87.88%. The results showed a yield increase student learning by 15.15% in cycle 1 to cycle 2 on the application of blended learning. (Rizkiyah and Nurmi, 2015)

### *b. Discussion*

The demands of learning in the future related to the utilization of information technology and telecommunications becomes a necessity. There are some things that need attention in implementing an electronic-based learning that is expected to improve the quality of vocational education, among others:

#### *1. Supply Facility of Electronics-Based Learning*

In order passage of school innovation in electronic-based learning, one of the efforts that must be done is to prepare every means pembelajaran which include the provision of internet connection devices or Wi-Fi, computer, laptop, tablet, HP Android, and procurement of school websites. All electronic-based learning tool prepared by the school, can be used by students as a support of student learning activities included to increase knowledge of students. Likewise by teachers, educational facilities can be utilized for smooth learning activities in the classroom as a form rmengajar attainment of quality in vocational education.

The availability of instructional media needs to be completed. For example, LCD, projector, computer, TV, and mathematics teaching aids. Teachers optimize the learning media presence for teaching and learning. In addition to adding exciting delivery of material, the use of media to facilitate understanding of mathematics. Another thing to consider in the implementation of learning mathematics is learning resource. Learning resources is defined as any place or environment, objects, and those that contain the information can be used as a vehicle for learners to make the process of behavior change. The shape is not limited whether in print, video, software format or a combination of various formats that can be used by students and teachers.

#### *2. Abilities and Skills Development Master in IT Sector*



In addition to setting up supporting infrastructure to realize innovation Information technology-based school, vocational school must pay attention to human resources. The school has made multimedia training for teachers in the vocational school. The purpose of this training is to provide knowledge about multimedia briefing to the teachers / teachers, to then be applied in teaching methods by utilizing facilities such as computer, tablet or laptop. Speakers of this training is the expert teachers in the field of multimedia is taken from one of the teachers at the vocational school.

Learning is an interaction between students and teachers in order to achieve the learning objectives. The relationship between students and teachers is a reciprocal relationship to each other in an active role within the framework of the way and the frame of mind that has understood and agreed. The teacher is successful in teaching if materialized changes in behavior and personality of students toward a better than ever

Over time, the implementation of e-learning in schools requires elements that exist in the schools to understand the e-learning. In general, the understanding of e-learning in schools can be shown by how often teachers to upload material and tasks to the e-learning portal. While students downloading materials or tasks assigned by the teacher. This indicates that both teachers and students have to understand the nature of e-learning and respond positively to the implementation of e-learning.

### *3. Utilization of Computer, Laptop, Tablet and Mobile Android in Learning*

Provide teaching aids for students to use computers, laptops, tablets, and / or HP Android. Computer, the tablet can be equipped with e-books or digital books are available to be read by students. It is also equipped with student attendance, so that students can check student attendance through the tablet. The tablet computer can also be used to check the student's final assignment. To facilitate the students take advantage of the tablet computer, the school has differentiated digital book content on the computer tablet per jurusan. Terkait use of tablet in the learning process, not all teachers require students to always use a Tablet Computers in the classroom when teaching and learning process. Because this is a Tablet Computer as an alternative to books alone.

There are many advantages to using tablets in the learning process is the ease of information distribution or delivery of material through the process share it. It also makes it easy for students to understand the material provided by the teacher, such as English language material. In addition, students do not need to carry a lot of heavy books to the school. Tablet computers can also be used for data search students learn through internet connection. In addition to practical and easy to carry anywhere, the use of tablet computers more attractive because of the bias comes with pictures and audio (voice)

### *4. Cooperation with the business world / industrial world in the provision of Electronic -Based Learning*

In order to realize the innovation of IT-based school would require no small cost. The strategic steps which are formulated schools covering their cooperation with other parties, therefore educational institutions which are non-profit institutions can be started the business partnership that investment



funds can be provided. Just as in the provision of educational facilities was helped also by the industry. Related to the provision of computer, laptop, or tablet, the school in collaboration with the leading provider of tablet computers. Then the provision of Wi-Fi devices also work with one ISP (Internet Service Provider). Through this partnership Vocational High School has thought of other benefits besides just providing educational facilities, but also carried out cooperation to be held classroom practice and apprenticeship in the enterprise

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

##### **a. Conclusion**

1. Quality is determined by the quality of vocational school graduates. The quality of vocational graduates is inseparable from the success of the learning process in the form of a teacher's ability to develop or electronic-based learning-oriented information and communication technology
2. E-Learning is a new trend in contemporary learning makes learning more effective and efficient.
3. Availability of facilities and infrastructure in support of e-learning-based learning in SMK. Based learning or e-learning is a learning process that is facilitated and supported by the use of electronic devices or information technology and communication, provision of internet connection devices or Wi-Fi, computer, laptop, tablet, HP Android
4. The application of e-learning in schools requires elements that exist in the schools, particularly skilled teachers to understand and implement e-learning. Teachers can use as distance learning or distance learning that allows learners learning activities without any direct physical interaction with teachers but conduct interaction on-line learning.
5. Facilitate students in the form of computer, laptop, tablet, and / or HP Android. Computer, the tablet can be equipped with e-books or digital books are available to be read by students.
6. Need strategic measures undertaken in the form of school cooperation with equipment providers provider of Wi-Fi. Educational institutions which are non-profit institutions can be assisted by the pioneering efforts of the industry leading provider of computer, laptop, or tablet

##### **b. Recommendations**

1. For educators: Innovation electronic-based learning is a necessity, so that every educator should have mastery of skills in information and communication technology (ICT) or other electronic device. One form of learning by using e-learning.
2. For institutions: information technology and telecommunications are developing now requires each institution to prepare all the facilities and infrastructure to meet the needs of electronic-based learning or e-learning integrative covering policy, quality standardization, network infrastructure and content, preparedness and culture education HR becomes important to be organized and managed effectively and efficiently
3. For the Government: Many educators who lack understanding and skilled in implementing an electronic-based learning or e-learning, so that the government immediately provide intensive



training to educators and provide facilities for online learning keterlaksanaan that can be utilized by all teachers and learners in throughout the country Indonesia.

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## STUDY OF THE IMPACT OF QUALITY IMPROVEMENT PROGRAM AND TEACHER PROFESSIONALISM THROUGH DECONCENTRATION SUBSIDY FUND FOR TEACHER QUALIFICATION IMPROVEMENT TO S1/D4

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**ABSTRACT :** As professionals, teachers are expected to have academic qualifications, competence, and in accordance with the certificate of authority to teach. Law No. 14 of 2005. The purpose of this study: 1) Obtaining an overview of the implementation of the management of the Academic qualification improvement subsidy program fund S1 / D4 that is distributed through deconcentration mechanisms to province. 2) Knowing the effect of Academic qualification improvement to S1 / D4 subsidy program fund that is distributed through deconcentration mechanisms to province to increase teacher performance. 3) Knowing the effect of Academic qualification improvement subsidy program fund S1 / D4 that is distributed through deconcentration mechanisms to province to increase teachers' professionalism. Research was conducted in the second semester of 2008-2009. The data collected using a closed model of self appraisal questionnaire. Data were analyzed using descriptive analysis and regression analysis. The results of the analysis provide some information: the teachers' performance who receives the fund of qualification improvement as educators are included in good category and even tend to be very good category. Similarly, if you look at every component that supports the teachers' performance as educators, such as teachers' competence in preparing, implementing the learning and evaluating are in good and excellent categories. However, the teachers' competence in evaluating the lessons, there are still about 23% is included in the category fair and less, while the ability of the profession as an educator development is very low, as well as personal development skills. There is a positive relationship between economic declaration aid performance for teachers' qualification improvement, which means that the better the performance of the economic declaration aid then, the teachers' performance will be also better, despite the effect is low. Similarly, the relationship between the economic declaration aid's performance in qualification improvement with teachers' professionalism is very small (less than 1%), so that the relationship can be considered insignificant.

**Keyword:** academic qualification

### I. INTRODUCTION

As a professional staff, teachers are expected to have academic qualifications, competence, and in accordance with the certificate of authority to teach. Act (Act) No. 14 of 2005 on Teachers and Lecturers chapter 7 mandate, that the teaching profession is a field of specialized work carried out on the basis of, among others, have academic qualifications, educational background in their respective sectors and have the necessary competence to carry out the task. In Article 9 states that the qualification is acquired through higher education level S1 / D4. It is more pronounced in Government Regulation No. 19 Year 2005 on National Education Standards Article 29 which states that educators in early childhood education (ECD), SD / MI, SMP / MTs, SMA / MA, SDLB / SMPLB / SMALB and SMK / MAK each have: a) the minimum academic qualification S1 / D4; b) The background of higher education in accordance with the subject they teach; c) Certificate of the teaching profession in accordance with the type and level of school where it works

The enactment of legislation (Act) and government regulation raise some consequences that



need attention, since the reality on the field does not meet the demands of government regulations. One of the efforts undertaken by the government to address the challenges for teachers who do not have qualifications of S1 / D4 is giving subsidy to improve teachers' qualification

Based on data from the Directorate General PMPTK, that nationally the number of teachers is 2,245,952 (2,245,952 teachers) who has minimal qualification are around 837 460 (37.3%) and the remaining 1,408,492 (62.7%) are teachers who do not have academic minimum qualifications mandated by law. In order to comply with the law, the teachers' qualifications today need to be improved.

To address the teachers who do not meet the requirements, the central government through the Ministry of Education, the Directorate General of Quality Improvement of Teachers and Education Personnel in 2008 to give subsidy to improve teachers' qualification in primary and secondary education.

The target of subsidy programs of academic qualification improvement of S1 / D4 in 2008 is teachers who are and will taking further education around 270,000 teachers while the following target groups. a) Advance subsidies provided up to 170,000 teachers who have received educational assistance in 2007 but still completing their education; b) recruitment of 100,000 new teachers for both who are and will improving their qualifications to the S1 / D4.

Subsidies that go to the above object are the provision of aid of some specific funds from the government for civil servants teachers and non-civil servant who are qualified and under the auspices of Department of Education in kindergarten, elementary, junior high, high school, vocational school, and PLB both public and private schools to obtain academic qualifications of S1 or D4 The above description lead to a general question: What is the benefit of granting subsidy to teachers who were targeted with such program in 2008 related to the improvement of knowledge, capabilities and performance of teachers in the learning process and to accelerate the process of improvement of educational qualification through teacher's quality?

## **II. OBJECTIVE**

Getting a an overview of the management implementation of the Academic qualification improvement to S1 / D4 subsidy program fund that is distributed through deconcentration mechanism to the province, which includes: (a) criteria for beneficiaries; (B) determination of the recipient; (C) the payment of benefits; (D) the benefit and (e) the control of the subsidy academic qualification improvement.

The next objective is to know the effect of the Academic qualification improvement to S1 / D4 subsidy program fund that is distributed through deconcentration mechanism to the provinces for teachers' improvement.

The next objective is to know the effect of the Academic qualification improvement to S1 / D4 subsidy program fund that is distributed through deconcentration mechanism to increase teachers' professionalism.



### III. RESEARCH METHOD

The study population was all teachers who receive the fund in 2008, which spread across all provinces in Indonesia. The samples provinces taken are 13 provinces and a sample of 154 teachers. The samples taken based on the province. The sampling technique is done gradually. The first phase determines sampled provinces purposively. Then the research subjects (respondents) were taken randomized.

The research is carried out in the second semester of 2008-2009. The data collecting is using enclosed questionnaire with Self Appraisal model. The assessment is done by teachers against themselves. Assessment shall include the ability to master the subject material they taught, understanding of the students they taught, able to design and implement the subject they taught and have professional capabilities as well as the development of his career.

Data analysis technique used is descriptive analysis, both quantitative and qualitative. Quantitative descriptive used to describe the state of the data obtained through the questionnaire using descriptive statistics, whereas qualitative descriptive analysis is used to present and draw conclusions from data from interviews and field. It also used a simple regression analysis to determine the effect of the economic declaration variable management of teachers' welfare aid program in special area on teacher performance as educators and professionals.

### IV. RESULTS AND DISCUSSION

#### A. Description of Teacher Beneficiaries' Performance Improvement Qualification

Based on data analysis, the information follows: There are 6.13% of respondents gave a negative response to the determination of program's criteria qualification improvement of teachers to S1 / D4. This percentage is below the tolerance limit of 10%. In other words, the performance of the economic declaration disbursement in determining qualification criteria for recipients is complying with applicable regulations.

There are 8.08% of respondents gave a negative response to the performance of economic declaration disbursement qualification improvement in determining the beneficiaries, it is under the tolerance limit of 10%. Thus it can be said that the performance of economic declaration disbursement qualification improvement in determining the beneficiaries comply with predetermined rules. However, there is one attribute that received negative responses over the tolerance limit of 10%, i.e. X6: *the teacher' proposed to receive subsidies as qualified teacher by the Provincial*

*Education Department is a teacher who has had NUPTK*, 14.5% obtained a negative response. This shows that there are teachers (respondents) who have been designated as recipients of teachers' qualification improvement, although they do not have the NUPTK yet. However, at the time of this research, they have made arrangements to have NUPTK with the help of the department of education in their local district.

There are 6.38% of respondents that gave negative response to the performance of economic declaration disbursement qualification improvement in the grant payment; it is under the tolerance





limit of 10%. Thus it can be said that the performance of economic declaration disbursement qualification improvement in grant payment is comply with predetermined rules. However, there is one attribute that received negative responses of more than 10%, i.e. an attribute X9: *During this time, teachers' subsidy paid on time*, gained 17.5% of negative response. This shows that there is a mistimed grant payment on this program. There are 20.50% of respondents who gave negative response to the grant's benefit, it is far above the tolerance limit of 10%. This indicates that the value of the grant's benefit has not met teacher's expectations as beneficiaries. There are three attributes that received negative responses above the tolerance limit 10%, i.e. attribute X<sub>11</sub>, X<sub>14</sub>, and X<sub>15</sub>. *Subsidies for teachers' qualification improvement is made for teachers who are continuing their education, these subsidies are not full aid, the funds are not intended to finance the entire purpose of the study*, it obtained 18.2% of negative response. This shows that not all teachers are aware that the subsidies granted is an aid which is not intended to finance the entire study. b) Attribute X<sub>14</sub>: *This subsidy will improve teachers' welfare*, has 12.9% of negative response. This shows that there are teachers who have not yet realized that the impact of the aid will improve teachers' welfare. c) Attribute X<sub>15</sub>: This aid has a positive value for teachers as the receiver.

There are 2.78% of respondents gave a negative response to the performance of economic declaration disbursement qualification improvement in controlling the aid, it is far below the tolerance limit of 10%. Thus it can be said that economic declaration disbursement qualification improvement in controlling aid has been going well with the predetermined rule. The percentage of teachers' competence in the learning evaluation is 22%, which is included in the category of fair and less.

Teacher performance as a professional: (1) self-learning and doing research, (2) further studies, seminars and training both as participants and as a resource, (3) active in professional organizations such as the Teachers Working Group (KKG) and Deliberation Subject Teacher (MGMPs), (4) write a book of articles on education is still very low, most are in the poor category. In other words, the beneficiaries' ability as a professional educator and the ability of self- development are still very low.

#### B. The influence of economic declaration qualification improvement's performance towards Teachers' Performance

The results of a simple regression analysis of economic declaration qualification improvement's performance variables (X) on the performance of teachers (Y1) obtained the value  $F = 21.948$  with significance  $\alpha = 0,000$ . This means that the regression between economic declaration qualification improvement's performance variables (X) on teachers' performance (Y1) is very significant. The result of the calculation is obtained a direction of coefficient regression  $b = 0,150$  of constant  $a = 3,133$  thus the form of regression of these variables can be formulated by the equation  $\hat{Y} = 3,133 + 0,150X$ . The direction of the regression equation can be described as follows. (See figure 1)

The strength of the relationship between economic declaration qualification improvement's performance (X) with the Teachers' Performance (Y) is indicated by the correlation coefficient. The SPSS calculation results show the correlation coefficient between economic declaration qualification improvement's performance (X) with the teachers' performance  $r = 0,320$  with determination coefficient of 0.102

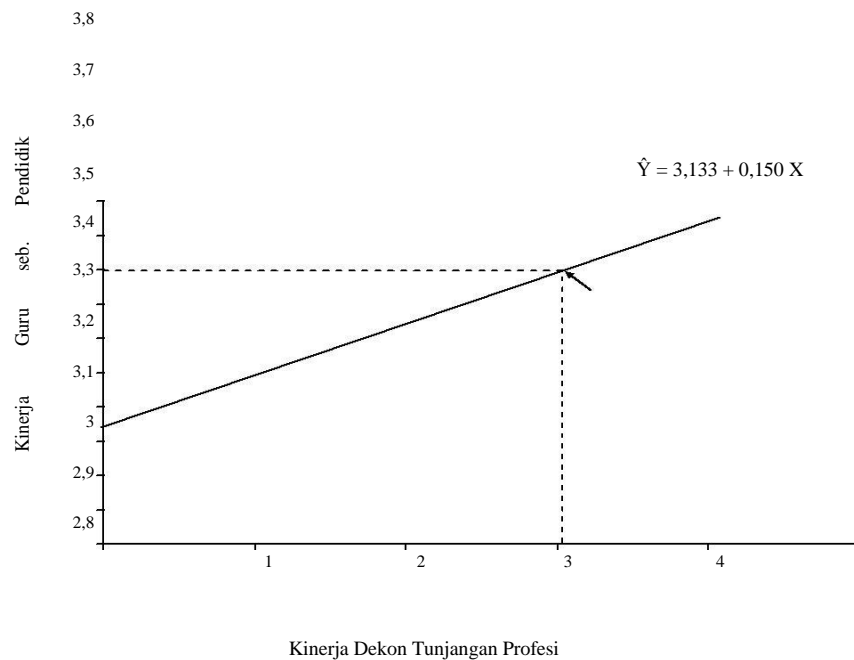


figure 1. regression line  $\hat{Y} = 2,947 + 0,06 X$

Based on the above data it can be concluded that there is a positive relationship between the performance of economic declaration qualification improvement with the performance of teachers, which means that the better the performance of economic declaration qualification improvement, the better the teacher performance, although its effect is low.

C. The influence of the performance of economic declaration qualification improvement grant towards Teachers' Professionalism

The results of a simple regression analysis of economic declaration qualification improvement's performance of qualification improvement (X) on the teachers' professionalism (Y2) obtained the value of  $F = 0.439$  with significance of  $\alpha = 0.508$ . This means that regression between the variable of economic declaration qualification improvement's performance (X) on the teachers' professionalism (Y2) is not significant at  $\alpha = 0.05$  level. It means that regression direction is not a linear. Thus the variable of teachers' professionalism cannot be predicted by the variables of economic declaration qualification improvement's performance, in other words economic declaration qualification



improvement's performance does not affect linearly with the teachers' professionalism.

The calculation results of SPSS shows the correlation coefficients between economic declaration qualification improvement's performance (X) with the teachers' professionalism (Y) shows that the correlation coefficient between them is  $r = 0,035$  at the significance of 0.508, with a coefficient of determination  $r^2 = 0,001$ . Thus it can be concluded that the relationship between them is very small (less than 1%), so that the relationship can be considered insignificant.

## **V. CONCLUSION**

The results of the analysis as presented above, shows that in general the performance of the beneficiaries as educators is included in both categories and tend to be very good. Similarly, if all the components that support the performance of teachers as educators are observed, the teachers' competence in preparing learning, competence in implementing the lessons and also competence in evaluating, all are in good and excellent categories. However, about teachers' competence in evaluating, there is still about 23% that included in the category of fair and less. Therefore the policy makers need to pay attention to improve teachers' competence in evaluating the lessons, while the ability of developing the profession as an educator and also the personal development skills are still very low.

There is a positive relationship between the performance of economic declaration qualification improvement with teachers' performance, which means that the better the performance of the economic declaration qualification improvement, then, the better the teachers' performance, although its effect is low. Similarly, about the performance of economic declaration qualification improvement with teacher's professionalism is very small (less than 1%), so that the relationship can be considered insignificant.



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## AN IMPACT OF VHS TEACHER CERTIFICATION ON TEACHER PERFORMANCES.

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**ABSTRACT** : This study aims to find out in-depth information on teacher certification impacts ( $X_1$ ), work capabilities ( $X_2$ ), work motivation ( $X_3$ ), and work commitment ( $X_4$ ) on teacher performances ( $X_5$ ) after teachers are certified. The study gives benefits to all educational stakeholders to evaluate the effectiveness of teacher certification in teacher performances and vocational high school (VHS) performances after the teacher certification program is implemented. The study employed the mixed methods with a sequential explanatory design by sequentially combining quantitative and qualitative research methods. In the preliminary stage, the research sample consisted of 300 productive teachers holding educator certificates at VHSs; they were selected by means of Krejcie-Morgan formula and the proportional random sampling technique. The data were analyzed statistically to answer the research questions and hypotheses. The results of the quantitative study were then strengthened, deepened, and widened by the qualitative method through in-depth interviews. In the final stage, the analysis was simultaneously done by combining the results of the quantitative and qualitative data analysis so that the conclusions and recommendations were more complete. The results of the study are as follows. (1) Impacts of VHS teacher certification bring about better changes in the aspects of pride, professionalism, and teacher welfare. (2) Teachers' work capabilities become better in the aspects of pedagogical, professional, personal, and social competencies. (3) Teachers' work motivation becomes higher in the aspects of needs for achievement, existence, affiliation, actualization and autonomy, and growth expectation. (4) Teachers' work commitment becomes higher in the aspects of affective commitment, continuity, and being normative. (5) VHS teachers' performances under study in the aspects of main duty implementation and professional development also become better. (6) As an aggregate, teacher certification, work capabilities, work motivation, and work commitment have strong impacts on teacher performances after the certification.

**Keywords:** impacts, teacher certification, teacher performances, school performances

### I. PENDAHULUAN

Sekitar empat puluh delapan tahun yang lalu, Denison (1967, p.78) melalui "human capital theory" telah membuat suatu hubungan antara pendidikan, produktivitas, dan pertumbuhan ekonomi, dimana pendidikan adalah determinan yang paling krusial dari kualitas tenaga kerja. Tampaknya relasi tersebut masih sangat relevan dengan kondisi saat ini. Menurut Trilling & Hood (1999, pp.5-6) dan Wen (2003, pp.21-94), faktor kunci penentu daya saing bangsa dalam era global adalah ilmu pengetahuan dan teknologi serta sumber daya manusia. Hal ini juga didukung oleh Hanushek & Wofsmann (2007, p.4) bahwa "cognitive skills" dari suatu masyarakat memiliki pengaruh yang kuat terhadap penghasilan individu dan pertumbuhan ekonomi. Pendidikan masih diyakini sebagai instrumen untuk meningkatkan kemampuan individu dalam berkontribusi terhadap produktivitas dan berdampak pada kesejahteraan masyarakat. Argumentasi tersebut di atas memberikan pemahaman bahwa pendidikan pada semua level termasuk pendidikan kejuruan (SMK) dapat berkontribusi terhadap pengembangan dan peningkatan daya saing suatu bangsa.

Pendidikan kejuruan (SMK) sebagai lembaga pendidikan yang bertujuan menyiapkan lulusannya memasuki dunia kerja memiliki peran strategis dalam menyiapkan SDM khususnya tenaga



kerja tingkat menengah. Sebagai sub sistem pendidikan nasional, pendidikan kejuruan harus berbenah guna mengantisipasi kebutuhan dan tantangan masa depan. Hal ini perlu dilakukan terus menerus diselaraskan dengan kebutuhan perkembangan dunia usaha dan dunia industri, serta ilmu pengetahuan dan teknologi. Perbaikan pendidikan menengah kejuruan diharapkan dapat menciptakan tenaga kerja terampil yang memenuhi kebutuhan dunia usaha dan industri, serta mencetak manusia yang mampu menciptakan lapangan kerja sendiri (Depdiknas, 2008b, pp.1-66).

Meskipun menunjukkan peran positif, beberapa studi masih menemukan permasalahan yang dihadapi oleh pendidikan kejuruan. Permasalahan tersebut terkait dengan kontribusi bagi masyarakat, kualitas penyelenggaraan program, pembelajaran, kesempatan lulusan mendapatkan pekerjaan, dan tantangan perubahan yang begitu cepat. *Governing Board Members of TVET (2004)*, mencatat beberapa isu dan trend pendidikan kejuruan di kawasan Asia Tenggara yang antara lain menunjukkan: (1) keterbatasan jumlah personil yang kompeten yang berkualitas tinggi termasuk memiliki komitmen dan fokus pada hasil; (2) keterbatasan kapasitas dalam memanfaatkan hasil penelitian dan evaluasi untuk pengembangan; (3) kurangnya program pengembangan staf; (4) citra negatif pendidikan kejuruan terutama di kalangan masyarakat; (5) minimnya jumlah guru yang berkualitas; (6) kurangnya kemitraan sektor pemerintah dengan swasta dalam pelatihan guru dan siswa; (7) kurikulum pendidikan yang kurang relevan menyebabkan ketidakcocokan lulusan pendidikan kejuruan dengan dunia kerja; (8) kurang antisipatif terhadap perkembangan dan ekspansi yang cepat dari teknologi informasi dan komunikasi; (9) keterbatasan pengembangan bahan-bahan pembelajaran; dan (10) kurangnya fasilitas, terutama laboratorium dan bengkel kerja.

Pada lingkup nasional, Direktorat Pembinaan SMK (2008b, p.8) juga memprediksi tantangan yang akan dihadapi para lulusan SMK akan semakin meningkat, untuk itu peserta didik perlu: (1) memiliki keterampilan dasar yang memungkinkan pengembangan dan penyesuaian diri mengikuti perkembangan iptek; (2) mengumpulkan, menganalisa, dan mengorganisasikan informasi; (3) mengkomunikasikan ide dan informasi; (4) merencanakan dan mengorganisasikan kegiatan; (5) mampu bekerjasama dan kerja berkelompok; (6) mampu memecahkan masalah; (7) berfikir logis dan mampu menggunakan ide-ide matematik; (8) menguasai bahasa komunikasi global (bahasa Inggris). Upaya membekali lulusan SMK dengan berbagai kompetensi tersebut selaras dengan analisis Bank Dunia (Nam, 2009, p.3), tentang perlunya perubahan dalam pembelajaran pendidikan kejuruan yang disesuaikan dengan tuntutan pasar kerja. Di era ekonomi berbasis pengetahuan saat ini yang ditandai dengan perubahan pasar, kemajuan ilmu pengetahuan dan teknologi, serta meningkatnya globalisasi dan internasionalisasi, menuntut penguasaan keterampilan dan kompetensi yang sesuai dengan realitas kebutuhan pasar tenaga kerja.

Sampai saat ini, realitas kebutuhan pasar kerja belum sepenuhnya mampu diantisipasi oleh pendidikan kejuruan. Menurut World Economic Forum Global Agenda Council on Employment (Klosters, 2014, p.5), isu tentang keterampilan (*skill*), *matching skill*, dan *skill mismatch* masih mendominasi permasalahan ketenagakerjaan. Secara nasional, terkait dengan daya serap lulusan SMK



oleh dunia usaha dan dunia industri, sekitar 25% kualitas lulusan SMK belum memenuhi ekspektasi dunia industri (Mustagfirin, 2015, p.2). Hal ini membutuhkan terobosan-terobosan baru dalam penyelenggaraan pendidikan kejuruan agar kualitas kinerjanya dapat meningkat.

Faktor mendasar yang dapat meningkatkan kinerja SMK menjadi lebih optimal adalah faktor kinerja guru-gurunya. Guru merupakan komponen yang paling menentukan dalam sistem pendidikan secara keseluruhan yang harus mendapat perhatian yang pertama dan utama. Argumentasi tersebut didukung oleh Fullan (2001, p.115), yang menyatakan bahwa *“educational change depend on what teacher do and think”*. Surya (2008:40), tumpuan kualitas pendidikan pada sosok guru merupakan hal yang wajar, karena guru sebagai pendidik merupakan jabatan yang amat strategis dalam menunjang proses dan hasil kinerja pendidikan secara keseluruhan.

Salah satu cara yang dilakukan oleh pemerintah untuk mengatasi permasalahan rendahnya kualitas guru ini adalah dengan mengadakan sertifikasi. Keputusan pemerintah mengadakan sertifikasi bagi tenaga pendidik (guru) bertujuan untuk: (1) menentukan ke-layakan guru dalam melaksanakan tugas sebagai pendidik profesional; (2) meningkatkan proses dan mutu hasil pendidikan; (3) meningkatkan martabat guru; dan (4) meningkatkan profesionalitas guru (Depdiknas, 2008a, p.5).

Tantangan nyata yang harus dihadapi guru SMK pasca sertifikasi adalah bagaimana guru SMK dapat *survive* dan mampu memberikan *learning services* yang sejalan dengan tuntutan dinamika perkembangan ilmu dan teknologi di abad 21. Guru SMK harus tanggap dan selalu belajar terhadap perubahan dunia dan keinginan masyarakat, termasuk dunia usaha dan dunia industri. Menurut Arends (2004, pp.20-28), menjadi seorang guru yang efektif, guru harus; (1) memiliki kualitas personal yang memungkinkan untuk mengembangkan hubungan antar manusia (siswa, orangtua, dan kolega); (2) dapat menciptakan ruang kelas yang demokratis sebagai model keadilan sosial untuk peserta didik; (3) memiliki dasar pengetahuan yang luas yang berhubungan dengan materi pelajaran, pembangunan manusia dalam proses pembelajaran, dan pedagogi; (4) memiliki pengalaman pengajaran yang efektif untuk merangsang motivasi siswa, meningkatkan prestasi belajar dan mengembangkan pola berpikir tinggi, dan menghasilkan siswa yang mandiri.

Berbagai permasalahan dan tantangan guru di atas makin menunjukkan pentingnya upaya untuk meningkatkan kinerja guru. Guru yang memiliki kinerja rendah tidak saja gagal memenuhi standar kinerja, namun juga akan memberikan pengaruh buruk kepada orang lain (Jones, Jenkin & Lord, 2006, p.2). Guru yang memiliki kinerja rendah dapat berpengaruh negatif kepada: (1) reputasi dan citra sekolah di masyarakat; (2) pencapaian kinerja sekolah; (3) kinerja guru lain; (4) kinerja staf pendukung; dan (5) kepemimpinan dan manajerial sekolah.

Sejak kebijakan program sertifikasi guru digulirkan oleh pemerintah (2007), sampai saat ini belum ada penelitian yang secara komprehensif mengungkap dampak sertifikasi guru terhadap perubahan kinerja guru SMK dan kinerja sekolah. Penelitian ini juga berusaha mengungkap gambaran dampak sertifikasi guru terhadap faktor-faktor yang secara teori dapat mempengaruhi kinerja guru dan kinerja sekolah pasca-sertifikasi. Menurut Schmidt & Hunter (2004, p.171), k antara



lain adalah kemampuan kerja, motivasi kerja, dan komitmen kerja (Greenberg & Baron, 2003, pp.207-208; dan Robbin, 2006, pp. 240-242).

Penelitian ini diharapkan mampu memberikan informasi secara empirik: (1) deskripsi variabel dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, kinerja guru, dan kinerja Sekolah Menengah Kejuruan pasca-sertifikasi; (2) pengaruh variabel dampak sertifikasi guru terhadap kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, kinerja guru dan kinerja Sekolah Menengah Kejuruan pasca-sertifikasi guru dimana tahap pertama didasarkan data penelitian kuantitatif, selanjutnya diperkuat, diperluas dan diperdalam dengan data penelitian kualitatif; (3) struktur hubungan variabel dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, kinerja guru dan kinerja Sekolah Menengah Kejuruan pasca-sertifikasi.

Hasil penelitian ini dapat bermanfaat bagi seluruh *stakeholder* pendidikan dalam menilai keefektifan sertifikasi guru terhadap kinerja guru maupun kinerja SMK setelah kebijakan program sertifikasi guru diberlakukan. Hasil penelitian juga dapat menjadi bahan masukan bagi perumus kebijakan dalam pembinaan tenaga pendidik terutama guru SMK di waktu mendatang.

## **II. METODE PENELITIAN**

### **A. Jenis Penelitian**

Penelitian pengaruh sertifikasi guru SMK terhadap kinerja sekolah ini termasuk jenis penelitian korelasional dengan menggunakan metode kuantitatif-kualitatif (*mixed methods*). Desain penelitian yang digunakan adalah desain *sequential explanatory* atau penelitian kombinasi model. Penelitian kombinasi dengan desain *sequential explanatory* adalah penelitian yang menggabungkan metode penelitian kuantitatif dan kualitatif secara berurutan, di mana pada tahap pertama penelitian dilakukan dengan menggunakan metode kuantitatif dan pada tahap kedua dilakukan dengan metode kualitatif (Cresswel, 2009, p.209). Metode kuantitatif berperan untuk memperoleh data kuantitatif yang terukur, yang dapat bersifat deskriptif, komparatif dan asosiatif sedangkan metode kualitatif berperan untuk membuktikan (memperkuat, memperlemah, menggugurkan), memperdalam, dan memperluas data kuantitatif yang telah diperoleh pada tahap awal.

### **B. Waktu dan Tempat Penelitian**

Penelitian dilaksanakan di SMK Negeri dan Swasta yang berada di wilayah provinsi Daerah Istimewa Yogyakarta (DIY), Bidang Keahlian Teknologi dan Rekayasa yang meliputi 4 kabupaten (Sleman, Bantul, Kulonprogo, dan Gunungkidul) dan satu pemerintah Kota Yogyakarta), selama 1 tahun terhitung sejak bulan Nopember 2013 sampai dengan Oktober 2014.

### **C. Populasi dan Sampel Penelitian**

Pada tahap awal (metode kuantitatif), populasi dalam penelitian ini adalah seluruh guru produktif Bidang Keahlian Teknologi dan Rekayasa di Daerah Istimewa Yogyakarta, yang telah memperoleh sertifikat pendidik. Pemilihan guru produktif sebagai populasi dalam penelitian ini dengan pertimbangan: (1) guru program produktif yang telah memperoleh sertifikat pendidik,



mempersiapkan dan melaksanakan pembelajaran sesuai kompetensi keahliannya dengan jumlah jam mengajar yang lebih banyak (minimal 24 jam mengajar per minggu), sehingga secara langsung membekali siswa sesuai standar kompetensi mata pelajaran yang diampu, (2) guru produktif merupakan faktor kunci penentu keberhasilan pembelajaran kejuruan yang akan mempengaruhi kualitas lulusan, dan (3) guru produktif merupakan pilar utama bagi Sekolah Menengah Kejuruan mengingat kompetensi produktif yang dimiliki adalah inti dari penyelenggaraan pembelajaran di SMK.

Jumlah guru produktif Bidang Keahlian Teknologi dan Rekayasa untuk SMK Negeri dan Swasta yang telah memperoleh sertifikat pendidik, berdasarkan data dari Lembaga Pengembangan dan Penjaminan Mutu Pendidikan Universitas Negeri Yogyakarta adalah sebanyak 1578 orang dengan rincian masing-masing kota/kabupaten ditunjukkan pada Tabel 1.

**Tabel 1.** Jumlah Guru Produktif SMK Bersertifikat Pendidik 2007-2012 di DIY

No	Kabupaten/Kota	Jumlah Guru Program Produktif SMK		
		Negeri	Swasta	Jumlah
1	Kota Yogyakarta	193	155	348
2	Sleman	186	231	417
3	Gunung Kidul	180	136	316
4	Bantul	111	119	230
5	Kulon Progo	129	138	267
Total		799	779	1578

Teknik sampling yang digunakan dalam tahap awal penelitian ini adalah teknik random sampling yang mengacu pada rumus Krejcie dan Morgan yang dikutip oleh Isaac & Michael (1990 p.162), sebagai berikut:

$$S = \frac{\chi^2 NP(1-P)}{d^2(N-1) + \chi^2(1-P)}$$

Keterangan:

- S = jumlah sampel yang diperlukan
- N = jumlah anggota populasi
- P = proporsi populasi yang ditetapkan sebesar 0,5
- D = derajat ketelitian yang ditetapkan sebesar 0,05
- $\chi^2$  = tabel nilai Chi-square sesuai tingkat kepercayaan 0,95 atau nilai Chi-square sebesar 3,841

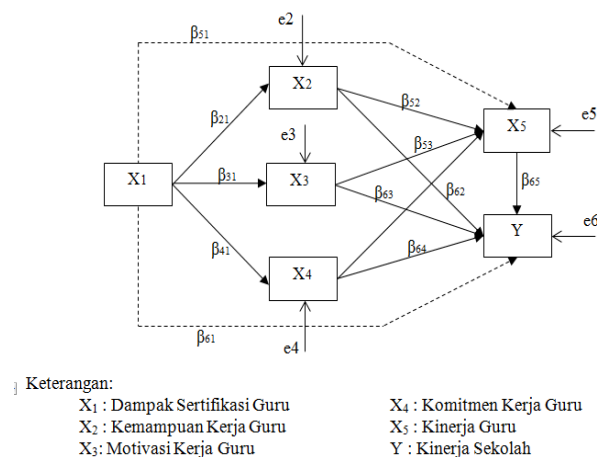
Berdasarkan formula tersebut di atas, diperoleh jumlah sampel sebesar 259 guru. Selanjutnya, untuk pertimbangan terhadap pengisian data-data kuesioner yang tidak lengkap, jumlah sampel tersebut dibulatkan menjadi 300 guru. Secara proportional, jumlah sampel untuk masing-masing sekolah disajikan pada Tabel 2.

**Tabel 2.** Ukuran Sampel Penelitian

No	Kabupaten/Kota	Jumlah Guru Program Produktif SMK		
		Negeri	Swasta	Jumlah
1	Kota Yogyakarta	37	29	66
2	Sleman	35	44	79
3	Gunung Kidul	34	26	60
4	Bantul	21	23	44
5	Kulon Progo	25	26	51
Total		152	148	300

Pada tahap penelitian berikutnya, untuk membuktikan, memperdalam dan memperluas data kuantitatif yang diperoleh pada tahap awal, perlu dilakukan penelitian lanjutan (metode kualitatif). Pada tahap ini perlu dipilih subyek penelitian yang tepat, sehingga data yang diperoleh benar-benar merupakan representasi data yang sesungguhnya. Pada penggunaan metode kualitatif subyek penelitian dipilih dari guru-guru SMK yang memiliki kapasitas sebagai "key informan" penelitian. Subyek dipilih bukan menimbang pada proporsi yang representatif, tetapi secara pragmatis subyek tersebut dapat memberikan informasi secara utuh mengenai dampak sertifikasi guru terhadap faktor-faktor yang mempengaruhi kinerja guru (kemampuan, motivasi dan komitmen), kinerja guru, dan kinerja sekolah pasca sertifikasi. Informan ditempatkan pada posisi aktif dan dipandang memahami dengan baik tentang sertifikasi guru dan kaitannya dengan pengaruh yang ditimbulkan, mudah diakses, dan memiliki waktu yang cukup.

#### D. Variabel Penelitian



Gambar 1. Diagram Jalur Variabel Penelitian

Kinerja individu dipengaruhi oleh banyak faktor, baik dari dalam maupun dari luar individu. Faktor-faktor tersebut Pada tahap penggunaan metode kuantitatif (Gambar 1), variabel dalam penelitian ini terdiri dari lima variabel bebas dan satu variabel terikat. Kelima variabel bebas tersebut adalah: Dampak Sertifikasi Guru ( $X_1$ ), Kemampuan Kerja Guru ( $X_2$ ), Motivasi



Kerja Guru ( $X_3$ ), Komitmen Kerja Guru ( $X_4$ ), dan Kinerja Guru ( $X_5$ ), sedangkan variabel terikatnya adalah Kinerja Sekolah ( $Y$ ).

E. Teknik dan Instrumen Pengumpulan Data

Pada tahap awal (metode kuantitatif), teknik pengumpulan data dalam penelitian ini adalah survei dengan menggunakan alat pengumpul data kuesioner. Bentuk angket digunakan untuk memperoleh data pengukuran kecenderungan perubahan yang dilakukan responden terhadap variabel-variabel dalam penelitian ini yaitu: dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, kinerja guru, dan kinerja sekolah, yang diwujudkan dalam butir-butir pernyataan. Butir-butir pernyataan tersebut digunakan untuk menggali informasi dari diri responden terhadap variabel-variabel penelitian melalui indikator-indikator yang telah disusun sebelumnya.

Berdasarkan alternatif jawaban yang tersedia, angket ini termasuk dalam kategori angket tertutup, karena responden memberikan tanggapan, penilaian atau pendapat terhadap setiap pernyataan dengan cara memilih salah satu alternatif jawaban yang dinilai paling sesuai dengan kondisi sebenarnya. Alternatif jawaban yang diberikan dalam angket menggunakan skala Likert dengan empat pilihan jawaban, yaitu: “sama saja (tidak ada perubahan)” diberi skor 1, “berubah lebih baik dari sebelumnya walaupun sedikit” diberi skor 2, “berubah lebih baik walaupun belum seluruhnya” diberi skor 3, “berubah lebih baik seluruhnya” diberi skor 4. Pemilihan skala Likert dengan empat pilihan dengan maksud untuk menghindari kecenderungan responden memberikan jawaban yang bersifat netral.

Pada tahap akhir (metode kualitatif), untuk memperkuat, memperluas dan memperdalam data kuantitatif, selanjutnya peneliti melakukan pengumpulan data melalui interview kualitatif (Mason, 2006, pp.49-103; Creswell, 2009, pp.179-180). Interview kualitatif, dan rekam audio dilakukan secara alami (*nature*) untuk memenuhi persyaratan *ontology* dan *epistemology*, sebagai bagian dari realitas sosial sekolah menengah kejuruan (SMK).

Interview kualitatif dilakukan terhadap sumber-sumber data dari orang-orang yang dipilih sebagai informan. Interview kualitatif merujuk pada bentuk-bentuk interview yang mendalam (*in-depth*), semi terstruktur dan agak longgar (Mason, 2006, p.62). Interview kualitatif dapat melibatkan interaksi satu lawan satu (*one-to-one*), digunakan untuk menggali data-data yang tidak dapat diobservasi secara langsung. Interaksi dialogis antara informan dan peneliti direkam menggunakan perekam suara digital. Secara ontologis interview dilakukan berdasarkan pertanyaan penelitian dan berhubungan dengan pengetahuan, pandangan, pemahaman, inter-pretasi, pengalaman dan interaksi penuh makna dari para informan sesuai dengan realitas sosialnya. Dalam posisi epistemologis cara pengumpulan data penuh makna dilakukan melalui percakapan interaktif, bertanya, mendengarkan, meningkatkan akses, bersahabat, meningkatkan artikulasi, dan bukan interogasi terhadap informan (Mason, 2006).

#### F. Teknik Analisis Data

Pada tahap awal penelitian (metode kuantitatif), teknik analisis data dalam penelitian ini menggunakan dua analisis yaitu analisis deskriptif dan analisis inferensial (uji hipotesis) dengan terlebih dahulu dilakukan uji persyaratan analisis.

##### *Analisis Deskriptif*

Analisis deskriptif dimaksudkan untuk mengetahui karakteristik masing-masing variabel serta dapat melakukan representasi obyektif masalah penelitian. Pada penelitian ini analisis deskriptif akan dilakukan penyajian data melalui: (a) distribusi frekuensi setiap variabel; (b) ukuran tendensi sentral (mean, modus, median); (c) variabilitas data (standar deviasi dan varian); dan (d) grafik pareto.

##### *Uji Persyaratan Analisis*

Uji persyaratan analisis dimaksudkan untuk menguji apakah data yang terkumpul memenuhi syarat dianalisis dengan uji statistika analisis jalur. Kerlinger (2005) mengemukakan empat syarat yang diperlukan untuk melakukan analisis korelasional agar kesimpulannya tidak menyimpang yaitu: (a) sampel penelitian harus diambil secara acak/random, (b) bentuk sebaran data x dan y harus berdistribusi normal, (c) hubungan antara variabel x dan y merupakan hubungan linier, dan (d) antara variabel bebas tidak terjadi multikolinieritas. Sedangkan untuk analisis jalur menurut Sudjana (2003, p.297), terdapat beberapa persyaratan yang meliputi: (a) hubungan antar variabel dalam model linear, aditif dan kausal; (b) masing-masing residual tidak berkorelasi dengan variable-variabel yang mendahuluinya dan tidak berkorelasi satu sama lain; (c) dalam sistem hanya ada arus kausal searah; (d) variabel-variabel diukur dengan skala interval; dan (e) tidak ada kesalahan pengukuran variabel-variabel. Coakes & Steed (1996, p.130), uji persyaratan analisis yang dilakukan dalam penelitian ini meliputi uji normalitas, uji linieritas, uji homoskedastisitas dan uji multikolinieritas.

##### *Uji Hipotesis*

Untuk menguji hipotesis tersebut dilakukan analisis regresi linier sederhana, regresi linier ganda, dan dilanjutkan dengan analisis jalur. Regresi linier ganda dilakukan untuk menguji keberartian regresi atau signifikansi pengaruh variabel bebas baik sendiri-sendiri maupun bersama-sama terhadap variabel bebas, sumbangan (determinasi) variabel bebas baik secara sendiri-sendiri maupun bersama-sama terhadap variabel terikat, dan model persamaan regresinya. Analisis jalur digunakan untuk mengetahui besarnya pengaruh langsung dan pengaruh tak langsung yang didasarkan pada model hubungan kausal empiris dari data hasil penelitian. Melalui analisis jalur dapat diketahui koefisien jalur, model persamaan struktural dan pola pengaruh langsung dan tak langsung dari model kausal.

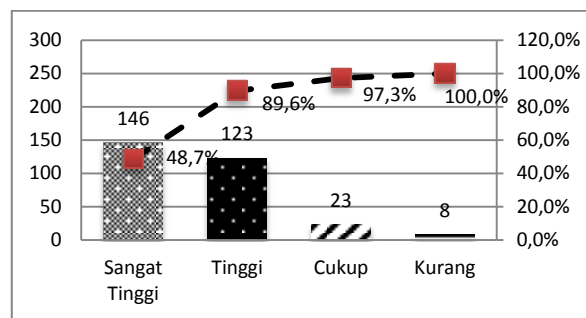
### **III. HASIL PENELITIAN DAN PEMBAHASAN**

#### A. Dampak Sertifikasi Guru

Hasil analisis data secara empiris terhadap variabel ini diperoleh rentang skor 21 sampai dengan 68, ukuran tendensi sentral diperoleh nilai rerata 53,54, modus sebesar 58,0, median sebesar 55,0, dan simpangan baku empiris sebesar 9,02. Hasil perhitungan rerata empiris sebesar 53,54 dan

nilai modus sebesar 58, menunjukkan bahwa nilai rerata empiris lebih besar dibandingkan dengan nilai rerata normatif (42,5). Hal ini menunjukkan bahwa kecenderungan data kuantitatif dampak sertifikasi guru SMK secara keseluruhan termasuk dalam kategori “tinggi”.

Tingginya perubahan dampak sertifikasi guru tersebut ditandai oleh karakteristik: (a) guru SMK memiliki kebanggaan, kepercayaan diri, dan semangat yang lebih tinggi; (b) guru SMK mengalami peningkatan kompetensi dan karir yang lebih baik; (c) guru SMK merasakan peningkatan kegembiraan dan kemanfaatan ekonomi yang lebih baik.

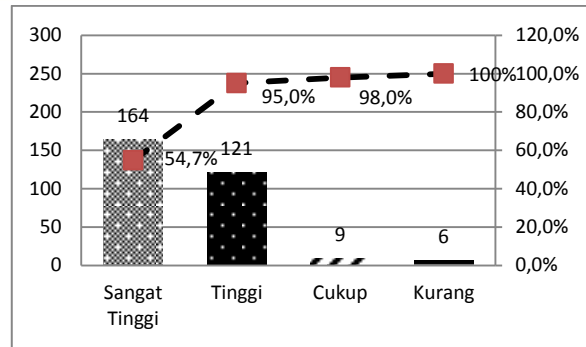


**Gambar 2.** Kecenderungan Data Variabel Dampak Sertifikasi Guru

Gambaran deskripsi variabel dampak sertifikasi guru tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwa pasca-sertifikasi, kedudukan guru SMK semakin kokoh, harga dirinya semakin meningkat, lebih tenang dan nyaman dalam mengajar, dan loyalitasnya juga bertambah. Guru SMK merasa lebih gigih untuk menyelesaikan tugas dan tanggungjawabnya. Kesejahteraan guru SMK yang meningkat sebagian dimanfaatkan untuk mengembangkan kompetensinya, sehingga penguasaan IT guru SMK semakin baik. Disamping dimanfaatkan untuk memenuhi tuntutan kurikulum seperti updating materi dan sumber pembelajaran, juga digunakan untuk pembuatan media pembelajaran.

#### B. Kemampuan Kerja Guru

Hasil analisis data secara empiris terhadap variabel ini diperoleh rentang skor 80,0 sampai dengan 268,0 ukuran tendensi sentral data secara empiris diperoleh nilai rerata 217,36, modus sebesar 255,0 median sebesar 221,0 dan simpangan baku empiris sebesar 32,40. Hasil perhitungan rerata empiris sebesar 217,36 dan nilai modus sebesar 255,0. Berarti nilai rerata empiris lebih besar dibandingkan dengan nilai rerata normatif (167,5), sehingga kecenderungan data kuantitatif kemampuan kerja guru SMK pasca-sertifikasi termasuk dalam kategori “tinggi”. Tingginya perubahan kemampuan kerja guru SMK tersebut ditandai oleh karakteristik: (a) guru SMK memiliki kemampuan mengenal karakteristik peserta didik dari aspek afektif, penguasaan teori belajar, pengembangan kurikulum, penyelenggaraan pembelajaran, pemanfaatan teknologi informasi, pengembangan potensi peserta didik, komunikasi, penilaian, evaluasi, dan tindakan reflektif yang lebih baik;



**Gambar 3.** Kecenderungan Data Variabel Kemampuan Kerja Guru

(b) guru SMK memiliki kemampuan dalam penguasaan materi, standar kompetensi, pengembangan materi pembelajaran, pengembangan keprofesionalan, dan pemanfaatan teknologi informasi dan komunikasi yang lebih baik; (c) guru SMK memiliki kemampuan berperilaku sesuai norma, agama, hukum, sosial dan budaya, jujur, mantap dan berwibawa, etos kerja, tanggungjawab, dan kode etik profesi guru secara lebih baik; (d) guru SMK mampu bertindak obyektif, tidak diskriminatif, berkomunikasi secara efektif, empatik, dan santun, beradaptasi di tempat tugas, dan membangun komunikasi dengan komunitas profesi guru secara lebih baik.

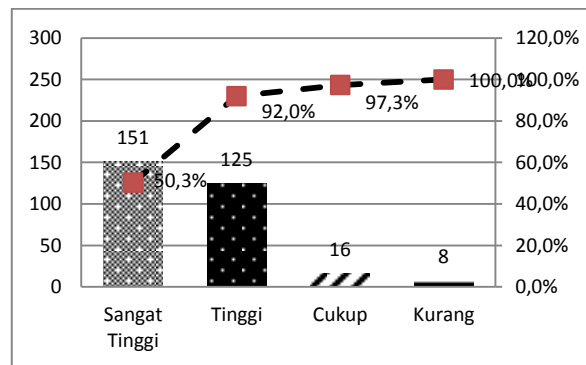
Deskripsi kuantitatif variabel kemampuan kerja guru tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwa pasca-sertifikasi guru SMK mengalami perubahan kompetensi pedagogis yang lebih baik sejak perencanaan, pelaksanaan pembelajaran, evaluasi hasil belajar, dan memanfaatkan hasil evaluasi untuk pengembangan potensi yang dimiliki oleh peserta didik. Pada aspek kompetensi profesional, guru SMK lebih mendalami penguasaan materi-materi baru, lebih aktif mengikuti pendidikan dan latihan yang relevan dengan kompetensinya, dan semakin tumbuhnya budaya belajar dengan sesama sejawat. Perubahan kompetensi kepribadian guru SMK pasca-sertifikasi yang terkait dengan norma agama, sosial, dan budaya relatif tidak berbeda karena relatif sudah terbangun secara harmonis. Pasca-sertifikasi, komunikasi antara guru dan siswa dapat terjalin dengan baik, tidak ada guru yang melakukan tindakan diskriminasi yang terkait gender, agama dan suku dalam pembelajaran, hubungan antar personel sekolah relatif terjaga, dan persaingan antar pribadi guru berjalan halus karena adanya forum-forum keagamaan dan kegiatan olahraga yang difasilitasi oleh sekolah.

### C. Motivasi Kerja Guru

Analisis data empiris terhadap variabel ini diperoleh rentang skor 59 sampai dengan 180, ukuran tendensi sentral data secara empiris diperoleh nilai rerata 142,46, modus sebesar 134 median sebesar 147 dan simpangan baku empiris sebesar 23,46. Hasil perhitungan rerata empiris sebesar 142,46 dan nilai modus sebesar 147,0 sehingga nilai rerata empiris lebih besar dibandingkan dengan nilai rerata normatif (112,5). Hal ini menunjukkan bahwa kecenderungan data kuantitatif motivasi kerja guru SMK pasca-sertifikasi termasuk dalam kategori “tinggi”.

Tingginya perubahan motivasi kerja guru SMK tersebut ditandai oleh karakteristik: (a) guru SMK memiliki semangat, tanggung jawab, kegigihan, tujuan dan target yang realistis, pertimbangan

resiko, keterbukaan terhadap kritik, dan etos kerja yang lebih tinggi; (b) guru SMK memiliki upaya penyelesaian masalah pembelajaran, pengarahan, pembimbingan, kerja keras, dan keinginan memperoleh penghargaan yang lebih tinggi; (c) guru SMK memiliki upaya dalam membangun hubungan yang hangat dan akrab, citra positif, keterlibatan dalam kegiatan, dan pelibatan diri yang lebih baik; (d) guru SMK memiliki upaya kemandirian dalam bekerja, pemilihan metode kerja, dan kenyamanan kerja secara lebih baik; (e) guru SMK memiliki keyakinan untuk keberhasilan, pemeliharaan kejujuran dan kedisiplinan dalam pengembangan karir dengan lebih baik.

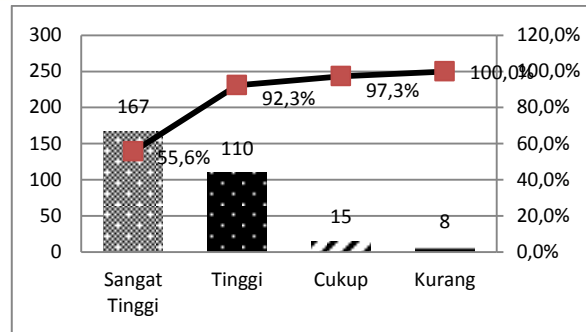


**Gambar 4.** Kecenderungan Data Variabel Motivasi Kerja Guru

Deskripsi kuantitatif variabel motivasi kerja guru tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwapasca-sertifikasi, guru SMK lebih aktif dan bersemangat mencari kegiatan yang dibutuhkan bagi pengembangan profesionalismenya. Terjadi perubahan semangat dari guru SMK dalam mengupayakan peningkatan prestasi peserta didiknya melalui penambahan jam di luar pelajaran. Guru SMK juga menjadi lebih kreatif dalam menentukan tindakan yang diperlukan untuk menyelesaikan masalah pembelajaran yang dihadapi siswa. Kebutuhan afiliasi guru SMK juga tersalurkan dengan lebih baik, sehingga hubungan yang hangat dan akrab dengan sejawat dapat terjalin dengan baik.

#### D. Komitmen Kerja Guru

Hasil analisis data penelitian terhadap variabel ini diperoleh rentang skor 27 sampai dengan 108, ukuran tendensi sentral data secara empiris diperoleh nilai rerata 88,47, modus sebesar 96,0, median sebesar 93,0 dan simpangan baku empiris sebesar 15,37. Hasil perhitungan rerata empiris sebesar 88,47 dan nilai modus sebesar 96, menunjukkan bahwa nilai rerata empiris lebih besar dibandingkan dengan nilai rerata normatif (67,5). Data ini menunjukkan bahwa kecenderungan data kuantitatif komitmen kerja guru SMK pasca-sertifikasi termasuk dalam kategori “tinggi”.



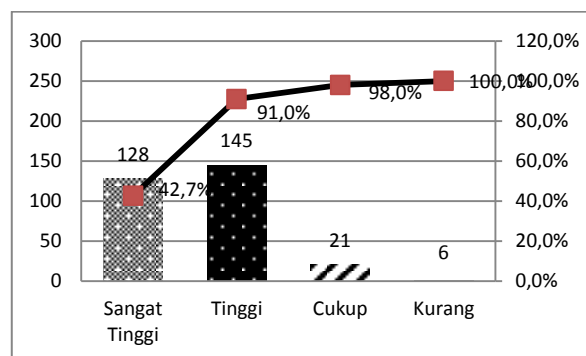
**Gambar 5.** Kecenderungan Data Variabel Komitmen Kerja Guru

Tingginya perubahan komitmen kerja guru SMK tersebut ditandai oleh karakteristik: (a) guru SMK memiliki keterikatan dengan sekolah, penerimaan tujuan dan nilai-nilai sekolah, serta keinginan berpartisipasi pada kegiatan sekolah secara lebih baik; (b) guru SMK memiliki upaya dalam membantu pencapaian tujuan sekolah, perolehan kemanfaatan dari sekolah, dan kegairahan kerja yang lebih tinggi; (c) guru SMK memiliki keinginan dan tanggung jawab untuk tetap menjadi bagian dari sekolah secara lebih baik.

Deskripsi kuantitatif variabel komitmen kerja guru tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwapasca-sertifikasi, guru SMK memilih fokus di satu sekolah dan meninggalkan tugas mengajar di sekolah lain. Sikap handarbeni guru SMK terhadap organisasi sekolah semakin kuat. Penerimaan guru SMK terhadap tujuan, nilai-nilai, dan aturan yang dimiliki oleh sekolah yang awalnya terasa berat, sedikit demi sedikit mengalami perubahan yang lebih baik. Di samping kesadaran guru untuk bekerja secara optimal berubah semakin baik karena merasa sudah tercukupi, tugas mengajar sebanyak 24 jam per minggu juga dilaksanakan dengan penuh tanggungjawab dan disiplin.

#### E. Kinerja Guru

Analisis data penelitian terhadap variabel ini diperoleh rentang skor 55 sampai dengan 180, ukuran tendensi sentral data secara empiris diperoleh nilai rerata 140,3, modus sebesar 142,0, median sebesar 142,0 dan simpangan baku empiris sebesar 23,15. Data ini menunjukkan bahwa nilai rerata empiris (140,3) lebih besar dibandingkan dengan nilai rerata normatif (112,5), sehingga kecenderungan data kuantitatif kinerja guru SMK pasca-sertifikasi termasuk dalam kategori “tinggi”.



**Gambar 6.** Kecenderungan Data Variabel Kinerja Guru





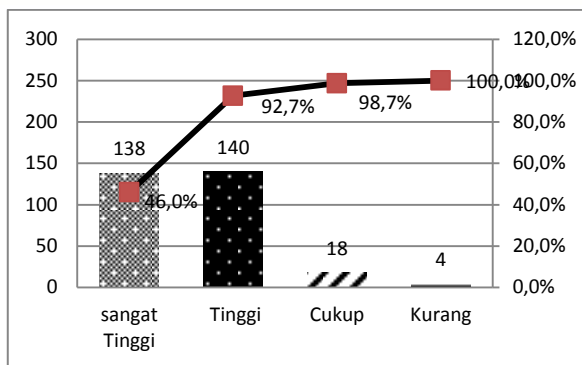
Tingginya perubahan kinerja guru SMK tersebut ditandai oleh karakteristik: (a) guru SMK dapat melakukan tugas pokok mengajar, mendidik, membimbing dan melatih peserta didik dengan lebih baik; (b) guru SMK dapat melakukan hubungan non pembelajaran, tugas pengembangan dan pengelolaan, tugas administratif, ekstrakurikuler, akreditasi sekolah, dan tugas non akademik lainnya secara lebih baik; (c) guru SMK dapat melakukan pengembangan profesionalisme, keikutsertaan dalam organisasi, dan kepemilikan penghargaan yang relevan dengan bidang pendidikan secara lebih baik.

Deskripsi kuantitatif variabel kinerja guru tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwapasca-sertifikasi, kesiapan guru dalam melakukan aktifitas mengajar lebih baik, pemanfaatan teknologi informasi untuk menunjang kegiatan tugas pokok dan administrasi lebih berkembang, dan guru SMK menjadi lebih intensif dalam membimbing dan melatih peserta didik. Pelaksanaan tugas administratif di luar tugas pokok relatif lebih baik karena ada peningkatan keaktifan guru SMK terhadap sekolah pasca-sertifikasi. Budaya meneliti, menulis karya ilmiah, dan mempresentasikan hasilnya pada forum ilmiah di kalangan guru SMK mulai bermunculan, walaupun baru sebagian kecil guru yang bersedia melakukannya.

#### F. Kinerja Sekolah

Hasil analisis data penelitian (empiris) terhadap variabel ini diperoleh rentang skor 52 sampai dengan 156, ukuran tendensi sentral data secara empiris diperoleh nilai rerata 124,54, modus sebesar 116,0, median sebesar 125,0, dan simpangan baku empiris sebesar 18,10. Data ini menunjukkan bahwa nilai rerata empiris lebih besar dibandingkan dengan nilai rerata normatif (97,5), berarti kecenderungan data kuantitatif kinerja sekolah (SMK) pasca-sertifikasi termasuk dalam kategori “tinggi”.

Tingginya perubahan kinerja SMK tersebut ditandai oleh karakteristik: (a) sekolah memiliki kelengkapan dokumen kurikulum, dokumen perangkat kurikulum, dan dokumen pendukung perangkat kurikulum dengan lebih baik; (b) sekolah dapat menyelenggarakan perencanaan pembelajaran, proses pembelajaran, penilaian hasil pembelajaran, dan pengawasan proses pembelajaran secara lebih baik; (c) sekolah memiliki prestasi akademik, daya serap lulusan, dan prestasi non akademik yang lebih meningkat; (d) sekolah dapat melaksanakan penilaian hasil belajar oleh pendidik, penilaian hasil belajar oleh sekolah dengan melibatkan asosiasi profesi, dan penilaian hasil belajar oleh pemerintah secara lebih baik; (e) sekolah memiliki pendidik dan tenaga kependidikan dengan kualifikasi akademik dan bidang keahlian yang relevansinya lebih tinggi dengan kebutuhan sekolah; (f) sekolah mampu menyelenggarakan sistem pendidikan secara efektif melalui perencanaan, pelaksanaan, dan pengawasan yang lebih baik.



**Gambar 7.** Kecenderungan Data Variabel Kinerja Sekolah

Deskripsi kuantitatif variabel kinerja sekolah tersebut diperkuat, diperluas dan diperdalam dengan hasil penelitian kualitatif yang menunjukkan bahwa pasca-sertifikasi, sekolah memiliki kesiapan yang lebih baik sejak awal semester dan lebih responsif terhadap perubahan kurikulum baru khususnya untuk mata pelajaran produktif. Aktivitas perencanaan, pelaksanaan, penilaian, dan pengawasan pembelajaran dilakukan oleh sekolah secara lebih intensif. Sekolah juga memfasilitasi penambahan aktivitas di luar pembelajaran untuk memenuhi tuntutan keterampilan yang harus dicapai peserta didik. Pasca-sertifikasi, uji kompetensi mata pelajaran produktif di SMK telah melibatkan asesor eksternal dan kelompok industri yang relevan. Di samping itu, kerjasama dengan DUDI juga terjalin lebih baik sehingga lulusan SMK banyak yang terserap langsung ke dunia kerja.

**Pengaruh Variabel Dampak Sertifikasi Guru terhadap Kemampuan Kerja Guru**

**Tabel 3.** Rangkuman Hasil Uji F Variabel  $X_1$  terhadap  $X_2$

Variabel		B	Beta	$r_{12}$	Determinasi $(r_{12})^2$	t hitung	Sig.t
Terikat	Bebas						
$X_2$	$X_1$	2,942	0,812	0,812	0,659	24,01	0,000

Berdasarkan rangkuman hasil uji t pada Tabel 3 diperoleh  $t_{hitung}$  sebesar 24,01 dengan nilai probabilitas ( $p$ )  $< 0,05$ , nilai korelasi  $r_{12}$  sebesar 0,812 dan koefisien determinasi  $(r_{12})^2$  sebesar 0,659 dapat dinyatakan bahwa pengaruh variabel dampak sertifikasi guru ( $X_1$ ) terhadap kemampuan kerja guru ( $X_2$ ) pasca program sertifikasi guru SMK teruji secara signifikan. Koefisien determinasi sebesar 0,659 memberikan informasi bahwa variabel dampak sertifikasi guru ( $X_1$ ) memberikan sumbangan sebesar 65,9% terhadap variabel kemampuan kerja guru ( $X_2$ ).

Secara kuantitatif, dampak sertifikasi guru memberikan sumbangan yang signifikan terhadap perubahan kemampuan kerja guru SMK pasca-sertifikasi. Hasil ini mengindikasikan bahwa setiap perubahan kualitas dampak sertifikasi guru akan mempengaruhi kemampuan kerja guru SMK. Hasil penelitian kuantitatif tersebut diperdalam dan diperluas dengan hasil penelitian kualitatif dimana pasca-sertifikasi, guru SMK mengalami peningkatan kebanggaan, kepro-fesionalan, dan kesejahteraan yang dimanfaatkan untuk memperbaiki kemampuan kerja guru baik pada aspek pengembangan keilmuan, penguasaan teknologi informasi, komunikasi sosial, maupun pengembangan personal.

Pengaruh Variabel Dampak Sertifikasi Guru terhadap Motivasi Kerja Guru.

**Tabel 4.** Rangkuman Hasil Uji F Variabel  $X_1$  terhadap  $X_3$

Variabel		B	Beta	$r_{13}$	Determinasi ( $r_{13}$ ) <sup>2</sup>	t hitung	Sig.t
Terikat	Bebas						
$X_3$	$X_1$	1,967	0,757	0,757	0,573	19,997	0,000

probabilitas ( $p$ )  $<0,05$ , nilai korelasi  $r_{13}$  sebesar 0,757 dan koefisien determinasi ( $r_{13}$ )<sup>2</sup> sebesar 0,573 dapat dinyatakan bahwa pengaruh variabel dampak sertifikasi guru ( $X_1$ ) terhadap motivasi kerja guru ( $X_3$ ) pasca program sertifikasi guru SMK teruji secara signifikan. Koefisien determinasi sebesar 0,573 memberikan informasi bahwa variabel dampak sertifikasi guru ( $X_1$ ) memberikan sumbangan sebesar 57,3% terhadap variabel motivasi kerja guru ( $X_3$ ).

Secara kuantitatif, dampak sertifikasi guru memberikan sumbangan yang signifikan terhadap perubahan motivasi kerja guru SMK pasca-sertifikasi. Hasil ini mengindikasikan bahwa setiap perubahan kualitas dampak sertifikasi guru akan mempengaruhi motivasi kerja guru SMK. Hasil penelitian kuantitatif tersebut diperdalam dan diperluas dengan hasil penelitian kualitatif, dimana perubahan kebanggaan, keprofesional-an, dan kesejahteraan guru SMK pasca-sertifikasi meningkatkan semangat dan kegigihan guru dalam mengajar, pengembangan karir dan profesionalismenya.

Berdasarkan rangkuman hasil uji F pada Tabel 4 diperoleh thitung sebesar 19,997 dengan nilai Pengaruh Variabel Dampak Sertifikasi Guru terhadap Komitmen Kerja Guru.

**Tabel 5.** Rangkuman Hasil Uji F Variabel  $X_1$  terhadap  $X_4$

Variabel		B	Beta	$r_{14}$	Determinasi ( $r_{14}$ ) <sup>2</sup>	t hitung	Sig.t
Terikat	Bebas						
$X_4$	$X_1$	1,139	0,675	0,675	0,456	15,793	0,000

Berdasarkan rangkuman hasil uji F pada Tabel 5 diperoleh thitung sebesar 15,793 dengan nilai probabilitas ( $p$ )  $<0,05$ , nilai korelasi  $r_{14}$  sebesar 0,675 dan koefisien determinasi ( $r_{14}$ )<sup>2</sup> sebesar 0,456 dapat dinyatakan bahwa pengaruh variabel dampak sertifikasi guru ( $X_1$ ) terhadap komitmen kerja guru ( $X_4$ ) pasca program sertifikasi guru SMK teruji secara signifikan. Koefisien determinasi sebesar 0,456 memberikan informasi bahwa variabel dampak sertifikasi guru ( $X_1$ ) memberikan sumbangan sebesar 45,6% terhadap variabel komitmen kerja guru ( $X_4$ ).

Secara kuantitatif, dampak sertifikasi guru memberikan sumbangan yang signifikan terhadap perubahan komitmen kerja guru SMK pasca-sertifikasi. Hasil ini mengindikasikan bahwa setiap perubahan kualitas dampak sertifikasi guru juga akan mempengaruhi peningkatan komitmen kerja guru SMK. Hasil penelitian kuantitatif tersebut diperdalam dan diperluas dengan hasil penelitian kualitatif dimana perubahan kebanggaan, keprofesionalan, dan kesejahteraan guru SMK pasca-sertifikasi juga mampu meningkatkan sikap keterikatan, kegairahan, dan kedisiplinan guru SMK.

Pengaruh Variabel Dampak Sertifikasi Guru, Kemampuan Kerja Guru, Motivasi Kerja Guru dan Komitmen Kerja Guru terhadap Kinerja Guru.

**Tabel 6.** Rangkuman Hasil Uji F Variabel  $X_1$ ,  $X_2$ ,  $X_3$  dan  $X_4$  terhadap  $X_5$

Variabel		B	Beta	$r_{par}$	Determinasi ( $r_{par}$ ) <sup>2</sup>	t hitung	Sig. t
Terikat	Bebas						
$X_5$	$X_1$	-0,177	-0,069	-0,095	0,009	-1,641	0,102
Uji F simultan: R = 0,909 R <sup>2</sup> = 0,827 F = 325,437 p = 0,000 C = 6,938	$X_2$	0,151	0,211	0,198	0,039	3,478	0,001
	$X_3$	0,368	0,369	0,229	0,052	5,378	0,000
	$X_4$	0,652	0,426	0,431	0,186	8,214	0,000

Berdasarkan rangkuman hasil uji F atas  $X_1$ ,  $X_2$ ,  $X_3$  dan  $X_4$  secara simultan terhadap  $X_5$  pada Tabel 6 diperoleh  $F_{hitung}$  sebesar 325,437 dengan nilai probabilitas ( $p$ )  $< 0,05$ , nilai korelasi sebesar 0,909 dan koefisien determinasi sebesar 0,827, sehingga dapat dinyatakan bahwa pengaruh variabel dampak sertifikasi guru ( $X_1$ ), kemampuan kerja guru ( $X_2$ ), motivasi kerja guru ( $X_3$ ), dan komitmen kerja guru ( $X_4$ ), secara simultan terhadap kinerja guru ( $X_5$ ) pasca program sertifikasi guru SMK teruji secara signifikan dengan sumbangan sebesar 82,7%. Secara parsial, variabel dampak sertifikasi guru ( $X_1$ ) tidak mempunyai pengaruh signifikan terhadap variabel kinerja guru ( $X_5$ ) dengan diketahui nilai uji t sebesar -1,641 dengan  $p > 0,05$ , nilai korelasi parsial -0,095 dan nilai koefisien determinasi sebesar 0,009. Selanjutnya variabel kemampuan kerja guru ( $X_2$ ) mempunyai pengaruh signifikan terhadap variabel kinerja guru ( $X_5$ ) dengan diketahui nilai uji t sebesar 3,478 dengan  $p < 0,05$ , nilai korelasi parsial 0,198 dan nilai koefisien determinasi sebesar 0,039. Variabel motivasi kerja guru ( $X_3$ ) mempunyai pengaruh signifikan terhadap variabel kinerja guru ( $X_5$ ) dengan diketahui nilai uji t sebesar 5,378 dengan  $p < 0,05$ , nilai korelasi parsial 0,229 dan nilai koefisien determinasi sebesar 0,052. Variabel komitmen kerja guru ( $X_4$ ) mempunyai pengaruh signifikan terhadap variabel kinerja guru ( $X_5$ ) dengan diketahui nilai uji t sebesar 8,214 dengan  $p < 0,05$ , nilai korelasi parsial 0,431 dan nilai koefisien determinasi sebesar 0,186. Berdasarkan koefisien determinasi parsial masing-masing variabel di atas, variabel yang mempunyai sumbangan terbesar terhadap kinerja guru adalah variabel komitmen kerja guru ( $X_4$ ) dengan nilai sumbangan sebesar 18,6%, selanjutnya berturut-turut variabel motivasi kerja guru ( $X_3$ ) memberikan sumbangan sebesar 5,2%, variabel kemampuan kerja guru ( $X_2$ ) memberikan sumbangan 3,9% dan variabel dampak sertifikasi guru ( $X_1$ ) tidak memberikan sumbangan (nilai koefisien determinasi sangat kecil). Dengan demikian dapat diketahui bahwa variabel komitmen kerja guru mempunyai pengaruh yang dominan terhadap pelaksanaan kinerja guru SMK pasca-sertifikasi.

Secara simultan, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru memberikan sumbangan yang signifikan terhadap kinerja guru SMK pasca-sertifikasi. Hal ini berarti setiap perubahan kualitas dari dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru akan mempengaruhi peningkatan kinerja guru

pasca-sertifikasi. Secara parsial, dampak sertifikasi guru tidak memberikan pengaruh langsung yang signifikan terhadap kinerja guru, sedangkan kemampuan kerja guru dan motivasi kerja memberikan sumbangan yang relatif kecil, sumbangan yang lebih dominan terhadap kinerja guru diberikan oleh komitmen kerja guru SMK.

Hasil regresi tersebut diperdalam dan diperluas dengan rangkuman hasil penelitian kualitatif bahwa dampak sertifikasi mempengaruhi perubahan kebanggaan, keprofesionalan, dan kesejahteraan guru SMK yang berdampak pada: (1) pengembangan keilmuan, penguasaan teknologi informasi, komunikasi sosial, maupun pengembangan personal, (2) peningkatan semangat dan kegigihan guru dalam mengajar, pengembangan karir dan profesionalisme, dan (3) perubahan sikap keterikatan, kegairahan, dan kedisiplinan guru SMK yang selanjutnya mempengaruhi keberhasilan guru dalam melaksanakan tugas mengajar, mendidik, melatih, dan membimbing peserta didik.

Pengaruh Variabel Dampak Sertifikasi Guru, Kemampuan Kerja Guru, Motivasi Kerja Guru, Komitmen Kerja Guru, dan Kinerja Guru terhadap Kinerja Sekolah.

**Tabel 7.** Rangkuman Hasil Uji F Variabel  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  dan  $X_5$  terhadap Y

Variabel		B	Beta	$r_{par}$	Determinasi ( $r_{par}$ ) <sup>2</sup>	t hitung	Sig. t
Terikat	Bebas						
Y	$X_1$	0,050	0,025	0,024	-	0,419	0,675
Uji F simultan: R = 0,815 R <sup>2</sup> = 0,664 F=116,371 p= 0,000 C=27,594	$X_2$	0,129	0,229	0,153	0,023	2,652	0,008
	$X_3$	-0,074	-0,094	-0,054	-	-0,935	0,351
	$X_4$	0,245	0,203	0,146	0,021	2,527	0,012
	$X_5$	0,393	0,498	0,336	0,112	6,126	0,000

Berdasarkan rangkuman hasil uji F atas  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  dan  $X_5$  secara simultan terhadap Y pada Tabel 7 diperoleh Fhitung sebesar 116,371 dengan nilai probabilitas (p) <0,05, nilai korelasi sebesar 0,815 dan koefisien determinasi sebesar 0,664, sehingga dapat dinyatakan bahwa pengaruh variabel dampak sertifikasi guru ( $X_1$ ), kemampuan kerja guru ( $X_2$ ), motivasi kerja guru ( $X_3$ ), komitmen kerja guru ( $X_4$ ), dan kinerja guru ( $X_5$ ), terhadap kinerja sekolah (Y) pasca program sertifikasi guru SMK teruji secara signifikan dengan sumbangan sebesar 66,4%.

Secara parsial, variabel dampak sertifikasi guru ( $X_1$ ) tidak mempunyai pengaruh signifikan terhadap variabel kinerja sekolah (Y) dengan diketahui nilai uji t sebesar 0,419 dengan p >0,05, nilai korelasi parsial 0,024. Selanjutnya variabel kemampuan kerja guru ( $X_2$ ) mempunyai pengaruh signifikan terhadap variabel kinerja sekolah (Y) dengan diketahui nilai uji t sebesar 2,652 dengan p <0,05, nilai korelasi parsial 0,153 dan nilai koefisien determinasi sebesar 0,023. Variabel motivasi kerja guru ( $X_3$ ) tidak mempunyai pengaruh signifikan terhadap variabel kinerja sekolah (Y) dengan diketahui nilai uji t sebesar -0,935 dengan p >0,05, nilai korelasi parsial -0,054. Variabel komitmen kerja guru ( $X_4$ ) mempunyai pengaruh signifikan terhadap variabel kinerja sekolah (Y) dengan diketahui nilai uji t sebesar 2,527 dengan p <0,05, nilai korelasi parsial 0,146 dan nilai koefisien determinasi sebesar 0,021. Variabel kinerja guru ( $X_5$ ) mempunyai pengaruh signifikan terhadap



variabel kinerja sekolah (Y) dengan diketahui nilai uji t sebesar 6,126 dengan  $p < 0,05$ , nilai korelasi parsial 0,336 dan nilai koefisien determinasi sebesar 0,112.

Berdasarkan koefisien determinasi parsial masing-masing variabel di atas, variabel yang mempunyai sumbangan terbesar terhadap kinerja sekolah adalah variabel kinerja guru ( $X_5$ ) dengan nilai sumbangan sebesar 11,2%, selanjutnya berturut-turut variabel kemampuan kerja guru ( $X_2$ ) memberikan sumbangan sebesar 2,3%, dan variabel komitmen kerja guru ( $X_4$ ) memberikan sumbangan 2,1%. Untuk variabel dampak sertifikasi guru ( $X_1$ ) dan Motivasi kerja guru ( $X_3$ ) secara parsial tidak memberikan sumbangan terhadap variabel kinerja sekolah (Y). Dengan demikian dapat diketahui bahwa variabel kinerja guru mempunyai pengaruh yang dominan terhadap kinerja sekolah.

Secara simultan, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, dan kinerja guru memberikan sumbangan yang signifikan terhadap kinerja SMK pasca-sertifikasi. Hal ini berarti setiap perubahan kualitas dari dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, dan kinerja guru akan mempengaruhi peningkatan kinerja SMK pasca-sertifikasi. Secara parsial, dampak sertifikasi guru dan motivasi kerja guru tidak memberikan pengaruh langsung yang signifikan terhadap kinerja SMK, sedangkan kemampuan kerja guru dan komitmen kerja guru memberikan sumbangan yang relatif kecil, sumbangan yang lebih dominan terhadap kinerja SMK diberikan oleh kinerja guru SMK. Hasil regresi tersebut diperdalam dan diperluas dengan rangkuman hasil penelitian kualitatif bahwa dampak sertifikasi mempengaruhi perubahan kebanggaan, kepro-fesionalan, dan kesejahteraan guru, dapat meningkatkan upaya guru SMK dalam (1) pengembangan keilmuan, penguasaan teknologi informasi, komunikasi sosial, maupun pengembangan personal, (2) perubahan semangat dan kegigihan

guru dalam mengajar, pengembangan karir dan profesionalisme, dan (3) perubahan sikap dalam keterikatan, kegairahan, dan kedisiplinan guru SMK, yang selanjutnya mempengaruhi keberhasilan guru dalam melaksanakan tugas mengajar, mendidik, melatih, dan membimbing peserta didik, dan akhirnya secara bersama-sama berkontribusi mewujudkan kinerja SMK secara lebih baik.

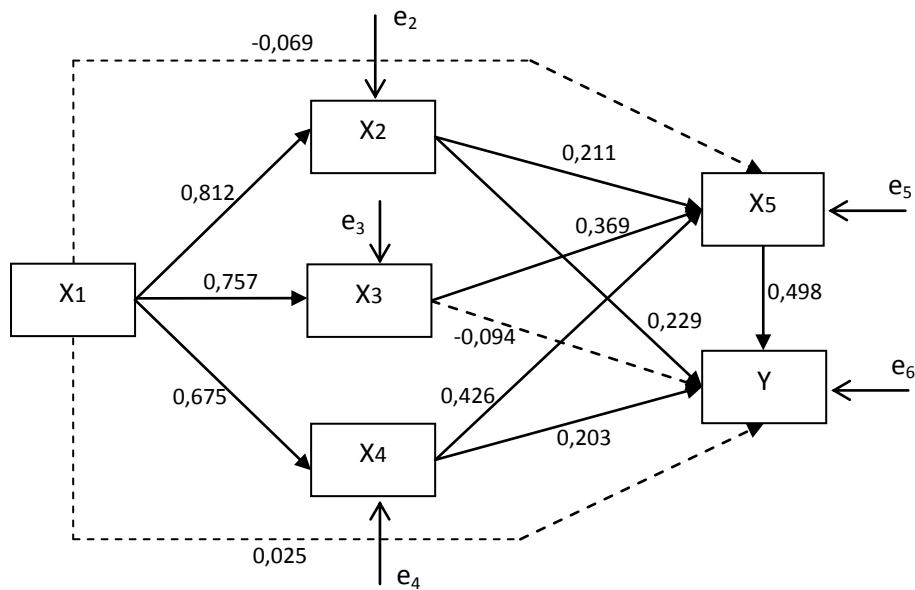
Hubungan Struktural Variabel Dampak Sertifikasi Guru, Komitmen Kerja Guru, Komitmen Kerja Guru dan Kine

**Tabel 8.** Rangkuman Koefisien Jalur

Sub Struktur	Variabel		R <sup>2</sup>	$\beta$	t <sub>hitung</sub>	Sig. t	Residu (e <sub>i</sub> )
	Endogen	Eksogen					
1	X <sub>2</sub>	X <sub>1</sub>	0,659	0,812	24,01	0,000	0,584
2	X <sub>3</sub>	X <sub>1</sub>	0,573	0,757	19,997	0,000	0,653
3	X <sub>4</sub>	X <sub>1</sub>	0,456	0,675	15,793	0,000	0,738
4	X <sub>5</sub>	X <sub>1</sub>	0,827	-0,069	-1,641	0,102	0,416
		X <sub>2</sub>		0,211	3,478	0,001	
		X <sub>3</sub>		0,369	5,378	0,000	
		X <sub>4</sub>		0,426	8,214	0,000	
5	Y	X <sub>1</sub>	0,664	0,025	0,419	0,675	0,580
		X <sub>2</sub>		0,229	2,652	0,008	

		X <sub>3</sub>		-0,094	-0,935	0,351	
		X <sub>4</sub>		0,203	2,527	0,012	
		X <sub>5</sub>		0,498	6,126	0,000	

Berdasarkan nilai koefisien jalur sebagaimana ditunjukkan pada Tabel 8, selanjutnya dapat dibuat model struktural empirik seperti Gambar 8. Tabel 8 memberikan informasi bahwa sub struktur 1, 2 dan 3 diketahui memiliki koefisien jalur lebih besar dari 0,05. Pada sub struktur 4, terdapat tiga jalur ( $\beta_{52}$ ,  $\beta_{53}$ , dan  $\beta_{54}$ ) memiliki nilai koefisien jalur yang lebih besar dari 0,05, sedangkan koefisien jalur  $\beta_{51}$  memiliki nilai koefisien jalur lebih kecil dari 0,05. Dengan demikian model struktural untuk sub struktur 4 dilakukan uji ulang (Tabel 9) dengan menghilangkan variabel dampak sertifikasi guru ( $X_1$ ) yang memiliki nilai koefisien jalur lebih kecil dari 0,05. Sub struktur 5 terdapat tiga jalur ( $\beta_{62}$ ,  $\beta_{64}$ ,  $\beta_{65}$ ) yang memiliki nilai koefisien jalur lebih besar dari 0,05, sedangkan dua jalur masing-masing  $\beta_{61}$  dan  $\beta_{63}$ , memiliki nilai koefisien jalur di bawah 0,05. Berarti pada sub struktur 5 perlu dilakukan uji ulang tanpa mengikutsertakan variabel dampak sertifikasi guru ( $X_1$ ) dan motivasi kerja guru ( $X_3$ ).



**Gambar 8.** Model Struktural Empirik

**Tabel 9.** Rangkuman Koefisien Jalur Hasil Trimming

Sub Struktur	Variabel		R <sup>2</sup>	$\beta$	t <sub>hitung</sub>	Sig. t	Residu (e <sub>i</sub> )
	Endogen	Eksogen					
4	X <sub>5</sub>	X <sub>2</sub>	0,825	0,165	3,058	0,002	0,418
		X <sub>3</sub>		0,357	5,218	0,000	
		X <sub>4</sub>		0,427	8,216	0,000	
5	Y	X <sub>2</sub>	0,663	0,208	3,310	0,001	0,581
		X <sub>4</sub>		0,174	2,389	0,018	
		X <sub>5</sub>		0,474	6,130	0,000	

Hasil analisis jalur menunjukkan bahwa: (a) dampak sertifikasi guru memberikan pengaruh langsung yang positif terhadap kemampuan kerja guru SMK pasca-sertifikasi, artinya semakin tinggi



kualitas dampak sertifikasi guru akan semakin tinggi kualitas kemampuan kerja guru; (b) dampak sertifikasi guru memberikan pengaruh langsung yang positif terhadap motivasi kerja guru SMK pasca-sertifikasi, artinya semakin tinggi kualitas dampak sertifikasi guru akan semakin tinggi kualitas motivasi kerja guru SMK; (c) dampak sertifikasi guru memberikan pengaruh langsung yang positif terhadap komitmen kerja guru SMK pasca-sertifikasi, artinya semakin tinggi kualitas dampak sertifikasi guru akan semakin tinggi kualitas komitmen kerja guru; (d) dampak sertifikasi guru berpengaruh tidak langsung secara positif terhadap kinerja guru melalui kemampuan kerja guru, motivasi kerja guru dan komitmen kerja guru, sehingga mengindikasikan bahwa kualitas kinerja guru akan ditentukan oleh perubahan dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru dan komitmen kerja guru.

Hasil analisis jalur juga menunjukkan bahwa dampak sertifikasi guru berpengaruh tidak langsung secara positif terhadap kinerja sekolah melalui kemampuan kerja guru, komitmen kerja guru, dan variabel kinerja guru. Hal ini mengindikasikan bahwa: (a) dampak sertifikasi guru berpengaruh tidak langsung terhadap kinerja sekolah melalui kemampuan kerja guru, yang berarti kualitas kinerja sekolah akan ditentukan oleh perubahan dampak sertifikasi guru dan kemampuan kerja guru; (b) dampak sertifikasi guru berpengaruh tidak langsung terhadap kinerja sekolah melalui komitmen kerja guru, yang berarti kualitas kinerja sekolah juga akan tergantung dari perubahan dampak sertifikasi guru dan komitmen kerja guru; (c) dampak sertifikasi guru berpengaruh tidak langsung terhadap kinerja sekolah melalui kemampuan kerja guru dan kinerja guru yang berarti kualitas kinerja sekolah ditentukan oleh perubahan dampak sertifikasi guru, kemampuan kerja guru, dan kinerja guru; (d) dampak sertifikasi guru berpengaruh tidak langsung terhadap kinerja sekolah melalui motivasi kerja guru dan kinerja guru yang berarti kualitas kinerja sekolah juga ditentukan oleh perubahan dampak sertifikasi guru, motivasi kerja guru, dan kinerja guru; (e) dampak sertifikasi guru berpengaruh tidak langsung terhadap kinerja sekolah melalui komitmen kerja guru dan kinerja guru yang berarti kualitas kinerja sekolah juga ditentukan oleh perubahan dampak sertifikasi guru, komitmen kerja guru, dan kinerja guru.

Hasil analisis jalur setelah *trimming* mengindikasikan: (a) kemampuan kerja guru terhadap kinerja sekolah, yang berarti setiap perubahan pada kemampuan kerja guru akan langsung menyebabkan perubahan kinerja sekolah; (b) komitmen kerja guru terhadap kinerja sekolah, yang berarti adanya perubahan komitmen kerja guru akan langsung menyebabkan perubahan terhadap kinerja sekolah; (c) kinerja guru terhadap kinerja sekolah, yang berarti adanya perubahan kinerja guru akan langsung berpengaruh terhadap perubahan kinerja sekolah.





#### **IV. SIMPULAN DAN REKOMENDASI**

##### **A. Simpulan**

Sebagian besar guru SMK umumnya telah mengalami perubahan kebanggaan, kepro-fesionalan, dan kesejahteraan sebagai dampak sertifikasi guru yang termasuk dalam kategori tinggi. Pasca-sertifikasi, kedudukan, harga diri, kenyamanan, loyalitas, kegigihan, dan kom-petensi guru SMK mengalami peningkatan yang lebih baik.

Sebagian besar guru SMK umumnya telah mengalami perubahan kemampuan kerja yang termasuk dalam kategori tinggi. Pasca-sertifikasi, kompetensi pedagogis, profesional, kepribadian, dan sosial guru SMK mengalami peningkatan yang lebih baik.

Sebagian besar guru SMK umumnya telah mengalami perubahan motivasi kerja yang termasuk dalam kategori tinggi. Pasca-sertifikasi, keaktifan, semangat, kreatifitas, dan komunikasi guru SMK mengalami peningkatan yang lebih baik.

Sebagian besar guru SMK umumnya telah mengalami perubahan komitmen kerja yang termasuk dalam kategori tinggi. Pasca-sertifikasi, komitmen afektif, kontinuan, dan normatif guru SMK juga mengalami peningkatan yang lebih baik.

Sebagian besar guru SMK umumnya telah mengalami perubahan kinerja guru yang termasuk dalam kategori tinggi. Pasca-sertifikasi, pelaksanaan tugas pokok, pelaksanaan tugas di luar tugas pokok, dan pengembangan profesionalisme, kepribadian, dan sosial guru SMK mengalami peningkatan yang lebih baik.

Sebagian besar SMK umumnya telah mengalami perubahan kinerja sekolah yang termasuk dalam kategori tinggi. Pasca-sertifikasi, sekolah memiliki kesiapan kurikulum, proses pembelajaran, prestasi akademik, sistem penilaian, tenaga pendidik, dan sistem pengelolaan sekolah yang lebih baik.

Dampak sertifikasi guru memberikan sumbangan 65,9% terhadap perubahan kemampuan kerja guru SMK pasca-sertifikasi. Pasca-sertifikasi, guru SMK mengalami peningkatan kebanggaan, keprofesionalan, dan kesejahteraan yang dimanfaatkan untuk memperbaiki kemampuan kerja guru baik pada aspek pengembangan keilmuan, penguasaan teknologi informasi, komunikasi sosial, maupun pengembangan personal.

Dampak sertifikasi guru memberikan sumbangan 57,3% terhadap perubahan motivasi kerja guru SMK pasca-sertifikasi. Pasca-sertifikasi, perubahan kebanggaan, kepro-fesionalan, dan kesejahteraan guru SMK meningkatkan semangat dan kegigihan guru dalam mengajar, pengembangan karir dan profesionalisme guru.

Dampak sertifikasi guru memberikan sumbangan 46,6% terhadap perubahan komitmen kerja guru SMK. Pasca-sertifikasi, perubahan kebanggaan, keprofesionalan, dan kesejahteraan guru SMK mampu meningkatkan sikap keterikatan, kegairahan, dan kedisiplinan guru SMK.

Secara simultan, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru memberikan sumbangan 82,75% yang signifikan terhadap perubahan kinerja guru SMK pasca-sertifikasi.



Secara simultan, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja guru, dan kinerja guru memberikan sumbangan 66,4% yang signifikan terhadap kinerja SMK pasca-sertifikasi.

Hasil analisis jalur menunjukkan bahwa: (a) dampak sertifikasi guru memberikan pengaruh langsung yang positif terhadap kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru SMK pasca-sertifikasi; (b) dampak sertifikasi guru berpengaruh tidak langsung secara positif terhadap kinerja guru melalui kemampuan kerja guru, motivasi kerja guru dan komitmen kerja guru; (c) dampak sertifikasi guru berpengaruh tidak langsung secara positif terhadap kinerja sekolah melalui kemampuan kerja guru, komitmen kerja guru, dan variabel kinerja guru.

#### B. Rekomendasi

Dampak sertifikasi guru SMK terbukti memiliki pengaruh langsung yang kuat dan positif terhadap peningkatan kemampuan kerja guru, motivasi kerja guru dan komitmen kerja guru SMK. Informasi ini perlu disebarluaskan kepada pemerintah pusat, dinas pendidikan propinsi, dan pimpinan sekolah, sehingga dampak sertifikasi guru dapat dipahami secara benar oleh seluruh lapisan masyarakat, mengingat sampai saat ini masih terdapat informasi yang keliru terkait dampak sertifikasi guru karena tidak berdasarkan hasil-hasil penelitian yang mendalam.

Kemampuan kerja guru SMK terbukti memiliki pengaruh langsung yang kuat dan positif, baik terhadap kinerja guru maupun kinerja sekolah. Informasi ini perlu disampaikan kepada pengawas dan kepala sekolah, bahwa pencapaian kinerja guru dan sekolah yang tinggi harus memperhatikan karakteristik kemampuan kerja guru SMK.

Motivasi kerja guru SMK baik secara simultan maupun parsial terbukti mempunyai pengaruh langsung yang positif terhadap kinerja guru. Informasi ini perlu disampaikan kepada Direktorat Pembinaan Pendidik dan Tenaga Kependidikan Pendidikan Menengah Kemdikbud, Dinas Pendidikan, Pengawas, dan Kepala Sekolah bahwa pencapaian kinerja guru yang tinggi dapat dilakukan melalui pembinaan yang memperhatikan karakteristik motivasi kerja guru SMK secara tepat.

Komitmen kerja guru SMK terbukti memiliki pengaruh langsung yang positif terhadap kinerja guru dan kinerja sekolah. Informasi ini perlu disampaikan kepada Direktorat Pembinaan Pendidik dan Tenaga Kependidikan Pendidikan Menengah Kemdikbud, Dinas Pendidikan, Pengawas, dan Kepala Sekolah, bahwa pencapaian kinerja guru yang tinggi dapat dilakukan melalui dorongan dan pembinaan yang memperhatikan karakteristik komitmen kerja guru SMK secara tepat.

Kinerja guru SMK terbukti secara dominan mempengaruhi kinerja sekolah. Informasi ini perlu disampaikan kepada Direktorat Pembinaan Pendidik dan Tenaga Kependidikan Pendidikan Menengah Kemdikbud, Dinas Pendidikan, Pengawas, dan Kepala Sekolah, bahwa pencapaian kinerja sekolah yang tinggi dapat dilakukan melalui pembinaan dan pemberdayaan guru SMK yang memperhatikan karakteristik kinerja guru tersebut secara tepat.

Secara bersama-sama, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru memberikan pengaruh yang kuat terhadap kinerja guru SMK pasca-sertifikasi.



Informasi ini perlu disampaikan kepada Direktorat Pembinaan Pendidik dan Tenaga Kependidikan Pendidikan Menengah Kemdikbud, Dinas Pendidikan, Pengawas, dan Kepala Sekolah bahwa pembinaan dan pemberdayaan guru melalui faktor-faktor dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, dan komitmen kerja guru SMK harus dilakukan terus-menerus dan berkelanjutan.

Secara bersama-sama, dampak sertifikasi guru, kemampuan kerja guru, motivasi kerja guru, komitmen kerja, dan kinerja guru memberikan pengaruh yang kuat terhadap kinerja SMK pasca-sertifikasi. Informasi ini perlu disampaikan kepada Direktorat Pembinaan Pendidik dan Tenaga Kependidikan Pendidikan Menengah Kemdikbud, Dinas Pendidikan, dan Kepala Sekolah bahwa pembinaan dan pemberdayaan terhadap kemampuan kerja guru, komitmen kerja guru, dan kinerja guru SMK dapat meningkatkan kinerja SMK secara optimal.

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### **Profil Singkat**

Saya dilahirkan di Pati, 13 Maret 1971 dari pasangan Bapak Ngasari dan Ibu Kasminah. Pendidikan dasar dan menengah yang saya selesaikan di Pati menghantarkan saya menjadi mahasiswa Pendidikan Teknik Mesin Fakultas Pendidikan Teknologi Kejuruan IKIP Yogyakarta dan lulus sebagai Sarjana Pendidikan (S-1) tahun 1995. Selanjutnya saya bekerja menjadi Quality Assurance Engineer di PT. Ismac Nissan Manufacturing Jakarta. Pada tahun 2002, saya bergabung menjadi tenaga pengajar di almamater saya (sekarang Universitas Negeri Yogyakarta, UNY) dengan mengampu matakuliah Teori Pemesinan dan Proses Pemesinan. Selanjutnya saya menempuh pendidikan jenjang Magister (S-2) bidang Teknik Mesin di Fakultas Teknik Universitas Gadjah Mada (UGM) lulus tahun 2006 (M.T.). Jenjang pendidikan Doktoral (S-3) Pendidikan Teknologi dan Kejuruan saya tempuh di Program Pascasarjana Universitas Negeri Yogyakarta, dan lulus tahun 2015.



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## IMPROVEMENT OF TECHNOLOGY AND VOCATIONAL EDUCATION AND REGIONAL DEVELOPMENT REQUIREMENTS

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**ABSTRAC** : Growth of technological science and communications which quickly give change picture that happened globally having implication and impact to development of area. First implicate, is needed by anticipation for the execution of investment so that limited development fund can be used in an optimal fashion. Both Implication, with investment partake to accompany skilled man power practice and education, in this case if less precise will generate the problem of activity to educate or train energy which have been educated at Education of Technology and is Vocational. Furthermore, require to be taken by stages to conduct technological monitoring newly in such a manner so that is swiftly conducted by adjustment in the form of restructuring in quality and investment Education of Technology of Vocational as energy to support investment. Realizing collaboration of area resources for in improving the quality of Education of Technology and needed by Vocational of role from various good side of local government and society to be created harmonious integrity among world Education of Technology and is Vocational, corporate world and local government.

**Keyword** :Technology and Vocational Education and Regional Development

### I. INTRODUCTION

Rapid development of Science and Technology has influenced the type and quality of jobs in various fields. Automatically, it requires a competence of Human Resources (HR) which are produced by educational institutions, either secondary or higher education. Technology and Vocational Education has to adjust itself continuously with regional development. Therefore, it is expected that the mission of Technology and Vocational Education in preparing its graduates is relevance with the needs of regional development.

Technology and Vocational Education is one of the sub-systems within the national education system. A number of current problems encountered in Technology and Vocational Education such as, (1) non optimal achievement of graduates competencies, (2) low quality of graduates, (3) the need to adjust the relevance between the graduates and regional requirement, (4) lack of concern from industry in Indonesia to the Technology and Vocational Education, and (5) inadequate facilities and infrastructures to support learning process.

Effectuation of the decrees of Minister of National Education No. 232/U/2000 and No. 045/U/2002 influence the operation of Technology and Vocational Education as the following:

1. Requirement to adjust a new paradigm of education management by emphasizing on competence, university autonomy, accountability, evaluation and accreditation.
2. Operation of education program by considering the shift of educational management system, from centralization to decentralization while maintaining the spirit of nationalism and unity.

The implementation of regional autonomy policy has wide impacts on the Technology and Vocational Education. These include providing local autonomy with vocational education personnel in



terms of quantity and quality, and also fulfilling the demands of diversified vocational education personnel. Therefore, Technology and Vocational Education have to be reorganized, reoriented and repositioned with the spirit of regional autonomy.

Shortage of trained and skilled personnel has led to the decrease of productivity and being not able to manage production system optimally, hence leading to high cost economy problems which in turn reducing the competitiveness of product sales and comparative advantage in producing a commodity. It is widely known, in development of a region, inadequacy in quantity and quality of vocational labors is one of the main reasons of the scarcity of resources and inefficiencies. Regarding to the efficiency of resources utilization, the importance of Technology and Vocational Education is understandable.

Vocational labors are the links in implementation of Science and Technology. Trained and skilled labors as the operators of technology implementation have a key position to increase production rate. Application of new techniques or new machines in the process of technological transformations will require Technology and Vocational Education which follows those transformations. A recent rapid progress in the field of biological technology, automotive engineering, materials technology, and electronics technology, particularly robots and television has pointed the importance of Technology and Vocational Education; yet will cause uncertainty in designing the curriculum for Technology and Vocational Education itself.

Besides the rapid changes in science and technology, Technology and Vocational Education must also consider the diversity of each region requirement for its graduates. Population and available resources in each region are not spread evenly both quality and quantity, so that regional development and applications of the technology that accompanying it vary from area to area. Local custom or tradition also requires adjustments in the application of technology and management locally. Regarding to this local or regional aspect, the Technology and Vocational Education requires regionalization of Technology and Vocational Education requirement.

This paper is limited to the qualitative aspects of the relevance of Technology and Vocational Education in conjunction with regional development. The main reason of this limitation is the uncertainty factors due to rapid change of technology and production techniques. Therefore, the formulation of objectives is more general and not specific. Moreover, this qualitative discussion is caused by unavailability of a detailed study in predicting the requirement of vocational education personnel. Like the national level, the so-called men power planning cannot be done as well at the regional level. However, rough estimation of labor requirement for the sector, subsector, and the program can be derived from the formulation of development program and policy, and employment elasticity.

For those reasons above, this analysis approach in the development of Technology and Vocational Education is linked to regional development, in the form of presentation of the



development of regional development and technological changing which in turn give an implication in the development of that Technology and Vocational Education.

## **II. CHALLENGES AND PROBLEMS**

### **Challenges**

1. The existence of the ASEAN free trade (AFTA) and the coming of Asia Pacific free market (APEC) cause much impact on the Technology and Vocational Education, in terms of quality improvement, recruitment and placement as well as the needs of teachers in every region in Indonesia.
2. A change in government policies on Technology and Vocational Education. These policies have influenced the effectiveness of existing vocational school, facilities and infrastructure improvement, utilization of the business and industry in a dual system education, effectiveness and improvement of teacher training's capability and the effectiveness of the number of students per class in the vocational education and training, as well as a wide range of potential impacts.
3. The existence of a new paradigm in national education in the context of crisis management, community empowerment and the creation of intelligent Indonesian civil society.
4. The existence of education decentralization as representation of balance authority's policy between central and local as a logical consequence of the Act No. 22 and 25 in 1999. It also influences on improving the welfare, quality, career development and teacher's placement those previously managed by the center then moved to the local government.
5. The existence of regional autonomy, which has impacts on financial management and education budgets, more dominated by local budget and partly subsidized by the central government. Therefore, decision-making processes related to the recruitments and placements of teachers are referring to particular regional policies.

### **Problems**

The evaluation of development implementation and analysis of regional development issues are emphasized on economic development due to its closed relation to the Technology and Vocational Education. Development in the economic field during the new era (Orba) and the reformation era, regardless of the many issues those needed to be refined again, has shown encouraging results. Equitability of development and its results through fulfilling of basic needs approach, which are the provision of food, clothing, shelter, education, health, employment and income, has been able to improve welfare and standard of living. Provision of food, clothing and shelter has increased each year, with the price where the people are able to buy.

Potential problems for increasing the income per capita in the future are the limitation and declining of the agricultural sector to support income increase and employment opportunities. These require an overview for the use of new technologies through investment of irrigation, high quality seed production, agricultural machinery and other things, so it can contribute to both income increase and employment opportunities.



Expansion of employment opportunities still seems to be relying on agriculture sector, which is expected to evolve to industrial sector. Meanwhile, the constructions or buildings show a declining trend in providing jobs opportunities due to the government policy in reducing the budget for government buildings or offices as the impact of monetary crisis in Indonesia previously. By studying the industrial growth over the years, the progress in industrial sector was still limited to small industries and handicrafts. Products from various industries are mainly still in the form of raw materials which have to compete in overseas markets with synthetic materials which are more competitive in price and quality.

### **III. DEVELOPMENT OF REGIONAL DEVELOPMENT AND TECHNOLOGY**

The development of regional economy cannot be separated from the characteristic of the national economy which is overseas market oriented. Primary commodities (agriculture and mining) are marketed inside the country as well as overseas. Similarly, food commodities are not only sold in the region, but also in the surrounding provinces and islands. Therefore, external and global economics factors also influence the regional economy.

On the other hand, the world economy is affected by the rapid development of science and technology. The discoveries on biological technology have been able to lower the production costs. Development of materials technology has affected the demand for metals such as lead, zinc, iron, aluminum, and steel. Alloy, plastic and steel with great strength and superior properties have replaced the pure metal as they can reduce weight and cost. Communications satellite weighing only 20 kilograms has replaced sea-cable communication system of 150,000 tons, and fiber optic has replaced copper as telephone wire. New type of ceramic compound has replaced the metal turbine in aircraft engine due to greater strength and heat resistance at high temperatures, reducing cost, and solving the corrosion problem as well.

The invention of micro chips has reversed the comparative advantages of the availability of low cost labors in developing countries. Initially, developed countries cannot compete in production costs due to their high wages, and as a result, many factories are relocated and built in the developing countries. By invention of micro chips, robots and automatic production systems can reduce production costs and avoid human errors in production. As the result, many the factories are then rebuilt in developed countries, whereas the same factories in developing countries cannot compete with the robot power. Therefore, as production of materials, the development of automation and robotics require restructuring in developing countries investment.

The regions that oriented to the overseas market for both primary and secondary products are also influenced by the revolution of biological technology, materials technology, and electronic technology. Regions require adjustment and restructuring of investment and relevance in the development of Technology and Vocational Education, at least in the long-term planning. Also, the use of advanced technologies in agriculture, industry and the processing and manufacturing industry, electronics technology, tourism, education and healthcare industries.





Agricultural production will shift from producing consumption products to producing seed or brood stock of crops, livestock, farm, plantation and fisheries. In addition, the composition or type of commodities produced more varied not only in food commodity but also high added value commodities, such as horticulture and flowers.

Development strategy in the industrial sector is directed toward the production of finished goods. Rubber and latex are processed into finished goods, such as gloves, rubber for medical used, foam rubber, tires and other rubber products. Similarly, raw materials of spices such as cinnamon, pepper and nutmeg are processed into final products for domestic and export consumption. In addition, it is also required to develop industries for agricultural machinery, water pumps and components of processing plants.

Development of Technology and Vocational Education as an educational service industry is a long-term strategy after the development of education as a service. The reason for development toward an educational service industry is that because each region has comparative advantage in intellectual development, and this activity has been successfully developed since the date before Independence Day. Therefore, in long term, the development of education will be directed toward a service industry.

The use of advanced technologies to support the development of agriculture, manufacturing, electronics, tourism, education and the healthcare industries will not only affect the planning of capital investment, but also investment in Technology and Vocational Education. Thus, it is required further cooperation with the local labor department, an activity that has been initiated by the labor department.

#### **IV. CLOSING**

Rapid development of science and technology as described above is intended to illustrate the global changes that have impact and implication to the regional economy development which has domestic and overseas market orientation. The first implication, it is necessary to have anticipation in investment program to optimize the limited development budget. The second implication, with the investment following education and training of skilled workers, in this case if the investment is inappropriate it will create problems in the activities to educate or train the personnel who have been educated in Technology and Vocational Education. Therefore, it is necessary to create steps for monitoring new technologies for quickly adjusting in term of restructuring in the investment and relevance of Technology and Vocational Education as supporting the power to the investment.



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EI-01-019

**IMPROVING STUDENT'S SOFTSKILL OF CONSTRUCTION  
ENGINEERING VOCATIONAL EDUCATION PROGRAM ON  
SEMARANG STATE UNIVERSITY IN PREPARING PROFESSIONAL  
PROSPECTIVE TEACHER  
(THE STUDY OF 2015 CURRICULUM IMPLEMENTATION)**

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**ABSTRACT :** *In 2015, ASEAN Economic Community (AEC) agreement has been implemented. This agreement has impacts on not only the economic sector, but also in other sectors. Not to mention, education field as the locomotive of human development. The Era of ASEAN free trade area must be welcomed by the world of education immediately, so that Indonesian human resources are ready to compete with other countries. AEC presents both challenge and an opportunity which require courage from university graduates. Construction Engineering Vocational Education Program is one of the Technology and Vocational Education Training program whose goals are to prepare prospective vocational education teacher and to increase the quality of its graduates to be able to compete in AEC Era. In order to achieve those goals, a review of the curriculum which becomes the fundament of learning process is necessary. National Education System suggests that the curriculum is structured to achieve national education goals by concerning about the stage of development of learners and their compatibility with the environment, the national development necessity, the development of science, technology and the arts, according to the type and level of each educational unit. As one of the efforts so that graduates can compete in the global era, Construction Engineering Vocational Education Program of Semarang State University, in conducting the curriculum review, emphasizes on the improvement of the quality of soft skills by not disregarding the hard skills in educating students as prospective teachers to have good professional skills.*

**Keywords:** curriculum implementation, prospective teacher, professional

## **I. INTRODUCTION**

At the end of 2015, the entire nation of Indonesia welcomed the ASEAN Economic Community (AEC) and play a direct role as one of the pillars of the ASEAN Community. ASEAN Community is an attempt to integrate ASEAN countries so that ASEAN becomes a safe, stable, and globally competitive regions in the world. The main concept of the ASEAN Economic Community is creating ASEAN as a single market and production base unity in which there is a free flow of goods, services, production factors, capital and investment as well as the elimination of trading tariffs among ASEAN countries. ASEAN Economic Community is expected to reduce poverty and economic disparity between the countries through a number of mutually beneficial cooperation.

The main concept of the ASEAN Economic Community is creating ASEAN as a single market and production base unity in which there is a free flow of goods, services, production factors, capital and investment as well as the elimination of trading tariffs among ASEAN countries. ASEAN Economic Community is expected to reduce poverty and economic disparity between the countries through a number of mutually beneficial cooperation. Upon the election of Indonesia as a center of free



trade in ASEAN Economic Community, the Indonesian government needs to have several preparations, starting from the preparation of infrastructure as well as creating skilled, qualified and professional human resources.

Research conducted by the Business-Higher Education Forum and the Collegiate Employment Research Institute at Michigan State University ([www.dbcc.cc.fl.us.htm](http://www.dbcc.cc.fl.us.htm)) contends that a response from leaders stating that graduates have the technical ability. However, they lack soft skills. Furthermore, the research corroborates that:

*Students growing niche to think a high GPA and a degree will guarantee career success, but anyone in the world knows that only work skills and character ensure success. The GPA Provides employers with one indication that the student can work hard and manage time well. Students graduating with 3.0 will pass the grade cut-off for most jobs. Some employers want to see a 3.5, but not most. A few even Become suspicious when the GPA gets beyond the 3.6 range. A corporate recruiter sent me this note: "Our cutoff is 3.0. A 3.2 is really looked at no differently from a 3.7.*

Nurturing soft skills is an important aspect in producing graduates who are capable of competing and succeeding in their prospective job. Therefore, a study of the patterns of soft skills integration and hard skills in learning the various strategies has paramount importance.

Within the context of vocational education and vocational teacher preparation, the integration of soft skills and character in the learning process plays a strategic role in an attempt to produce graduates and prospective professional vocational teachers. Producing graduates who have the essential competence requires prospective teachers who have both soft skills and hard skills. One of the efforts conducted by the Construction Engineering Vocational Education Program to produce graduates as professional prospective teachers was by evaluating and drafting a curriculum which includes soft skill in addition to maintaining and improving the hard skill.

### **Definition of Soft Skills**

Soft skills are defined as "Personal and interpersonal behaviors that develop and maximize human performance (e.g. coaching, team building, initiative, decision making, etc.) Soft skills does not include technical skills such as financial, computing and assembly skills". (Berthal). Peggy in his book entitled *The Hard Truth about Soft Skills*, published in 2007, argued that "soft skills encompass personal, social, communication, and self - management Behavior, they cover a wide spectrum: self - awareness, trustworthiness, conscientiousness, adaptability, critical thinking, organizational awareness, attitude, Initiative, empathy, confidence, integrity, self-control, leadership, problem solving, risk taking and time management "

The challenge of the job market is very demanding to the candidates. The job market concerns not only with academic skills (hard skills), but also with soft skills aspects. According to Elfindri, et al (2011: 67), Soft skills are skills and life skills, either for themselves, group, or community, as well as



with the creator. Having the soft skills makes a person's existence is increasingly meaningful in the community. Soft skills are comprised of communication skills, emotional skills, language skills, social skills, ethics and morals, manners and spiritual skills.

Soft skills consists of two parts, namely intrapersonal skills and interpersonal skills. Muqowim (2012: 10), describes soft skills as follows: Soft skill is the ability to manage oneself appropriately and the ability to build relationships with others effectively. The ability to manage ourselves is called intrapersonal skills. Meanwhile, the ability to build relationships with others is called interpersonal skills.

Soft skills are often used as a prerequisite for obtaining particular position or job. Iyo Mulyono (2011: 99) argues that, "soft skills are a complement of hard skills. These types of skills are parts of a person's intelligence quotient, and often become a prerequisite to gain certain position or a particular job". Soft skills are outside the sphere of academic and non-technical ability. Syamsul Bahri Talib (2010: 199) argues, "Soft skills are one's personal advantage related to the non-technical terms, including the ability to communicate, socialize, and the ability to control oneself". Based on the above definitions, soft skills can be defined as skills beyond the ability of technical and academic ability. Soft skills are more associated with sensitivity of one's feelings both to himself and to his surroundings. The existence between soft skills and hard skills in oneself should be balanced.

### **Soft Skill Attributes**

Soft skills are skills of a person in accordance with others (including himself). The attributes soft skills include shared values, motivations, behaviors, habits, character and attitude. These soft skills attributes are possessed by each person at different levels, influenced by their habit to think, say, act and behave. However, these attributes can be changed if those concerned are willing to change by familiarizing themselves with new things. Installing new habit requires 90 consecutive days of practice (Aribowo, 2005).

Based on the study conducted in Britain, America and Canada, there are 23 dominant soft skills attributes in job market. Those 23 attributes are sorted by priority in the job market, namely:

1. Initiatives
2. Ethics / integrity
3. Critical Thinking
4. Willingness to learn
5. commitment
6. Motivation
7. Excited
8. Reliable
9. Oral Communication
10. Creative
11. Analytical Capabilities
12. Can cope with stress
13. Self-management
14. Resolving issues
15. Can summarize
16. cooperatives
17. Flexible
18. Working in teams
19. Independent
20. Listening
21. Tough
22. Logical Arguments
23. Time management



## II. RESULTS AND DISCUSSION

Developing the attributes of soft skills of students in higher education necessitates early identification regarding what soft skills attributes are about to be developed. The identification can be accomplished by the survey technique to the students by using questionnaires. The students were given a questionnaire containing lists of the soft skills attributes. A list of soft skill attributes that will be enhanced by the Construction Engineering Vocational Education Program was obtained from the poll results to graduates employers, and studies and the vision of educators in the study program, combined with the values and norms which are expected to produce qualified graduates. This activity was conducted because it is still rare for universities in Indonesia to explicitly state the values that they uphold. Even if there are rarely socialized to all faculty, staff and students. Construction Engineering Vocational Education Program is aimed at explicitly stating its highly upheld values.

The steps of soft skills development can be conducted in various ways. The steps to develop soft skills in the curriculum 2015 implementation in Construction Engineering Vocational Education Program are included in these following development programs:

1. Written curriculum is conducted by inserting a pre-defined soft skills into the learning design. Therefore, the student mastery of the certain soft skills should be included in the aspect of the subject assessment. In 2015, Construction Engineering Vocational Education Program completed a new curriculum which includes the development of soft skills in some subjects. The capabilities which are built are
  - a. Communication skill. It encompasses verbal and non - verbal communication. The indicators of non - verbal communication which were developed are the ability to listen and give appropriate respond actively. Furthermore, verbal communication indicators which were developed are the ability to convey ideas clearly, confidently, and coherently, use contextually standard language in conveying ideas and appropriate interpersonal communication in accordance with the circumstances.
  - b. Problem Solving Ability. The indicators of problem solving ability encompass the ability to identify, to analyze, to design problem solving strategy, and to justify the verity of problem solving activity.
  - c. The team workability. The indicators of team work ability include the ability to interact, participate, and contribute in a group as well as the ability to respect the opinions of others.
  - d. Leadership skills. The indicators of leadership skills which have been developed to enhance the leadership skills consist of the ability to design the upcoming activity, to organize the implementation of an activity, and to provide motivation and to be able to receive opinions, criticism and suggestions.

These abilities above is a resource for prospective teachers to develop themselves optimally in the job market in the future.



2. Hidden curriculum. The formulation of hidden curriculum was conducted informally through the interaction between lecturers and students, the lecturers as role models. The hidden curriculum can also be conducted by creating academic atmosphere in the department or study program. The lecturers during their lecturing activity can provide a role model of self-discipline, responsibility, ethics, self-reliance for the students
3. Co-curriculum. It utilizes lecturing activity which take place off campus such as Field Study (KKL), Field Work Practice (PKL), teaching field experience (PPL), or Community service (KKN).
4. Extra-curriculum activities involve students' activity unit as a place to train students' soft skills.

The implementation of soft skills development in the Construction Engineering Vocational Education Program subsequent to the preparation of a new curriculum which emphasizes the development of soft skills is implemented in the learning process, in student activities which include both curricular and extra-curricular activities. The emphasis of the soft skills is not memorization but its practice by people who study or who want to develop. The students of Construction Engineering Vocational Education Program who want to develop or enhance their soft skills are given the opportunity to become a lecturer assistant who assist students in carrying out or finishing assignment.

As described earlier in this paper, the development of soft skills is only effective via teaching. Lecturing activities make lecturers as role models for the students. For example, discipline for the student, then a good example can be demonstrated to students by lecturers. If professors want students arrive on time, then the teacher must first come to class. When students are expected to always maintain the cleanliness of the class, the lecturer should be able to wipe the writing board after class finishes. If the lecturer has promised to return the assignment within in three weeks, then he must not to return the 5 weeks later.

Role models can be shown by peer edification with colleagues in front of students. The edification derived from the word "to edify" is to award for the proportion of peers. Inter – lecturers' vilification should be avoided in front of the students. If the professor lost in the competition, then don't make the students as a place to complaint. Giving appraisal to the students in front of other students is necessary if the student is able to achieve certain achievement, such as in students' writing grant competition, the outstanding student achievement as well as other competitions.

The transfer of the soft skills can also be accomplished by giving moral message at the beginning or the end of the lecture. This method is called the Message of the week (MOW). The message can be conveyed in form of wisdom from a variety of sources with their meaning in daily life, or animation support from internet web site. It can also be conducted by "sharing" between the students themselves.

In addition to, the transfer of soft skills can be accomplished through the hidden curriculum. "Hidden Curriculum is the broader concept of which the informal curriculum is a part" Lessons of the



hidden curriculum are taught implicitly. Hidden curriculum is more powerful because it can make the learning process more attractive and enjoyable. The role of the faculty in this regard are:

- Establish dialogue process
- Handle group dynamics
- Engage with student motivation
- Introducing critical thinking
- Empowering Hidden Curriculum

While transferring the knowledge, the professors usually lecture, and may be followed by questions and answers. For example, when a lecturer delivered an illustrative case in front of students on theory about organization, knowledge is transferred can be the organizational structure, functions of each line, duties and authority of each personnel. This case will not be told of the decision making process (Jogijanto, 2006). If the professors want to give the case to develop the "wisdom", The Department of Construction Engineering Vocational Education Program was trying to make adjustments in the learning process by implementing self - acquired process. During the implementation of which, the student must be active and professors must act as facilitators and hold the responsibility of the success of the students. The purpose of this study is to improve analytical ability, communication skills, develop the personality and way of thinking and to improve the quality of wisdom.

During the learning process, the lesson plans were changed from the conventional way of planning. In the lesson plan, competencies expected to be mastered by the students after the completion of the lecture must include teaching methods to achieve those outcomes. The aspect which is no less important in lesson planning is the assessment indicators that explain how to measure the achievement of learning objectives.

Each learning method is specific to achieve a certain competence. Therefore, one learning method in a certain subject may not be appropriate for other subject. The approach used in teaching in Construction Engineering Vocational Education Program is Student - Centered Learning (SCL). The creativity of the lecturer in motivating students is very influential in the success of SCL. SCL approach is only possible if the number of students in one class does not exceed 50 - 60 people. This has been carried out with the number of participants of each class is 50 students. In addition to that, in carrying out the SCL approach, lecturers should be able to provide the facilities, motivation, tutorials as well as providing feedback on the material being taught.

Assessment can be conducted in various ways. Cognitive domain can be assessed by a written test, psychomotor domain is assessed during students' practice, and the affective domain can be assessed by observation. The student - centered learning is difficult to implement because learning activities in the Construction Engineering Vocational Education were conducted in Team Teaching. The team teaching consists of more than one lecturers in a class to assess learning process at certain moments so that the achievement of learning objectives can be evaluated optimally.





### **III. CONCLUSION**

1. Development of soft skills in the learning process can be accomplished through learning activities in the classroom and lab work in the laboratory or field. It requires sincerity and creativity of the lecturer who teach the subjects and the competencies expected from the subject.
2. The learning approach used is Student - Centered Learning (SCL)
3. The tasks of the lecturer in learning process which utilizes the SCL approach are:
  - a. Facilitating: providing books, teaching module, hand-outs, journals, research, and time.
  - b. Motivate: by paying attention to the students, giving material relevant to the student's ability level and contextual situations, giving motivation and trust in students so that he can achieve the expected competencies, to give satisfaction to the students towards learning that we teach.
  - c. Giving tutorial: show the way / means / methods that assist students to search for and find a solution to problems related to learning materials.
  - d. Giving feedback: monitor and correct way of thinking / outcomes in order to achieve optimum targets within its capabilities.



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EI-01-006

## EFFECTIVENESS OF LEARNING MANAGEMENT SYSTEM (LMS) ON COMPUTER ASSISTED LEARNING COURSE OF STUDENTS OF STUDY PROGRAM IN INFORMATICS ENGINEERING EDUCATION

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**Abstract:** Learning Management System (LMS) is a device used in implementing e-learning. The use of LMS has a purpose as an alternative renewal learning management information system used by educators in order to improve the quality of the lessons. The application or use of LMS is more effective to support learning activities conducted by conventional and electronic learning (e-learning). With the help of LMS educators can monitor the progress of each learner through this system. Information Engineering of Education Program, State University of Malang, in the course LMS uses computer assisted learning in lectures. In this paper aims to determine the improvement of student learning outcomes and enhancing the effectiveness of the implementation of the LMS. This research is pre-experimental design with one-group pretest-posttest design. The subjects of this study are students of Program Study Informatics Engineering of Education in 2012. In this study, the data obtained in the form of questionnaires, field notes by investigators and student results on the subjects of computer assisted learning. The results showed that: (1) there is an increase learning outcomes computer assisted learning courses using learning management system (Edmodo system) positive, (2) by using a learning management system (Edmodo system) will improve the effectiveness of lectures.

**Kata kunci:** effectiveness, Learning Management System (LMS), e-learning

### I. INTRODUCTION

The development of information technology (IT) today is so rapid it would be very influential in many areas of life, one of them in the field of education. The quality of education of a country will be supporting the improvement of the quality and progress of various sectors in the country. The quality of education in Indonesia is starting to develop. This is evidenced among other things by the data UNESCO (2012) ranked on the Human Development Index (HDI), the composition of the level of achievement in education, health, and income per head that shows that Indonesia's human development index began to rise. This increase would be achieved by a process, namely improving the quality of education and the learning process is carried out therein.

In general, these learning activities carried out in universities by making faculty as educators is based on the curriculum used. In general, the learning process is done by face to face directly (face-to-face), as well as lectures conducted at the State University of Malang. Lectures at the State University of Malang in general is still done face to face directly. This learning is often referred to conventional learning models. Based on the findings of the field can be known conventional learning has advantages and disadvantages, including by conducting conventional learning and manual or in other words, learning is done directly (face-to-face), the lecturer can directly monitor the progress of students, can interact directly with students, can determine the ability of each student and many more.



Besides having advantages, there are also shortcomings of conventional learning that is relevant learning resources are used is limited so that the knowledge students are only fixated on learning resources established by lecturer resulting knowledge or insight of students is limited, other than that the learning process will also take place in monotonous and less enjoyable and in the subject of the collection and processing tasks given by lecturers, students often lack the discipline and not timely. Based on these problems, it is necessary to develop a learning process that can involve the role of technological developments therein.

According Aunurrahman (2012), there are also technological developments affecting the implementation of the system of governance as well as lectures. Utilization of Information and Communication Technology (ICT) in the learning system has changed the conventional pattern learning system or traditional patterns into a modern pattern of media (Husamah, 2014). Integrating ICT in pembelajaran is the right step to learning centered on the learner (students centered), increase effective communication skills, problem-solving skills, and critical thinking skills, creative, adaptive, and reflective (Gray, 2012). Unfortunately, the rapid development of ICT that has not been used optimally in the learning process (Kusairi 2011; Tamba, 2011; and Samuel & Olive, 2007).

Within higher education, information technology has enabled interaction between lecturers and students without being limited by space and time. In Electrical Engineering, State University of Malang, especially on a course Pendidikan Information (PTI) has been used several alternative models of learning as well as system managers lecturing activities as supporting learning activities to improve the quality of education in the State University of Malang, one of which is the use of e-learning in every activity of the lecture.

The study program Information Engineering Education at the State University of Malang has been utilizing e-learning to support each lecture activities undertaken, it can be seen from the use of Learning Management System (LMS) as the system manager of the lecture activities, especially in the course of Computer Assisted Learning (PBK). Earlier in the course PBK, all lectures done conventionally and less structured in their design so that the learning results obtained still can not be maximized. After the development of LMS, more structured management of learning activities and a wider availability of material. Aunurrahman (2012: 229) argues that e-learning is learning by using electronic devices, especially online communications. According Patmanthara (2014: 52) e-learning is the process of learning to use a computer, network, software teaching facilities equipped with communication, monitoring and evaluation. Darin E. Hartley in Patmanthara (2014: 52) says “e-learning is a type of learning that allows tersampaiannya teaching materials to learners by using the internet, intranet, or other network media. Learning Management System (LMS) or a Virtual Learning Environment (VLE) is a software or software designed to assist educators in the learning process in making online classes (Patmanthara, 2014: 152). According to Ellis in Prog, et al (2011) learning management system is a software (software) for the purposes of administration, documentation, reports on activities, learning activities, and activities online, e-learning and training materials, all of



which is done with online. LMS can also be interpreted as the software used to create web-based course materials online and manage learning activities and results (Riyadi in Prog, et al., 2011).

LMS according Patmanthara (2014: 56) is a system or application e-learning that has functions for managing the classroom, making the material, discussion forums, evaluation and assessment system. LMS has two (2) different levels, the first weeks to support conventional learning process and the second to support distance learning as a substitute for conventional learning (Pituch & Lee in Hendrik and Wahid, 2005). Through the LMS, the component processes of teaching and learning activities can still be carried out either through the available features.

Based on examination of computer assisted learning courses and students of S1 PTI force in 2012 majoring in Electrical Engineering, Faculty of Engineering, University of Malang that use learning management system or LMS has several advantages that greatly assist the implementation of lectures on the subjects of computer assisted learning. Additionally, penggunaan learning management system can also improve student discipline and punctuality in collecting duties, as well as by utilizing the learning management system in the lecture activities also increase student motivation and learning outcomes due to easy access to the materials provided by the lecturer of the course. In other words, a Learning Management System or LMS is the system manager that is able to accommodate lectures all activities related lectures. The benefits of the use of learning management system had only said to be more effective, efficient and very helpful lectures both process and its management, but never carried out measurements with certainty the extent of the effectiveness of the use of LMS, benefits and impact or influence that after using the LMS. Based on the above problems, the study aims to determine: (1) whether eLearning using the computer aided management system will improve learning outcomes? And (2) Does using a learning management system (system Edmodo) will increase the effectiveness of lectures ?.

## **II. METHOD**

This study uses pre-experimental study design with models of one-group pretest-posttest design is the design of experiments by comparing the situation before and after treatment in the experimental class (Puslitjajnov, 2008: 7-8; Creswell, 2009: 158-159; Fraenkel and Wallen, 2009: 265; Sugiyono, 2009: 110; and Emzir, 2010: 96). Learning management system effectiveness is measured by comparing the participants' competence after treatment (O2) with the ability of the participants before treatment (O1). O1 with O2 difference scores were analyzed using t-test.

Pre-experimental study was conducted at the State University of Malang (UM) in the first semester of the 2015/2016 academic year. The study population is students of Information Engineering Education (PTI) UM with a number of students as many as 152 students. Samples are offering PTI class A totaling 33 students. Instruments were divided into two treatment instrument and measuring instruments. This treatment instrument instrument pe-rang-kat form of learning that is integrated with a learning management system (LMS) in the subject of computer assisted learning. Measurement instrument used to measure student learning outcomes after learning using LMS and to



examine the effectiveness of the course using LMS. Instrument of measurement in this study consists of two kinds, namely: an objective test and questionnaire responses efektivitas students to know the system.

Accordance with the object and the type of data, data analysis technique used is the technique different test analysis (t-test) and quantitative descriptive analysis. Analysis of the t-test is used to obtain information increase student learning outcomes through value difference test pretest and posttest. Descriptive analysis provides a systematic overview of the data that is factual and accurate information on the facts about the effectiveness of the use of LMS in computer assisted learning courses that are presented in tables, charts, or diagrams. Steps to analyze quantitative data, namely: give a score to each indicator; determine the mean value; determine the value of the mode; and interpret the meaning. Based on data obtained from questionnaires, analysis and interpretation performed on each indicator. Descriptive analysis technique used is to use a frequency table, the mean percentage of each item used the formula:

$$P = \frac{F}{N} \times 100\%$$

Information:

P = the percentage sought;

F = the score of each indicator;

N = ideal score (Sudjana, 2005).

The result of the calculation of percentages were consulted on the interpretation category score in the descriptive analysis of data as Table 1.

**Table 1** Interpretation Category Scores in Descriptive Analysis

No.	Interval	Category
1	3,25 – 4,00	Very Good
2	2,50 – <3,25	Good
3	1,75 – <2,50	Poorly
4	1,00 – <1,75	Not Good

### III.RESULTS AND DISCUSSION

This data is the initial ability of the participants before participating in learning activities PBK obtained from the value pretest and learning outcomes data obtained from the value of the posttest after participating in learning activities using the learning management system. Data pretest and posttest of students can be seen in Table 2.

**Table 2** Description Pretest and Posttest Data

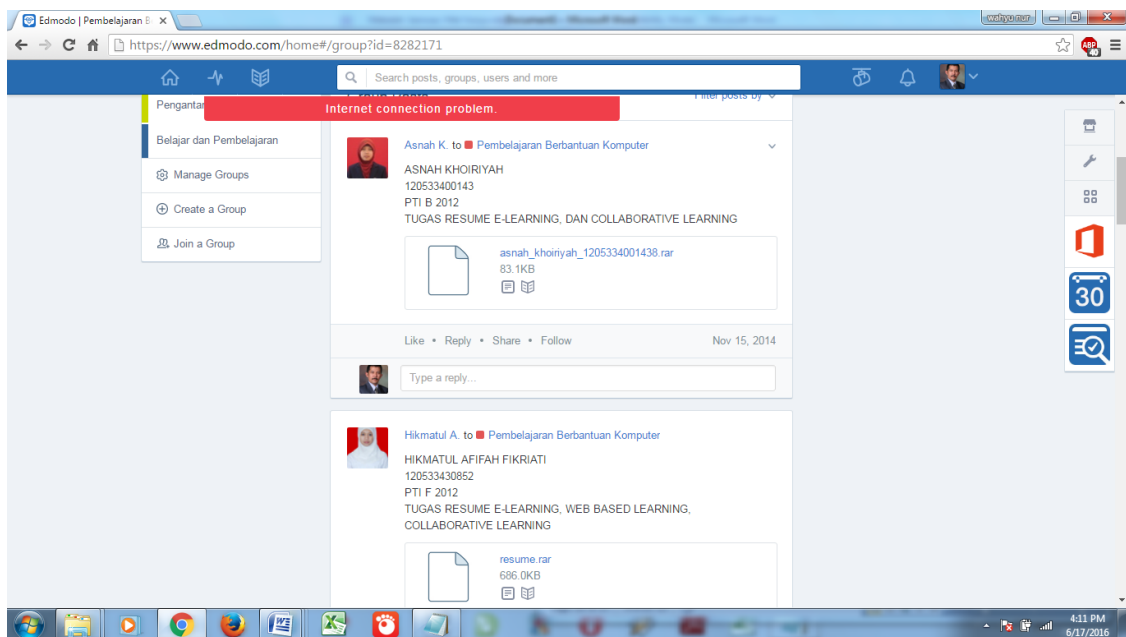
PTI	Max	Min	Average	Std
2013	Score	Score	Score	deviation
<i>Pretest</i>	75,00	45,00	61,00	67,93
<i>Posttest</i>	100,00	70,00	82,00	54,48

In Table 2 it can be seen that in the course of computer assisted learning pretest mean score of 60.00 and a posttest at 80.00. As for the standard deviation for the pretest and posttest at 17.79 at 12.65. Results of different test pretest and posttest values can be seen in Table 2. In Table 3 it can be seen that  $t_{count}$  of student data in 2013 PTI greater than  $t_{table}$  ( $t_{count} > t_{table}$ ), so it can be said that there are significant differences between the data pretest and posttest.

**Table 3** Different Test Results Data of Pretest and Posttest of Field Trial

PTI 2013	N	$\bar{x}$	$T_{count}$	$t_{table}$
<i>Pretest</i>	30	61,00	-10,396	2,002
<i>Posttest</i>	30	82,00		

Score learning outcomes demonstrate different levels of learning outcomes before and after da teaching and learning activities ( $t\text{-test} = -10.396, p = 0.000 < 0.05$ ). This means that the LMS is more interesting than learning model that is held on the subjects of computer assisted learning.



**Picture 1** Learning to Use LMS

The process of multi-directional interactions between learners and a variety of learning resources is a form of facilitation in building a new meaning as the representation of the learning experience. Source of learning by design in this case can be professors, students, and non-print materials printed, learning strategies, and the background of physical or non-physical existence is purposely-designed to achieve the learning objectives that have been set. Sources studied by utilization of different types of learning resources that are not designed specifically for the achievement of learning objectives, but its presence can be used to enhance the effectiveness and attractiveness of learning methodology research (Reigeluth, 1983).

Learning to use LMS allows the flexibility of different individuals. Students learning activities with styles and different ways (individual differences). This situation can be explained from a variety of alternatives that must be taken by students during the course of computer assisted learning, for example, the interaction between students, students and lecturers, as well as a class forum. Learning is also synergy between the mode and manner of learning that can foster learning initiatives and acts.

Lecturer role as manager of the “mengorkestrakan” learning activities via LMS. This is reflected in the learning scenario that puts the role of professor as a facilitator, manager, and as a catalyst in the learning activity. Representation of the role of facilitator in this case shown by the commitment that is always ready to facilitate the students, either individually, in small groups, and large groups (classes) in accordance with the needs at all times and stages of learning, both in the classroom and outside the classroom, both of which associated with the mode and manner of learning and support a variety of learning resources.

**Table 4** Data of LMS Effectiveness Test Results

No	Aspect	Average Score	Category
1	Clarity function of LMS	3,45	Very Good
2	The relevance of the objectives of the LMS with the students' needs	3,48	Very Good
3	Suitability and accuracy of the material with the purpose of the lecture	3,12	Good
4	Suitability evaluation to measure the level of student understanding	3,22	Good
5	The complexity of the LMS component	3,03	Good
6	Feasibility and attractiveness of the LMS as a product of learning media	3,36	Very Good
7	The level of ease of use LMS	3,39	Very Good
8	LMS functionality level to increase the interest and attention of students in the lecture	3,42	Very Good

Disclosure of sub variables suitability LMS with the purpose of the lecture is represented by the aspect of clarity of function LMS, the relevance of the objectives of the LMS with the students' needs, the accuracy of the material with the purpose of the lecture, and the suitability evaluation to measure the understanding level of students is done through a review of the indicators contained in Table 4. Table 4 shows that in general the respondents found the clarity of LMS functionality including category very good on all indicators. Aspects of the relevance of the objectives of the LMS with the





needs of the students included in the very good category. While the aspect of suitability and accuracy of the material with the aim of lectures and suitability evaluation to measure the level of understanding of students fall into good category. This has meant that in general respondents thought LMS effectiveness as a medium of learning in terms of compliance with the course objectives included in the very good category and fit for use.

Disclosure of the sub-level variables feasibility of LMS as a medium of learning represented by aspects of the complexity of the components LMS, feasibility and attractiveness of the LMS as a product of learning media, the level of convenience applications of the LMS, and the level of functionality LMS to increase the interest and attention of students in the lecture conducted by study of the indicators presented in Table 4. Table 4 shows that in general the respondents argued that the complexity of the LMS components including both categories. Aspects of the feasibility and attractiveness of the LMS as a learning media products included in the category of very good on all indicators. In the aspect of the level of ease using LMS included in the very good category. While aspects of the LMS functionality to improve the level of interest and attention of students in the lecture included in the category of very good on all indicators. This has meant that in general respondents thought LMS effectiveness as a medium of learning in terms of the feasibility of LMS as a learning medium included in the very good category and fit for use.

Based on these results it can be concluded overall that the effective use of LMS in computer assisted learning the course in terms of learning outcomes and student questionnaires, in the category very well. With these results in other subjects, the concept of the use of LMS in the lecture can be used as a diversification of learning with blended learning models using Edmodo. LMS utilization in lectures conducted to improve the quality of learning through teaching methods of passive methods become participative methods with the help of technology.

Factors supporting the implementation of LMS in the lecture should also be supported by ICT competencies possessed by the lecturer. Self-development investment lecturers in the use of ICT can make a positive contribution, both the students and the lecturers themselves (Sujianto, Mukhadis, & Isnandar, 2012; and Munadi, 2009). Through the use of ICT in teaching faculty and students can work together to learn, discuss, share information, and discover knowledge.

Most lecturers actually been using ICT in college used to prepare lectures, making presentations, and conducting evaluations of students (Singh & Samili, 2014; and Samuel & Olive, 2007). Lecturer is already using ICT, especially computers at this stage of the preparation, implementation, and evaluation in a simple, but for the use of ICT in a more sophisticated and specific yet to be implemented. Therefore, a lecturer in bidag ICT skills, especially in the use of LMS needs to be improved (Keengwe & Onchwari 2011 and Simonson, 2008).



#### **IV. CONCLUSION**

Based on the results, it can be concluded that:

1. Learning Management System is more effective to improve learning results of computer assisted learning courses based on benchmark results of student test scores in Information Engineering Education UM.
2. The effectiveness of the use of LMS can be viewed from the ease, the attractiveness and suitability LMS course on computer assisted learning. Effectiveness LMS primarily due to the strength of alternative modes and ways of learning that emphasizes the principle that “the class is learning center” and not “class is the central teaching”; multidirectional process of interaction occurs; keeluasaan accommodation of individual differences; cultural awakening answering-questions, questioning-answers, and questioning-questions; Facilitated me-search skills and take advantage of the information; and the role of lecturers over as conductor.

#### **V. RECOMMENDATION**

From the conclusion that there is, it can be suggested for lecturers to improve ICT competencies that support the concept of integration of ICT into the lecture. One of the integration of ICT into which can be applied in the course is the use of Learning Management System (LMS). Increased competence can be done by way of learning self-taught, following the system of apprenticeship at fellow lecturers who have used LMS in lectures, and training. University lecturers are required to be able to facilitate in enhancing ICT competencies by way of conducting ICT training regularly. Thus, if the implementation of ICT training regularly and sustainably implemented in schools, the level of integration of ICT in learning can be increased and the effect on student learning outcomes, and formed a professional teacher.



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EI -01-014

## PRODUCTIVE PERFORMANCE OF TEACHERS OF VOCATIONAL SECONDARY SCHOOL'S MECHANICAL ENGINEERING MAJOR : SURVEY ON VOCATIONAL SCHOOL TEACHER'S PERFORMANCE AT THE REGENCY AND CITY OF MOJOKERTO

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**ABSTRACT:** This research is intended to identify performance profile of teachers of Vocational School's Mechanical Engineering major in Mojokerto and teacher's performance based on age and certification status. Teacher's performance is perceived from four aspects of teaching competence, namely pedagogic competence, personal competence, social competence and professional competence. The research employs survey ex-post facto method on productive teachers with the vocational school's mechanical engineering major in Mojokerto. By means of stratified proportional random sampling, 222 teachers are respondents for sampling. The respondents are stratified into three age groups, namely young (22-34 years old), middle (35-37 years old), and elderly (48-60 years old). Certified teachers are those with teacher's certification, while and non-certified teachers are those not without certification. Teacher's performance is measured by means of an instrument with tested validity and reliability. The research data show that (1) teachers generally perform well (average of 80.42), some perform very well (score of 91.35) and some perform fairly well (score 66.35); (2) certified teachers perform better (average of 80.97) compared with non-certified teachers (average of 79.31); (3) teachers in all age strata perform well (younger teachers with an average of 84.58), middle aged teachers with an average of 79.17; and elderly teachers with an average of 79.17); (4) certified teachers in all age category perform well (younger teachers with an average of 79.17, middle-aged teachers with an average of 84.58, and elderly teachers with a n average of 79.17); non-certified teachers in all age categories perform well (younger teachers with an average of 77.08, middle-aged teachers with an average of 81.41, and elderly teachers with an average of 79.43). The anova 2-line statistics test proves that (1) there is significant difference between performance of younger, middle-aged and elderly teachers ( $F_h = 27,372 > F_t = 3,038$ ;  $p < 0,05$ ); (2) there is significant difference between certified and non-certified teachers ( $F_h = 12,452 > F_t = 3,888$ ;  $p < 0,05$ ); (3) and there is significant interaction between teacher's age factor and certification towards the teacher's performance ( $F_h = 3,746 > F_t = 3,038$ ;  $p < 0,05$ ). The research concludes that (1) teachers at the vocational school's mechanical engineering major in Mojokerto perform well; (2) teachers in middle aged category perform better that those of younger and elderly categories (3) certified teachers perform better that non-certified teachers; (4) there is an interaction of age and certification with the teaching performance. Despite different teaching performance in terms of ages and certification, no contrasting difference is found. This suggests that certification status has not improved teacher's performance in an optimum way for slight difference found in the research. Essential performance is attributed to competence and work motivation. This implies to the necessity for improvement of competence enhancement training and work motivation within the certification process in order to elevate teacher's performance in an optimum way.

**Key words:** Teacher's Performance, certification, and ages

### I. INTRODUCTION

Within the current global information, teachers' role remains crucial and strategic in the process of execution of education in vocational schools. Despite the fact that teachers are no more the core source of study, the role remains central to the process of transform of knowledge and technology; and the building of decent characters. There has been a shift in teachers' role, from the role of learning source to that of learning manager that serves as designer, organizer, and initiator of learning process to assure a smooth process of learning for the students. In addition to that, another irreplaceable school teachers' role is their role in place of students' parents at school, inspirator and



model for the students in terms of the process of attitude-value, personality and good character building.

The Government, through Article 10 (1) of Act No UU No. 14/2005 on teacher-lecturer, specifies teacher-lecturer's *Tupoksi* (main duty and function). Teacher's main duty and function includes all teacher's teaching activities, the followings being major tasks: planning, execution, and evaluation of learning, including remedial actions for the sake of completion of learning target. The article confirms that, in order to satisfactorily perform such main duty and function, teachers shall be equipped with four qualifications, namely pedagogical competence, personality competence, social competence and professional competence. Vocational school teachers are required to possess both theoretical and comprehensive vocational commands for optimum performance (Riyanto, 2009). Under such qualification, teachers are expected to be able to demonstrate their optimum performance of duty and function.

Some scholars define performance as interaction of capabilities, motivations and opportunities in performing their duties and responsibilities in an efficient and effective way for the interest of the organization's goals. (Robbins in Moeheriono, 2010: 61; Gibson in Suhardiyono 2013: 15). Performance describes the level of achievement of an activity program in implementing an activity program for materializing the organization's goal, purpose, vision and mission. In other words, teacher's performance can be defined as functional interaction of competence, motivation and work opportunity in term of satisfactory fulfillment or school organizational goals. A teacher's performance efficiency and effectiveness will be proven by means of the level of achievement of the designed learning activity program; indications of which are expressed in measured achievement of organization's goal, purpose, vision and mission.

As stated above, for successful performance of duty and function, teachers are required to demonstrate their pedagogic, personal, social and professional competences obtained from professional education. Pedagogic competence refers to teachers' didactic and methodic skills with which they take the role of educating and coaching pupils. Pedagogic competence or learning management competence includes the competence of comprehension of pupils' characteristics, management of learning planning and implementation, evaluation of learning process result and development of pupils' talent potentials and interests (Mulyasa, 2008:75; Yamin, 2010:9; Payong, 2011:29; Saud, 2009:50).

According to Helbert (2007: 2), comprehensive command of related knowledge and competence constitutes teachers' foundation for successful teaching duties. Teachers' performance that effectively improve class activities will result in better outputs (Hamid, 2012:89). Teachers' professional performance in curriculum implementation refers to teachers' activities in learning implementation, namely planning of learning, learning implementation and evaluation of learning process and result (Depdiknas, 2008: 21; Ismanto, 2007). In short, teachers' pedagogic performance



includes teacher's ability in understanding their pupils; and in designing, planning and implementing learning in order to help the pupils actualize their potentials and interests.

Teacher's professional competence is defined as extensive and comprehensive command of subjects taught as to ensure that teachers are able to perform their duty and function for the sake of the learning process. (Lestari, 2010). In Government Regulation no 19/2005 on Education National Standards, Article 28 (3c) in specific defines professional competence as teacher's extensive and comprehensive command on learning subjects which enables teachers to coach their students in fulfillment of competence dictated in the National Education Standards; including competences related with completion of teaching tasks and extensive and comprehensive command of school curriculum teaching subjects and science substances in the form of command of courses, structure and academic methodology. (Sanjaya, 2010:18; Yamin, 2010: 11; Mulyasa, 2008:135).

With regards to vocational competence, Article 1 of Ministry of Education's Regulation no. 28/2009 vocational competence standards for Senior Vocational Schools and Moslem Senior Vocational Schools states that vocational competence standards for Senior Vocational Schools and Moslem Senior Vocational Schools constitute national education standards that complement subject component standards for senior vocational and senior Moslem vocational schools. Teacher's Performance in term of professional competence refers to the command of school subjects as per curriculum, related academic substances, command of structure, scientific methodology and extensive and comprehensive understanding of subject matters which enable teachers to comprehend knowledge and competence in an optimum way. Command of vocational standard competence includes basic vocational competence, vocational theories and vocational practices.

Some scholars define personal competence as the representation of steady personality which is characterized by personal stability, personal maturity with the quality of being wise, and role a model for their pupils, and last but not least, being faithful. (Yamin, 2010:8). Playing a role as a model, a teacher must be equipped with some personality development competence that includes (1) (1) religious competence, (2) the ability to respect and appreciate other people's faith, (3) the ability the conduct social life I accordance to prevailing community norms, rules and values, (4) the ability to develop decent social quality such as manner and courtesy, (5) the ability to be democratic and open to criticisms and new insights (Sanjaya, 2010:18).

The Minister of Education's Regulation Number 16/2007 specifies personal competence standard that covers five major competences, namely (a) demonstration of conducts adjusted to the Indonesian national religious, legal, social and cultural norms, (b) representation as an honest, decent and a role model for the pupils and community, (c) representation of steady, stable, and respected personality (d) demonstration of high work ethics, responsibility, and pride and confidence of being a teacher, and (e) demonstration of good maintenance of teaching profession ethical code. In short, teacher's performance in terms of personality aspects is characterized by teacher's personal



competence which represents steadiness, stability, respect, maturity, model for pupils, responsibility, high holding of teaching profession ethical code, respectful of others, democratic, openness to criticisms.

Teacher's performance in social aspects includes teacher's ability to interact and communicate with other in an effective way (Yamin, 2010: 12). Social competence constitutes teacher's ability in communicating and interacting effectively with pupils, teaching assistants, parents/guardian of pupils, and the local community. Social competence also includes teacher's capability of being a part of the community which at least is indicated by the ability to communicate in verbal, written and sign manner; to use communication and information technology in a functional way; to effectively get along with their pupils and parents and with the local community. (Mulyasa, 2008: 173). In short, teacher's performance in terms of social aspects is characterized by teacher's capability of interacting with others effectively; capability in verbal, written and sign communication; and capability of using communication and information technology in a functional way.

Based on the description above, it can be concluded that teacher's performance constitutes a teacher's competence in organizing teaching duties while being responsible for the academic achievement of pupils under they are working with. Such competence can also be seen by pedagogic, professional, social and personality competences. Indicators of performance in pedagogic aspects include the ability to design and invent learning plan, execution of learning plan and evaluation of learning result. Indicators of performance in terms of professional aspects include command of vocational subjects, and theories and practices of vocational subjects. Indicators of performance in terms of personality include discipline, responsibility, fairness, wisdom, honesty. Indicators of social performance include the ability to effectively communicate with the pupils, fellow teachers, superordinates, and the community; and the ability to functionally use the communication and information technology. Indicators of teacher's performance are summarized in Table 1.

**Tabel 1.** Teacher Performance Assessment Indicators

No	Teacher's Performance	Indicators
1	Pedagogic Competence	<ol style="list-style-type: none"> <li>1. Ability to compose and design learning plan.</li> <li>2. Ability to execute the learning plan.</li> <li>3. Ability to assess and evaluate result of learning activities.</li> </ol>
2	Professional Competence ( <i>Teaching Materials</i> )	<ol style="list-style-type: none"> <li>1. Command of basic vocational competence</li> <li>2. Command of vocational courses</li> </ol>
3	Personal Competence	<ol style="list-style-type: none"> <li>1. Disciplined and possession of teaching responsibility</li> <li>2. Fair, wise and honest conducts.</li> </ol>
4	Social Competence	<ol style="list-style-type: none"> <li>1. Ability to communicate effectively with the pupils both individually and severally.</li> <li>2. Ability to use functional information and communication technology.</li> </ol>

With regards to quality improvement of teacher's performance, the national government is developing teacher's certification programs. Teachers who have passed are will be certified and are considered to be capable of serving as professional teachers and therefore are eligible for teacher's



professional allowance. There are some models of teacher certification, namely evaluation for teacher's performance portfolio, PLPG program and PPG program for young teachers. The certification program has been in existence for about ten years and trillions of rupiah has been spent. The questions is, has the teacher's performance at the vocational schools increased in an optimum way after being certified as professional teachers and rewarded with the teachers professional allowance?

Some researches on relations of teacher's certification and teacher's performance show that (a) teacher's profession allowance for elementary, junior and high schools' teachers can significantly improve teachers' performance (Maria, 2011). Teacher's performance under research includes academic quality, main duties and functions, professional development and professional supports; (b) allowance for certified teachers contributes to lecturers' productivity in terms of production of academic works and researches (Muhardi and Arinto Nurcahyono in, 2013); (c) there has been a significant influence of teacher's profession certification on both teacher's and lecturer's motivation and performance (Hesti Murwati in Surakarta Vocational Schools, 2013) (d) hasil studi Raddana(2013), and teacher's profession allowance and teacher's competence simultaneously effect teachers' performance in Nusa Tenggara Barat state high schools (Raddana, 2013).

This study in particular intends to identify (a) vocational school teachers' performance profile and (b) contribution of teacher's certification and teacher's age to vocational teachers' school performance. The result of study is expected to give information on vocational schoolteachers' performance which also indicates the contribution of teacher's certification program (in this case portfolio evaluation, PLPG dan PPG) to teacher's performance improvement. Functional allowance received by the teachers is expected to be perceived as an appreciation to teacher's profession which improves teacher's welfare that in turn can improve the vocational school teachers' performance.

## II. RESEARCH METHOD

The research on productive teacher's performance was conducted with some vocational school teachers for mechanical engineering major in Mojokerto in 2015. According to the data available at the Directorate of Vocational School Supervision, on 2015, 37 vocational schools in Mojokerto offers mechanical engineering study program. 173 productive teachers under research are certified while the other 161 are not certified. The subject of the study is 334 productive teachers, and 222 productive teachers were selected as samples by means of *proportional-stratified random sampling* method. The subject of study was vocational school teachers teaching subjects of engineering of light vehicles, motorcycles, welding and engines work. Teacher's performance is measured based on pedagogic, professional, personality and social competence indicators. The study did not include different treatment on school status (state or private).

The Survey method employed in the study was *ex post facto* design at 27 vocational schools, which comprised of 4 state vocational schools and 23 private vocational schools. The purpose of the





study was to describe vocational school teacher's performance profile; to make comparison between certified and non-certified teachers; and to make comparison of teacher's performance by ages, namely young, middle aged and elderly, Teacher's performance was measured by means of teacher's performance test. Data on teacher's ages and certification were derived from respective school database. Prior to testing, test and questionnaires were tried for validity reliability. Data of study were analyzed by means of descriptive statistics technique and 2-line Anova inferential statistics. Design of study is summarized in Table 2 below :

*Tabel 2. Research Design*

	Ages(in years)		
	Young (22-34)	Middle-Aged (35-47)	Elderly (48-60)
Sudah	Teacher's Performance	Teacher's Performance	Teacher's Performance
Belum	Teacher's Performance	Teacher's Performance	Teacher's Performance

### III. RESULT OF RESEARCH

The research suggests that (a) in general, the Mojokerto's productive vocational school teachers' performance is quite good; (b) middle-aged teachers' performance better than both younger and elderly teachers' performance; (c) Certified teachers' performance is better than non-certified teachers' performance; and (d) there is an interaction between teacher's ages and certification to the vocational school teachers' performance. The Anova-test result suggests that there is a significant difference between middle-aged teachers performance compared to that of the young and elderly teachers. ( $F_h = 27.372 > F_t = 3.038$ ;  $p < 0.05$ ). Middle-aged teacher's performance is proven to be higher than that of their younger and senior fellows. The finding confirms Robbins' finding (2013) that the older someone is the lower the performance will be.

The findings of the result are in line with other scholars' findings, namely (a) age positively affects managerial job performance (b) age strongly affects dentists' performance of at the community health centres in Jogjakarta (Supriyono, Diyah Umi Megawati and Pipiet Okti in Suhardiyono, 2013). How age contributes to teachers' performance can be explained by the fact that age factor is parallel to work experience, that is the older a teacher is the higher their burden will be when holding a teaching position. Work experience factor is predicted to be contributive to the teacher's performance improvement. The Anova analysis result suggests that there is a significant difference between certified teachers' performance and that of non-certified ones. ( $F_h = 12.452 > F_t = 3.888$ ;  $p < 0.05$ ). Data shows that the average performance of certified teachers is higher than that of non-certified teachers.

According to Robbins, one of the driving motivational factors is the physiological factor in which consists of the motivation to meet the need for food, drink, dwelling and other physiological needs. This fulfillment of basic needs are inseparable with the need for financial support that is closely related with the teacher's welfare. Certified teachers receive teacher profession allowance. Certification process is done by means of 2-week PLPG program and one-year PPG program. This



teacher certification program has made it possible for teachers to get themselves refreshed and improve their competence as well. This provision of functional allowance has become the main factor of performance improvement of certified teacher when compared to that who are non-certified.

Hesti Murwati's research concludes that there is a significant effect of teacher certification to teacher's work motivation and performance. The data confirms with Muhardi and Arinto Nurcahyono's findings in Raddana (2013) which suggests that allowance for certified teachers affects lecturers' productivity in terms of production of academic work and researches.

Researches on age interaction and teacher's certification to vocational school teachers in Mojokerto concludes that middle-aged teachers' performance is better than that of both young and elderly ones. Certified teachers demonstrate better performance compared to that of non-certified teachers. The 2-line Anova test result concludes that hypothesis  $H_0$  is rejected and  $H_a$  is accepted ( $F_h = 3.746 > F_t = 3.038$ ;  $p < 0.05$ ); which means there is an interaction between ages and certification to the teacher's performance. The findings confirm Kaliri's (2008) which concludes that teacher certification positively affects teachers' performance in state senior high schools in Pemalang.

Based on the above findings and conclusion, it is recommended that (a) the government should make necessary follow up for certified professional teachers by applying routine performance evaluation scheme so that certified teachers are able to maintain and implement their competence in real work as professional teachers. Such evaluation result will be a consideration for disbursement of teacher's profession allowance. In the event of reduced performance, necessary sanction may be applied by retaining the profession allowance until certification test is satisfactorily fulfilled; (b) vocational school teachers being professional in vocational education should continuously refresh their personality, pedagogic, professional and social competences in response to the advancement in science and technology. Vocational school teachers are expected to make themselves refreshed with new related vocational theories and practical skills. Programs for refreshment of teacher's competence should be regularly offered to make sure that certified teachers' competence remained up-to-date. It is even obligatory for the vocational teachers to be certified with the respective subject under teaching for renewal of vocational competences.



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## EDUCATIONAL PROGRAM EVALUATION BY USING CIPP MODEL

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**ABSTRACT :** *There are many models of evaluation that can be used to evaluate a program. However, the most commonly used is the context, input, process, output (CIPP) evaluation models. CIPP evaluation model developed by Stufflebeam and Shinkfield in 1985. The evaluation context is used to give a rational reason a selected program or curriculum to be implemented. A wide scale, context can be evaluated on: the program's objectives, policies that support the vision and mission of the institution, the relevant environment, identification of needs, opportunities and problems specific diagnosis. Evaluation input to provide information about the resources that can be used to achieve program objectives. Evaluation inputs used to: find a problem solving strategy, planning, and design programs. Evaluation process serves to provide feedback to individuals to account for the activities of the program or curriculum. The evaluation process is conducted by: monitoring sources can potentially cause failure, prepare a preliminary information for planning decisions, and explain the process that actually happened. Product evaluation measure and interpret the achievement of goals. Evaluation of the products also come to: the measurement of the impact of the expected and unexpected. The evaluation is conducted: during and after the program. Stufflebeam and Shinkfield suggest product evaluation conducted for the four aspects of evaluation: impact, effectiveness, sustainability, and transportability. The decision making process is done by comparing the findings / facts contained in context, input, process and product standards or criteria that have been set previously.*

**Keywords:** evaluation, education program, CIPP model

### I. INTRODUCTION

#### a. Measurement, Assessment, and Evaluation

Speaking of the evaluation, we will be faced with three terms that are interrelated with each other even in the field sometimes occur overlapping in use, namely measurement, assessment, and evaluation. Actually, what the common thread of these three terms? Are these three terms together or is it different? If equal, the equation which is so well if different, the difference where? To answer these questions will be discussed with a review of the literature. Measurements used to collect information on which to base a decision, and evaluation using the measurement results to make a decision (Mehrens & Lehman, 1984). Meanwhile, according to Griffin and Peter (1991), measurement is the determination of the object observed numbers/data retrieval. The assessment is the interpretation of the results of observation and description of the results of the overall measurement. While evaluation is an activity use the assessment results as consideration for decision making. So, from both the above opinion can be concluded that measurement, assessment and evaluation have understanding and different functions, but between the one and the other interrelated. In more detail, in the *Encyclopedia of Evaluation* stated that “*evaluation is an applied inquiry process for collecting and synthesizing evidence that culminates in conclusions about the state of affairs, value, merit, worth, significance, or*



quality of a program, product, person, policy, proposal, or plan”(Mathison, 2005:140). From the above it can be seen that the evaluation is a process of inquiry that is used to gather and synthesize the evidence ended conclusions about the state of affairs, value, merit, feasibility, significance, or quality of the programs, products, people, policies, proposals or plans.

The results of the evaluation involves two aspects, namely empirical and normative aspects. Therefore, the evaluation activities in contrast to the basic science research, clinical epidemiology, investigative journalism, or public poll.

Evaluation has a very broad sense and is not a new concept. Hadley and Mitchell (1994:48), defines evaluation as “*applied research carried out to make or support decisions regarding one or more service programs*”. While understanding the evaluation according to the United Nations Development Program/UNDP (2006:6) is “*selective exercise that attempts to systematically and objectively assess progress towards and the achievement of an outcome. Evaluation is not a one-time event, but an exercise involving assessments of differing scope and depth carried out at several points in time in response to evolving needs for evaluative knowledge and learning during the effort to achieve an outcome*”.

Further Stufflebeam (in Worthen & Sanders, 1973:129) states that “*evaluation is the process of delineating, obtaining and providing useful information for judging decision alternative*”.

From the definition of the evaluation above it can be concluded that the evaluation is an activity to gather information about the workings of something, which then the information is used to determine an appropriate alternative in the decision.

#### **b. Educational Evaluation**

So what is the evaluation of education? Understanding evaluation of education, according to Law Number 20 Year 2003 on National Education System Article 1 stated that educational evaluation is control activities, underwriting, and determination of the quality of education to the various components of education at every track, level and type of education as a form of education provision. While accreditation is the program's eligibility assessment activities in education units based based on defined criteria .Criteria that refers to the eight National Education Standards, created by the National Education Standards Agency where the National Education Standards are the minimum criteria regarding the educational system in the whole territory of the Republic of Indonesia<sup>8)</sup>. Eight National Education Standards are: 1) the content standard, 2) the process standard, 3) the competency standard, 4) the teacher and staff standard and, 5) the facilities and infrastructure standard, 6) the management standard, 7) the financing standard, and 8 ) the assessment standard.

#### **c. Monitoring and Evaluation**

In the field of education is also often used the term monitoring and evaluation is commonly abbreviated as *money*. Actually, what the common thread of the two terms? Do



words have a striking difference? To answer these questions, we can find the answer from literature.

According to the United Nations Development Program/UNDP (2006:6), monitoring is defined as “ *a continuing function that aims primarily to provide the management and main stakeholders of an ongoing intervention with early indications of progress, of lack thereof, in the achievement of results. An ongoing intervention might be a project, programme or other kind of support to an outcome*”. While understanding the evaluation according to the United Nations Development Program/UNDP (2006:6) is “ *selective exercise that attempts to systematically and objectively assess progress towards and the achievement of an outcome. Evaluation is not a one-time event, but an exercise involving assessments of differing scope and depth carried out at several points in time in response to evolving needs for evaluative knowledge and learning during the effort to achieve an outcome*”.

#### **d. Evaluation and Research**

In the field of education is also often overlapping use of terms between evaluation and research. What is the common thread that can be drawn from both?

Mertens (2009) states that “ *while there is much overlap between the world of research and evaluation, evaluation occupies some unique territory*”. More detail, Trochim (2006) argues that “ *evaluation is unique because of the organizational and political context in which it is conducted, which require skills in management, group processes, and political maneuvering that are not always needed in research*”.

While Arikunto (2013) states that in terms of objectives, evaluation research, and evaluation of education, there are three differences. *First*, evaluation research is usually conducted in the context of decision making. *Secondly*, the evaluation is usually carried out with a limited purpose. *Thirdly*, evaluation studies with educational research related to consideration of the meaning and value.

In the research, researcher wanted to find a picture of something later described, whereas in program evaluation, the evaluator want to know how high the quality or condition of something as a result of the implementation of the program, after the data was collected as compared to specific criteria or standard.

In the research, researcher led by the formulation of the problem, whereas in program evaluation, the evaluator would like to know the level of achievement of the program, and if the objectives have not been achieved, the evaluator wanted to know where the deficiencies and why. The results are used to determine the follow-up or a decision to be taken.

There are many models of evaluation that can be used to evaluate a program. However, the most commonly used are Context, Input, Process, Product (CIPP) model.

## II. CIPPEVALUATIONMODEL

Stufflebeam & Shinkfield (1985:156) states that “*this basic framework of the CIPP was complete (context evaluation to help develop goals, input evaluation to help shape proposal, process evaluation to guide implementation, and product evaluation to serve recycling decisions)*”. This model has a basic framework that is complete, ie the evaluation context to help formulate objectives, evaluation input help in preparing the program, the evaluation process is to direct enforceability of a program, and product evaluation to determine the achievement of a program.



Figure1. The CIPP model of evaluation  
Source: <https://www.google.co.id/search>

Dharma, et al (2013:345) states that the curriculum evaluation carried out for two interests, namely the measure of accountability and feedback curriculum implementation. Evaluation of curriculum accountability measures if the evaluation of the curriculum aims to examine accountability in achieving educational goals with regard to quality and quantity of yield and cost-effectiveness. The evaluation is conducted to provide feedback on the implementation of the curriculum when the evaluation aims to eliminate the limitations and continuously improve performance at both the individual and institution.

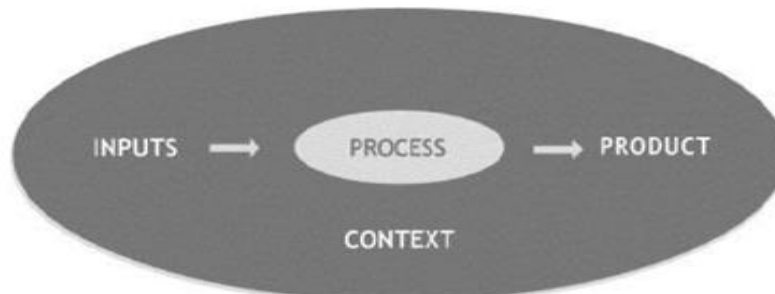


Figure2. The CIPP evaluationmodel  
Sumber: <http://www.cglrc.cgiar.org>





CIPP is an acronym of context, input, process, and product. CIPP evaluation model has been widely used to evaluate a program, policy, and can also be used to evaluate the curriculum on a small scale. Things that need to be evaluated in each component of the activities are:

**a. Context Evaluation**

Context evaluation is used to give a rational reason a program or curriculum have to be implemented. On a large scale, can be evaluated in the context of: the program's objectives, policies that support the vision and mission of the institution, the relevant environment, identification of needs, opportunities and specific problems diagnosis. Need assessment is a common example of context evaluation. In a small scale, can be applied to evaluate the learning program objectives. Context evaluation to serve planning decision.

**b. Input Evaluation**

Input evaluation to provide information about the sources that can be used to achieve program objectives. Input evaluation is used to: find a problem solving strategy, planning and design programs. The results of the input evaluation: budget, schedule, proposals and procedures. In learning activities, input evaluation can also be done to find sources that can be used in the learning process so that it can serve to establish appropriate learning strategies. Input may contain: student component, infrastructure, media, teacher, etc. Input evaluation to serve structuring decision.

**c. Process Evaluation**

Process evaluation serves to provide feedback to the individual to take responsibility for the activities of the program or curriculum. Process evaluation is carried out with: monitor potential sources can cause failure, prepare a preliminary information for planning decision, and explain the process that actually happened. Process evaluation requires: data collection instruments (observation sheet, assessment scale, field notes, etc.). Process evaluation to serve implementing decision.

**d. Product Evaluation**

Product evaluation measure and interpret the achievement of objectives. Product evaluation also arrive at: measuring the impact of the expected and unexpected. The evaluation is conducted: during and after the program. Stufflebeam suggest the product evaluation conducted for four aspects of evaluation: *impact, effectiveness, sustainability, and transportability*. Product evaluation requires: an instrument (such as test sheet, interview sheet, and observation sheet) to observe behavior change after the implementation of the learning program. Product evaluation to serve recycling decision.

Banerjee & Muley quoted by Ajit Kumar (2011:61)<sup>16)</sup> states that the three stages in the technical educational activities interrelated, namely: (1) input is community needs and resources, (2) process is about learning, and (3) output is workforce skills.



With the CIPP evaluation model will be produced four types of decisions, namely: 1) decision in planning that affects the choice of goals and objectives, 2) make decision that ensure the design of strategies and procedures are optimal to achieve the goals, 3) implement the decision: the work done to bring and improve by selecting the designs, methods, and strategies, and 4) repeat the decision to establish continuity, change or terminate the program activities.

### **III. THE OBJECTIVE AND BENEFITS OF PROGRAM EVALUATION**

What exactly is the purpose of implementation of the program evaluation? Wholey, Hatry & Newcomer (1994:1)<sup>17)</sup> state that “*program evaluation attempts to provide processes that agencies of all kinds can apply to obtain better, more valid, answers to these questions*”. While Dharma, et al (2013)<sup>14)</sup> explains that all program activities using the program evaluation to see the level of success that has been achieved, determine the effectiveness and efficiency of ongoing program and to obtain information to establish the next program is worth doing.

From the above it can be concluded that the program evaluation is a unit or entity activities aimed at collecting information about the realization or implementation of a policy, takes place in a continuous process, and occurs in an organization involving a group of people to decision-making.

There are four benefits that can be drawn from the program evaluation activities, namely:

1. Termination of program.
2. Revise program.
3. Continuing program.
4. Disseminate program.

At least five traits into program evaluation requirements, namely:

1. Referring to the rules which apply.
2. Do systematically.
3. Identified determinants of success and failure of the program.
4. Using standard benchmarks.
5. The evaluation results can be used for decision making.

To produce the right decision from the program evaluation depends on the ability of the person doing the program evaluation (evaluator). There are at least six conditions to be evaluator, namely:

1. Able to carry out.
2. Accurate.
3. Objective.
4. Be patient and persevering.
5. Carefully.
6. Responsible.



#### IV. EVALUATION EXECUTION

According Arikunto (2013:228)<sup>11)</sup>, there are several steps that must be done by the evaluator at the time of the program evaluation, namely:

1. Evaluator conduct a bookreview, field, and gather information from experts to gain an overview of the issues to be evaluated.
2. Evaluator formulates the program/research problem in the form of evaluation research questions.
3. Evaluator develop a evaluation research proposal.
4. Evaluator set evaluation planning, arranging instruments, preparing human resources, and carry out trials instruments.
5. Implementation of the evaluation in a form the evaluation model that has been adapted.
6. Evaluator collecting data with instruments that have been prepared based on the details of the components to be evaluated.
7. Analyze the collected data by comparing it to benchmarks/criteria has been established in accordance with the objectives set by the program manager.
8. Summing up the results of the evaluation based on an idea of the extent of the data in accordance with the benchmarks/criteria.
9. Information on the results of the evaluation study submitted to the program manager or the parties ask for help to the evaluation researcher.

According Wholey, Hatry and Newcomer (1994:233-385)<sup>17)</sup>, there are some procedures/methods for data collection that can be done in the implementation of program evaluation, namely:

1. Use of rating by trained observed.
2. Designing and conducting surveys.
3. The use of expert judgment.
4. The use of role-playing in evaluation.
5. The use of Focus Groups Discussion (FGD).
6. Managing field data collection from start to finish.
7. Collecting data from agency records.

Data analysis in the program evaluation can use some methods/approaches, namely:

1. Using statistics appropriately.
2. Using regression models to estimate program effects.
3. Cost-benefit analysis.

Further according to Wholey, Hartly and Newcomer (1994: 457)<sup>17)</sup>, steps in conducting a cost-benefit analysis, there are three steps, namely: (1) determine the benefits of a proposed or existing program and place a dollar value on those benefits, 2) calculate the total cost of the program, and 3) compare the benefits and the costs.



## V. THE DECISION OF PROGRAM EVALUATION

In general, there are three follow-up/recommendations made by the evaluator to the decision maker to a running program, namely:

1. The program continued and disseminated because they were considered good and successful.
2. The program revised because there are things that are not in accordance with the benchmarks/criteria desired.
3. The program stopped because there is less evidence/not good or there was a violation in the implementation.

## VI. CONCLUSION

There are many models of evaluation that can be used to evaluate a program. However, the most commonly used are context, input, process, product (CIPP) evaluation model.

CIPP evaluation model developed by Stufflebeam and Shinkfield in 1985. The purpose of the evaluation is to collect data or information to be compared with the criteria that have been made and then conclude. The gap between the real condition in the hope that is sought. The gap obtained a description of whether the implementation of the programs surveyed was appropriate, less appropriate, or not in accordance with predetermined criteria.

The decision making process is done by comparing the findings/facts contained in context, input, process and product with a standard or predefined criteria.

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## OPTIMIZATION OF STUDIO LEARNING SYSTEM FOR ARCHITECTURE STUDENTS

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**ABSTRACT:** *The process of architectural education is still resting on studio learning model. This learning model adopted a model of education in the era of Beaux-Arts. This model was originally educate students who are considered to have the talent in drawing, painting, sculpture and architecture. Architectural Studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified. Application of studio learning system in Architecture Students of Universitas Negeri Semarang (UNNES) implemented in the form of Architectural Design Studio Subjects, starting the first semester to VI. Implementation courses studio until 6 semesters with a series of stages Semester Lesson Plan (RPS) which is adapted to the weight of the competence and design cases. The issues are how much influence the learning process of the studio system in enhancing the competence of architecture students. Some related variables such as: curriculum, materials, human resources and facilities. By optimizing the studio learning system, every architectural students are expected to follow the course properly and achieve the targeted learning outcomes.*

**Keywords:** learning, studio, students, architecture

### I. INTRODUCTION

Study Program of Architecture Engineering is under the Department of Civil Engineering, Faculty of Engineering, Semarang State University (UNNES: Universitas Negeri Semarang), established in 2001 by decree of the Rector of the UNNES. This learning process of study program until Academic Year in 2003. Based on Decree of General of Higher Education Ministry of National Education, Republic of Indonesia in view of the licensing process has not been approved, Study Program of Architecture Engineering UNNES obliged to follow a joint program with the nearest state university institutions, in this case with Faculty of Engineering, Gadjah Mada University in Yogyakarta.

Furthermore, under the Decree of the Ministry of National Education, Republic of Indonesia Number: 89 / D / O / 2010 dated July 9, 2010 of the Operating Licence Study Program Architecture Engineering opened with the status of study program of Architecture Engineering under the auspices of the Department of Civil Engineering, Faculty of Engineering, UNNES. Architecture Engineering established and organized in the framework of educating the nation and improve the welfare of the Indonesian people, especially in the scientific field of architecture, according to the foundation of the Republic of Indonesia, Pancasila and the 1945 Constitution and Law No. 20 Year 2003 on National Education System, and Government Regulation No. 19/2005 on the National Education Standards as the basis for the implementation of law and reform of the national education system. Thus honesty, openness, and concern for the community as well as responsive and environmentally sound must be contained in the concept and implementation of education.



The process of architectural education is still resting on learning model studio. This learning model adopted a model of education in the era of Beaux-Arts. This model was originally educate students who are considered to have the talent in drawing, painting, sculpture and architecture. Architectural Studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified. Application of studio learning system at Architecture Students of UNNES implemented in the form of Architectural Design Studio Subjects, starting the first semester to VI. Implementation courses studio until 6 semesters with a series of stages Semester Lesson Plan (RPS: Rencana Pembelajaran Semester) which is adapted to the weight of the competence and design cases. The issues are how much influence the learning process of the studio system in enhancing the competence of students of architecture. Some related variables such as: curriculum, materials, human resources and facilities.

Adicpto (2002) states that the architectural education system has an uniqueness when compared with the education system in other fields. Architectural education system inherited from the past are still relevant today. Relevance is evident is the apprenticeship system in practical work and in the studio which is a legacy of education system of Beaux-Arts. While learning by doing by making models or work on assignments in such a basic workshop inherited from the Bauhaus school.

One of the process of architectural education relies on studio learning system by adopting a model of education in the era of Beaux-Arts, founded by Mazarin Kaqrinal 1648. In this model explained earlier educate students who are considered to have the talent in the field of drawing, painting, sculpture and architecture. Students work in the studio to accompany the artists chosen as Master to become his patron. They learn to someday be considered capable of standing alone. Measures of success is when a student won the competition regularly held. Architectural design studio as a place of education process is expected to equip prospective architects competencies the students so that will be able to professionally certified.

According to Salama (2001), the architectural studio is the outcome of a wide range of knowledge that is integrated in the activities of designing which is guided by a tutor who professional from practitioners. Studio model is expected of the students can obtain information on how the real conditions and problems that occur in the process of designing in the community. It is capable of forming pride in the profession see the tutor as the spearhead of a successful educational process architecture, process this success greatly influenced the extent of the interaction is well established and the duration of coaching in the studio. The Tutor should be able to be a facilitator and stimulator of creativity of the students in the process of designing.

Arikunto (1980) menjelaskan bahwa pengajaran lebih menunjuk pada suatu kegiatan yang mengandung terjadinya proses penguasaan, pengetahuan, keterampilan dan sikap oleh subyek yang sedang belajar. Kebutuhan manajemen pengajaran desain berhubungan langsung



pada perwujudan hasil karya desain arsitektur oleh mahasiswa. Untuk mewujudkannya tidak hanya bakat tetapi membutuhkan\ cara berpikir desain melalui pelatihan di studio arsitektur. Studio sebagai wadah kegiatan, melatih mahasiswa untuk mempelajari, mempraktekkan visualisasi dan representasi, mempelajari bahasa baru serta dibina berpikir secara desain. Pelatihan tersebut memperhatikan peran pembimbing selain dosen sebagai Pengampu mata kuliah. Keterlibatan bersama antara seluruh elemen pembelajaran (dosen dan mahasiswa) dalam sebuah studio.

Arikunto (1980) explained that teaching is more pointed on an activity that contains the process of mastery, knowledge, skills and attitudes by the subjects being studied. Teaching management needs of the design is directly related to the realization of architectural design work by the students. To realize not only the talent but needs \ thinking the design through training in studio. Studio as a basis for activities, to train students to learn, practice visualization and representation, learning new languages and fostered thinking design. The training supervisor at the role other than as a lecturer. Joint engagement between all elements of learning (lecturers and students) in a studio.

According to Susilo (1998), the studio is a place of study formed from the Latin word as *studere*, which means to pursue and in English, meaningful study of learning. Because the study was to pursue the real sense, the studio is not just a place to learn solely. Persevere means thinking with variations in combination with philosophy, science and technology, even art. By simulative various problems of real life tested are identified, analyzed, prepared in accordance priority rating, synthesized as an alternative solution following stages according to the evaluation cycle processes based on the input-output system is methodologically and thematically.

Studio learning system is a method of learning that should be conducted in a professional, effective, and efficient so that implementation efforts are undertaken breakthroughs (improvisation) in order to deliver the best results. There is a diversity of studio teaching methods, depending on the purposes of each college organizers. However, there are some corridors: (1) Comparative study design through a natural environment to enrich the knowledge in designing location support (through outdoor activities; (2); Modelling studio architectural design that integrates with course support as accumulation efficiency in the practice of critical thinking which is lifelong learning; (3 ) a constructive alternative learning architectural studio that gives freedom to the students so that evoke creativity optimally; (4) Final Project with a non studio allows advantages in favor of the freedom of students to independently practice managing time and thinking responsibly (IT, software) ; (5) Studio contextual have the potential to support learning in the process of designing the architecture through literature, criticism, research, and solutions to problems in actual and accurate (APTARI, 2009).





## **II. METHODS**

This research used the exploratory method in collecting and analyzing data. Exploratory study aims to explore and understand information and facts about the phenomenon under study and the center of attention because it is still little known (Kuntjojo, 2009). Explorative method is based on the facts that are specific views, then do the mapping and categorizing. This method is also supported by field research to strengthen analysis. In this research, exploratory methods to see how the design studio learning system by identifying the level of effectiveness and optimal results.

## **III. DISCUSSION**

### **A. Profile of Graduates of Architecture Engineering UNNES**

Profile of Graduates of Architecture Engineering UNNES are expected to work and absorbed in some areas of employment: (1) Academics in the field of Architecture; (2) Professional Architect / Architectural Consultants; (3) Contractor / Managing Buildings; (4) Actors of Building industry; (5) Government / bureaucrats; (6) Appraisal in Construction; (7) Designer art in the field of Handy Craft, Furniture, and Interior Elements.

### **B. Competencies of Graduates of Architecture Engineering UNNES**

Competence of graduates is divided into a core competency and supporting competency, each of which has a fairly good level of competitiveness.

#### **1. Key Competencies**

- a) Understanding the basic knowledge of architecture with intelligent, especially hooked up with the theory, history, art, technology, and other human sciences.
- b) Ability to create architectural designs, interior, landscape, and environmental settlement / urban by observing the relationship between people, buildings and caring for the environment sustainable.
- c) Ability to intelligently understand the structural design, construction, and building systems and specifications of materials along with user code following the development of science, technology and environment-friendly.
- d) Ability to act as planners, implementers, managers of building / built environment, and understand the laws / regulations institution building, as well as care and high responsibility, in practice the code of ethics profession to maintain the quality of a good environment for the survival of the community.
- e) Be able to apply and develop the knowledge and expertise in both conceptual and application architecture that is tolerant of problems and a growing need in the community.

#### **2. Supporting Competencies**



- a) Ability to convey ideas and concepts with the international language of polite, intelligent, and democratic and has a breadth of knowledge related to architecture and the built environment.
  - b) Able to be estimator and financing arrangements (cost control) as well as project management is honest, intelligent and responsible technological growth and matrial buildings, as well as having high integrity to the assignment and profession.
  - c) Take control and are able to apply computer graphics, ranging from 2-dimensional and 3-dimensional, as well as animation, to support the smooth implementation of the tasks / roles professionalism
3. Other Competencies
- a) Understand the various methods of research and scientific writing, and able to provide an appreciation of the work of architecture and the built environment, intelligently and democratic
  - b) Ability to design intelligently and creatively to lay out graphics and create aesthetic interior elements with a variety of media that are environmentally friendly.
  - c) Ability to create mockups / mock-up design with good design results.

### **C. Subjects-based Studio in Architecture Engineering UNNES**

In Architecture Engineering UNNES, subjects-based studio are Architectural Design Studio and Architectural Final Project. The subjects are to be a "core" or learning core architecture applied conditional retrieval system according to the specified minimum value. The distribution of these courses in the semesters are:

**Table 1.** Distribution of Subjets-based Studio

<b>No</b>	<b>Subjects</b>	<b>Credits</b>	<b>Semester</b>
1.	Architectural Design Studio 1	4	1
2.	Architectural Design Studio 2	4	2
3.	Architectural Design Studio 3	4	3
4.	Architectural Design Studio 4	5	4
5.	Architectural Design Studio 5	5	5
6.	Architectural Design Studio 6	5	6
7.	Architectural Final Project	7	8

*Source: Profile of Architecture Engineering UNNES, 2013*

Subjects-based Studio carried out in 16 meetings including the Middle Semester Exam as a middle evaluation stage. Unless Architecture Final Project are included in the thesis university system. Each meeting is held for 50 minutes per credits. Technically, Architectural Design Studio 1 s / d 4 graphics using the technique of drawing by hand (manual graphic), while the

Architectural Design Studio 5, 6 and Final Project Architecture using computer graphics techniques.



manual graphic

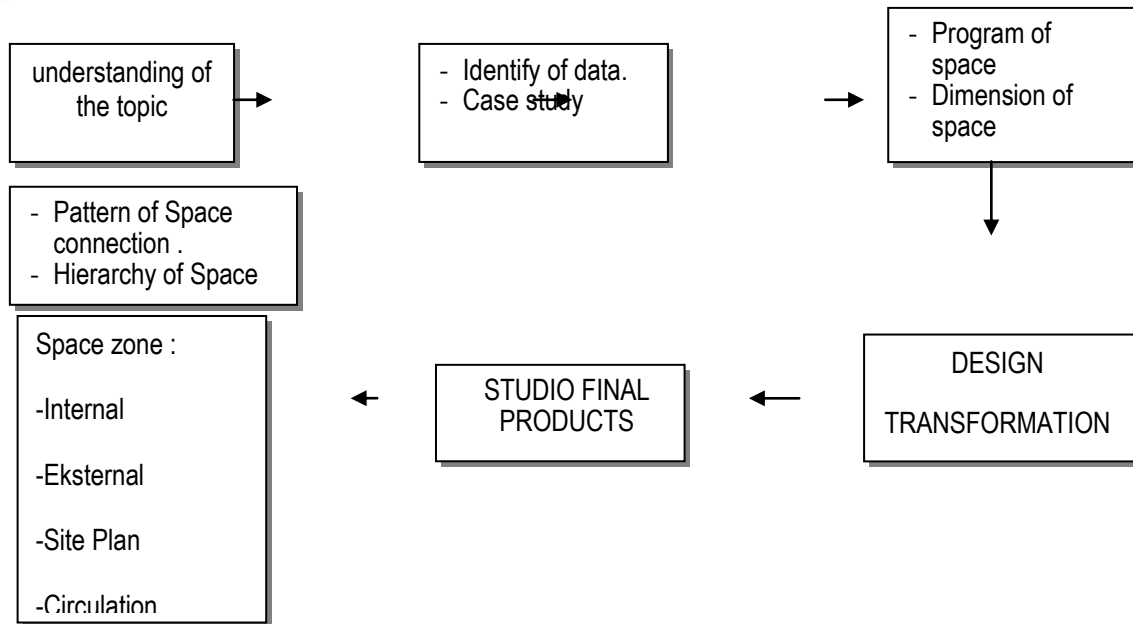


computer graphic

**Figure 1.** Graphic methods in studio

The use of the graphics system manually in semester 1 s / d 4 has the purpose to provide an experience that integrates design concept understanding and gross motor skills of participants studio. It also encourages the creativity of participants in the pouring studio best sketch capabilities without relying entirely on computer graphics. This is important, because the tendency of each participant studio for clicking "copy-paste" the object or image material is not merupakan yag their pure act. After this experience gained, the 5th semester and later can use the computer as a tool for designing appropriate concept study set.

The steps in Architectural Design Studio in Architecture Engineering UNNES is as follows.



**Figure 2.** The steps in Architectural Design Studio

Each lecturers accompany the studio learning process which is divided into several groups according to the locations that have been set. The process takes place in a place with the assistance provide input or comment on the design process, Phase assistance is implemented in accordance reference Semester Lesson Plan each meeting.

Rate the evaluation phase is through the middle of the performance-based portfolio, namely the assignment of groups and individuals with writing Platform for Architectural Planning and Design. While the final assessment by the completeness and conformity procedures set the image as well as the final aesthetics of the design development: concept design, site plan, building floor plans, elevations, cuts, perspective exterior and interior, architectural details, as well as mock mass composition of the building.

At the stage of design development / design of the participants carrying out the process of Final Project Architecture in the studio with a "quarantine draw", by following the prescribed rules:

- a. The whole process of the development stages of the design / design is done in the studio.
- b. Participants are required to complete a studio presence that has been provided 2 times Presence breakfast and lunch.
- c. The timing of the final studio from 08.00 - 16.00.
- d. If unable to attend for any reason shall inform the organizing committee.
- e. Participants who leave the room must fill in the sheet presence that has been provided.
- f. Implementation of Mentoring can be done in the studio and the student must fill "SiTedi" (page <http://skripsi.unnes.ac.id>).
- g. Participants are strictly forbidden smoking studio or bring liquor into the studio.



- h. Participants are strictly forbidden to interfere with activities outside the studio.
- i. Participants studio during the execution of the final studio dressing is not allowed to use the shorts, T-shirts, flip-flops and must keep ethics.
- j. Participants studio must maintain the cleanliness and beauty studio space and security.
- k. If deemed necessary and approved by the organizing committee exam Final Project Assessment Architectural Final Project through an evaluation mechanism through final test of the project that has been generated by the participants of Architectural Final Project consists of two phases: the preparation phase and Phase Development of Platform for Architectural Planning and Design / design through studio. The second stage of the evaluation process to determine the final value of a Final Project Architecture, with the weight of each stage are as follows:

- a. Platform for Architectural Planning and Design = 30%
- b. Design development = 70%

The details of each stage of the assessment can be seen in the table following the final project assessment system:

- a. Platform for Architectural Planning and Design assessed with the following details:
  - 1) Understanding Project Title embodied in Space Program : 5%
  - 2) Site Approaches : 10%
  - 3) Application of Structural and Building Construction Technology : 5%
  - 4) Building Appearance : 10%
- b. Design development assessed with the following details:
  - 1) Design Concept : 10%
  - 2) Situation + Site plan and floor plan: 15%
  - 3) Views and Sections: 15%
  - 4) Architectural Details: 5%
  - 5) Perspective exterior and interior: 10%
  - 6) Structure Construction and Building Systems: 5%
  - 7) Model and Visual Presentation: 10%



**Figure 2.** Final Test of Architectural Final Project

#### **IV. CONCLUSION**

Based on the results of research, learning systems architectural design studio is more optimal and increased performance. Performance control lecturers and professors of the classes are also excellent views of the optimal results are obtained. For more optimizing studio results, it is necessary to increase the quantity and quality of the studio with the support of more adequate infrastructures as needed activity.



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## **DEVELOPMENT OF MODULAR DYNAMIC OBJECT ORIENTED LEARNING ENVIRONMENT AS AN EFFORT TO E-LEARNING AT SMK IN SOUTH SULAWESI**

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**ABSTRACT :** *This study aims to find models of Using MOODLE to improve student SMK achievement in South Sulawesi. The research was conducted at SMK in South Sulawesi, with the object this research is the students of SMK at Computer Engineering and Network Departement. This study was designed in the two phases . The first phase, conducted a survey of Learning Process ( PBM ) using a conventional approach. The second phase of this research is to create a module Free MOODLE then tested in the field. Based on the results of research on the average results of the needs assessment MOODLE at SMK TKJ South Sulawesi is known that 90 % of respondents agreed with the use of MOODLE as e-learning. Furthermore, to test MOODLE Guide found that (a) aspects of the format used on the module MOODLE in category 3.25 (good); ( B ) aspects of language use in the MOODLE modules known to be in the category of 3.27 ( good ) ; ( C ) aspects of the illustrations used in MOODLE modules are in the category of 3.27 ( good ) ; ( D ) the aspect of clarity that is used on MOODLE modules known to be in the category of 3.25 (good). This research method testing carried out by conducting surveys, discussions with stakeholders, Conducting small group , large group, as well as in SMK TKJ desimination stage in South Sulawesi.*

**Key Word:** *MOODLE, E-Learning, SMK*

### **I. INTRODUCED**

With facilities and computer capabilities, subject matter that has been manipulated through the application program will be more easily understood by learners, further enhance the interest of learners, as well as giving a boost stronger learners to follow the lessons that ultimately improve learning outcomes of students (James, 2005).

E-Learning System as a learning concept that is considered effective and efficient in order to utilize information technology to the world of education has been judged necessary to anticipate the changing era in which all leading digital era both the mechanism and content. Development of e-Learning system should be preceded by an analysis of the needs of users.

According to the development of systems and software, the needs of these users have the highest position and the implementation of e-Learning system that is mainly caused that the developed system does not correspond to what is actually needed by the user. MOODLE is one application of the concepts and mechanisms of learning that utilizes information technology. MOODLE is a name for an application program that can transform an instructional media into a web form. MOODLE is an application Course Management System (CMS) which can be downloaded free, used or modified by anyone under license GNU general





public license that is distributed by the free software foundation. MOODLE provides a complete software package.

The demands of study at Vocational High School requires students to improve their academic achievement by mastering the theories related to voting and skilled majors to process the information it receives, so ready to enter the real working world after completing the study. Observations in the field has highlighted that in general the learning process of vocational students in the province of South Sulawesi, particularly in applications Modular Object-Oriented Dynamic Learning Environment for teaching and learning process still low level.

The purpose of this paper is to describe the results of the development of a learning model based on e-learning using MOODLE Department of Computer Engineering and Network of vocational schools in South Sulawesi.

This research is important to be implemented mainly to: ( 1 ) Efforts to update the learning model and learning materials for vocational students; ( 2 ) Efforts to develop a learning model based on e-learning in a structured and innovative vocational; ( 3 ) The integration of media technology ( IT ) systems in vocational learning by learning to use e-learning built from Modular Object-Oriented Dynamic Learning Environment.

## **II. RESEARCH METHODS**

### **A. The Model Development**

Model application of e -learning instructional system development model adopted by Dick & Carey arguing that should software developers in the field of education and teaching using one of the development model that has been used by experts in the field of education (Dick & Carey, 2001).

Components of instructional models Dick & Carey (2001 ) are: ( 1 ) identify the purpose of teaching, ( 2 ) analysis of teaching, ( 3 ) identify entry behavior, ( 4 ) to formulate the purpose of performance, ( 5 ) developing the test items the reference benchmark, ( 6 ) develop teaching strategies, ( 7 ) develop and establish modules or teaching guides, ( 8 ) design and conduct formative assessment, ( 9 ) revising the teaching and ( 10 ) develop and conduct summative evaluation.

### **B. The Procedure Development**

Procedures planned research done through the following stages:

#### **1. Pre-development**

The first phase development procedure, is to conduct a survey of the learning process and its relation to student academic achievement. This includes the motivation to learn , problem-solving, collaborations teacher-student, and independent learning class student of SMK South Sulawesi addition do conceptual analysis aimed at the assessment of the principles, concepts and rules associated with student achievement study of literature, journals, research reports , internet , as well as discussions with experts and peers.



## **b . Development**

In this development , the activities carried out are :

### *1 ) . Develop Research Instruments*

The instrument used in this study namely The questionnaire. The questionnaire used for the information of the students related to the teaching and learning process in the classroom .

### *2 ) . Developing Learning Materials*

Develop training materials are complete write all of the materials obtained in the preceding stage , into a prototype e -learning that has been intact .

### *3 ) . Evaluation*

The evaluation is intended to determine the quality of the implementation of e-learning by expert testing , test a small group ( teachers ) as well as a large group test (the student ) . For more details of the evaluation can be seen in the post- development activities

## **C. The Data Collection Technique**

Collection Techniques Data various types of information from various sources, will be used data collection techniques are techniques of data collection questionnaire. Questionnaire data collection techniques is done by providing a set of questions or a written statement on the implementation of EL -MOODLE. Questions in the questionnaire given to respondents to gauge the effectiveness of the use of EL - MOODLE at vocational schools in South Sulawesi.

## **D. The Source Data**

Furthermore, the source of the data from this study is derived from: ( 1 ) The teachers of Computer Engineering and Networks , ( 2 ) Students of vocational schools Expertise Computer Engineering and Networks ; ( 3 ) Expert Learning ; ( 4 ) Expert E - Learning ; ( 4 ) document on MOODLE .

## **III. RESULTS AND DISCUSSION**

### **A. Format**

Based on the results of the assessment from the aspect of MOODLE module format used on the module MOODLE that the average score ratings of the respondents were in the category of 3.25 ( good ) . In detail 5 grains indicators are indicators of clarity modules rated with a mean score of 3.09 ( good ) , the appeal of which is owned modules rated respondents with a mean of 3.27 ( good ) , the numbering system used was rated by respondents with a mean of 3.27 , the system the layout / space got a score of 3.23 , and the type and font size gets the value of 3.41 .

### **B. Syntax**

Based on the results of the assessment module MOODLE review of aspects of the language used on the module MOODLE note that the average score ratings of the respondents were in the category of 3.27 ( good ) . In detail 4 grains indicators are indicators of the use of terms of the EYD rated respondents with a mean value of 3.36 ( good ) . Clarity Indicator instructions / directives rated respondents with a mean value of 3.36 ( good ) . Simplicity



indicators sentence structure of respondents rated their mean of 3.23 ( good ) . The language used indicators are communicative respondents rated their mean of 3.14 ( good ) .

### **C. Illustration**

Based on data in Table 4.3 on the average assessment MOODLE modules from the aspect of illustrations used on the module MOODLE note that the average score ratings of the respondents were in the category of 3.27 ( good ) . In detail 3 point indicator is an indicator of support illustration rated respondents with a mean value of 3.09 , the indicator has a clear display assessed respondents with a mean value of 3.50 , easily understood indicator of 3.27

### **D. The Clarity**

Based on the data in table 4.4 on the average assessment MOODLE modules from the aspect of illustrations used on the module MOODLE note that the average score ratings of the respondents were in the category of 3.25 ( good ) . In detail 4 grains indicators are clear indicators that will be implemented rated aspects of the respondents with a mean value of 3.23 , the indicator linkage content with learning problems in class rated respondents with a mean value of 3.41 , the indicator attract students 3,18 . Indicators of material are grouped in sections corresponding rated respondents with average grades of 3.18 .

## **IV. CONCLUSIONS**

Based on the results of this study concluded that :

Based on the results of the Pre - assessment module MOODLE terms of aspects format used on the module MOODLE that the average score ratings of the respondents were in the category of 3.25 ( good ) . With clarity indicator modules rated with a mean score of 3.09 ( good ) , the appeal of which is owned modules rated respondents with a mean of 3.27 ( good ) , the numbering system used was rated by respondents with a mean of 3.27 , system layout settings / space got a score of 3.23 , and the type and font size gets the value of 3.41 .

Results of Pre - assessment module MOODLE review of aspects of the language used on MOODLE modules are in the category of 3.27 ( good) and aspects of the illustrations used are in the category of 3.27 ( good ) as well as aspects of the illustrations used in MOODLE modules known that the mean score assessment of the respondents were in the category of 3.25 ( good )



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EI-02-017

## IMPLEMENTATION OF MECHANICAL ENGINEERING CURRICULUM FOR 3 AND 4 YEARS VOCATIONAL HIGH SCHOOL WITHIN THE LEARNING PROCESS IN SCHOOL AND INDUSTRY TO INCREASE GRADUATES QUALITY IN ASEAN ECONOMIC COMMUNITY ERA

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**ABSTRACT :** There are many models of Vocational High School (VHS), varying in period of study, educational design (in school and industry), and the competence design such as 3-year VHS, 4-year VHS and community college. Vocational education in Indonesia is facing the ASEAN Economic Community (AEC) challenge. Proper curriculum for the 3-year VHS, 4-year VHS is "outcomes-based curriculum". Regulation of the Minister of Education and Culture Republic Of Indonesia number 70 year of 2013 about the Basic Framework and Curriculum Structure for VHS showing 3 and 4 years programs. This research is a descriptive research, comparing two independent samples as a mean to know the comparison of the implementation of Mechanical Engineering curriculum for 3 and 4 years VHS at the study process in school and industry to increase the graduate's quality at VHS Negeri in Makassar. The result shows that most of the graduates of 3 and 4 years VHS has not been able to adapt to the program demands and the development of science and technology and also there are difference in the implementation of curriculum at school and the industry. So that there are also difference in response from the student of 3 and 4 years of VHS. It can be concluded that the graduates from 4-year VHS more ready to overcome the challenge of the AEC era.

**Keyword:** Curriculum, VHS 3 years, VHS 4 years, graduate, AEC

### I. INTRODUCTION

National Education System (NES) has uniqueness in classifying technological education and training (vocational education and training/VET) and rather differs from other countries. The establishment of Vocational High School (VHS) with 4 (four) years period of study is a different profile from most other VHS profile with program a period of study 3 (three) years. Program VHS 4 years exists very few in Indonesia and the study design and competence are different from VHS 3 Years.

Technological Education and Training (TET) or vocational education (VE) has a huge potential to prepare student to directly enter the working world. At the elementary and intermediate education level, VE covers by Vocational High School (VHS) and Madrasah Aliyah Kejuruan (MAK). In application in field there is various models VHS, either from a period of study, education design of multiple system (DMS) and also the competence design, like VHS 3 Years, VHS 4 Years and community college.

Regulation arranging education types in Indonesia there is in Laws of the Republic of Indonesia Number 20 The year 2003 about National Education System (NES), Section 15 says "Education type



include education of public, vocational, academy, profession, vocational special and religious". Vocational education is defined as intermediate education that preparing the students to work in corporate and industrial world accordingly to the area of expertise.

Development of market economics this time indicates that vocational education and human resource capacity expansion becomes principal priority scale in national strategy and politics advances strategy, economic and technology. Along with requirement and labor market demand, and public request, hence vocational education and training aim and undertakes to increase interest. But challenge presents interest is not easy thing to be done. VHS 3 years and VHS 4 years is expected as an answer to face the challenge of Asean Economic Community (AEC) which started at 1 January 2016.

Jitgarun, et.al (2003) express that "issues about vocational education is processing learning to teach vocational area not related to market and/or requirement of market ..., and education must build vocational performance or interest or qualification each position of work so that corporate world and industry can place correct man in correct job". Nurettin, et.al (2004), "Vocational Technical Education (VTE) is a process providing an adoption between work and the individual ... A competency is a skill (or a group of skills) which must be mastered at minimal levels of performance prior to employment in an entrylevel position with the world of work". Vocational education (VE) is an institute claimed to bridge between individuals and industrial work world and also the world. In replying the challenge, the VHS must yield competencies to work in industrial world.

Education policy which written in the Government Regulation Republic of Indonesia number 32 The year 2013 about National Education Standard, section 1 verse 4 express that "Competency is a set of attitude, knowledge, and skill which must be owned, involved, and mastered by student after studying a study material, ends a program, or finishing a certain set of education".

Regulation of The Minister of Education and Culture Republic of Indonesia number 70 the year 2013 about Basic Framework and Curriculum Structure of Vocational High School (VHS) and Madrasah Aliyah Kejuruan (MAK), where theoretical anvil expressed that "Curriculum 2013 developed to theory "standard-based education", and the curriculum theory bases ... Curriculum bases on competency designed to give experience of itswideness learning for student in developing performance to behave, to know, to skilled, and to act".

Regulation of The Government Republic of Indonesia number 17 the year 2010 about Organizer Education at Paragraf 2 Form of Set of Education of section 78 verse 3 express that "VHS and MAK can be consisted of 3 (three) class level, that is class 10 (ten), class 11 (eleven), and class 12 (twelve), or consisted of 4 (four) class level that is class 10 (ten), class 11 (eleven), class 12 (twelve), and class 13 (thirteen) as according to working world demand".

What is interesting that in Regulation of the Minister of Education and Culture Republic of Indonesia number 70 the year 2013, curriculum basic structures consisted of 2 type VHS/MAK, that is VHS/MAK 3 years and VHS/MAK 4 years. From subject side both types of VHS/MAK is same, but differentiating both types of VHS that is VHS 4 years has additional 48 hourstime allocations during 1



(one) year. This study can be performed at school and/or industry, for VHS 3 years executed at class XII and VHS 4 years executed at class XIII.

Vocational education in Indonesia is challenging which is enough weight to answer free trade challenge the year 2020, so the purpose of vocational education must prepare working force having competence capable to compete with labour from other countries. This is the consequence Asean Free Labour Association (AFLA) and Asean Economic Community (AEC).

The low level of competency, difference of competency in each expertise area and relevance the graduate can be made reference in evaluating and reflects level of competition and relevance study, at program VHS 3 years and programme VHS 4 years. Competency of vital importance for every student or individual to answer challenge in facing development of technology which is very fast. In Regulation of the Government number 19 The year 2005 about NES and turns into Regulation of the Government number 32 The year 2013, where section 26 article 3 express that "graduate competency standard at an intermediate vocational education unit aims to increase intelligence, knowledge, personality, behavior, and skill to live independently and follows further education as according to its vocational expertise".

Based on that regulation, can be concluded that there are 3 (three) important aspects of which must become purpose of vocational education that is working competence aspect (form of knowledge and skill), vocational character aspect (form of personality of work and harmonious balance life between humanities, environmental and religion-to God) and development aspect of career through vocational education.

Proper curriculum for good vocational education of program VHS 3 years and also programme VHS 4 years is curriculum based on interest with "outcomes-based curriculum". And the expansion of curriculum aimed at attainment of competencies formulated from Graduate Competency Standard (GCS). And so do assessment result of learning and result of curriculum measured from attainment of competency. (Ministry of Education and Culture, December 2012).

From the aspect of programme competency approach VHS 4 years should have competency that is more pre-eminently from at program VHS 3 Years because one year difference in study period. Program VHS 4 Years has also excellence from the time of practical training in industry for 1 semester. Duration of study that is sufficiently long allows the students VHS 4 years has competency to exceed programme competency VHS3 years even can be equated with diploma one (D1). So this research emphasizes at the implementation of curriculum Mechanical Engineering VHS 3 years and VHS 4 years at process study in school and industry in increasing quality of graduate in Asean Economic Community (AEC) in Makassar - South Sulawesi. Based on background elaborated above, hence the purpose of research is comparing the implementation of curriculum Mechanical Engineering VHS 3 years and VHS 4 years at study process in school and industry in increasing quality of graduate.



## II. THEORY FRAME

Vocational education is education preparing student to enter employment at world industry matching with requirement qualification by industrial world and gives provision to student to develop self potency. From vocational education process bears self potency as according to certain interest area, so that purpose of the management of education in VHS is to increase knowledge and student skill, to prepare them as skillful intermediate-level of labour, educated, and professional, and can develop self in line with development of science, technological and art. Djojonegoro (1998:32-33), arises some reasons the importance of skilled man power between it in goods production process and also service, in consequence occupies important role in determining level of quality and production cost, supports growth of industrialization a state, and skillful labour is excellence factor faces global competition.

### A. Vocational Education Curriculum

With having immeasurable opinion about understandings of curriculum, hence theoretically rather difficult to determine one under standing which can embrace all opinions. But, understanding of fundamental concept about this curriculum is really important existence. In document of curriculum 2013 Ministry of Education and Culture (2012:2) express that "Conceptually, curriculum is an education response to requirement of public and nation building to rise the generation of the nation". Taba in Riyanto (2009:16) expansion of curriculum that is "a curriculum is a plan for learning". He, defines curriculum with the elements is "All curricula, no matter what their particular design, are composed of certain elements. A curriculum usually contain a statement of aims and of specific objectives; it indicates some selection and organization of content; it either implies or manifests certain patterns of learning and teaching, whether because the objectives demand them or because the content organization requires them. Finally, it includes a program of evaluation of the outcomes". Finch and Crunkilton (1984 : 9) arises "... curriculum may be defined as the sum of the learning activities and experiences that a student has under the auspices or direction of the school".

In Regulation of The Minister of Education and Culture Republic of Indonesia number 70 the year 2013 about base frame curriculum structures VHS/MAK, where at section 1 verse 2 express that "High School Curriculum Structures VHS/MAK is organization of core interest, Subject, learning load, and fundamental competence in each VHS/MAK" curriculum developed with a purpose to yields graduate which can work for industrial world or opens employment, corresponds to development of science and technological with situation and condition of where they work.

Finch and Crunkilton (1984:12) that "The ultimate success of a vocational and technical curriculum is not measured merely through student educational achievement but through the result of that achievement-result that take the form of performance in the work world". Meaning from vocational education curriculum that is affiliate at process (experience and activity) what designed school to yield graduate expected to be absorbed at employment.





In theoretical anvil of In Regulation of The Minister of Education and Culture Republic of Indonesia number 70 the year 2013 the expressed that "curriculum 2013 developed to theory" education based on standard-based education, and the curriculum theory bases on competency (competency-based curriculum). In curriculum 2013 about base competency VHS (2013:1) express that " Graduate Competency Standard (GCS) which has been formulated for certain set of education of VHS utilized to formulate basis competency needed to reaches it. Remembers GCS still must be reached by the end of VHS/MAK which the duration is 3 years or 4 years, in business is facilitating formulation operational of basic competency, required purpose of expressing competency performance at every class at VHS".

And curriculum 2013 has not written specifically elaborates every expertise programme is including expertise programme Mechanical Engineering. But marginally has been arranged in In Regulation of The Minister of Education and Culture Republic of Indonesia number 70 the year 2013 about base frame curriculum structures VHS/MAK shown to tables 1 and tables 2 curriculum public structures VHS/MAK (programme 3 years and programme 4 years).

**Table 1.** Curriculum Public Structures VHS/MAK (Programme 3 years)

MATA PELAJARAN		ALOKASI WAKTU BELAJAR PER MINGGU		
		X	XI	XII
<b>Kelompok A (Wajib)</b>				
1.	Pendidikan Agama dan Budi Pekerti	3	3	3
2.	Pendidikan Pancasila dan Kewarganegaraan	2	2	2
3.	Bahasa Indonesia	4	4	4
4.	Matematika	4	4	4
5.	Sejarah Indonesia	2	2	2
6.	Bahasa Inggris	2	2	2
<b>Kelompok B (Wajib)</b>				
7.	Seni Budaya*	2	2	2
8.	Pendidikan Jasmani, Olah Raga, dan Kesehatan	3	3	3
9.	Prakarya dan Kewirausahaan	2	2	2
Jumlah Jam Pelajaran Kelompok A dan B per minggu		24	24	24
<b>Kelompok C (Peminatan)</b>				
Mata Pelajaran Peminatan Akademik dan Vokasi (SMK/MAK)		24	24	24
<b>Jumlah Jam Pelajaran yang harus ditempuh per-minggu</b>		<b>48</b>	<b>48</b>	<b>48</b>

**Tabel 2.** Curriculum Public Structures VHS/MAK (Programme 4 years)

MATA PELAJARAN		ALOKASI WAKTU BELAJAR PER MINGGU			
		X	XI	XII	XIII
<b>Kelompok A (Wajib)</b>					
1.	Pendidikan Agama dan Budi Pekerti	3	3	3	3
2.	Pendidikan Pancasila dan Kewarganegaraan	2	2	2	2
3.	Bahasa Indonesia	4	4	4	4
4.	Matematika	4	4	4	4
5.	Sejarah Indonesia	2	2	2	2
6.	Bahasa Inggris	2	2	2	2
<b>Kelompok B (Wajib)</b>					
7.	Seni Budaya*	2	2	2	2
8.	Pendidikan Jasmani, Olah Raga, dan Kesehatan	3	3	3	3
9.	Prakarya dan Kewirausahaan	2	2	2	2
Jumlah Jam Pelajaran Kelompok A dan B per minggu		24	24	24	24
<b>Kelompok C (Peminatan)</b>					
Mata Pelajaran Peminatan Akademik dan Vokasi (SMK/MAK)		24	24	24	24
<b>Jumlah Jam Pelajaran yang harus ditempuh per-minggu</b>		<b>48</b>	<b>48</b>	<b>48</b>	<b>48</b>

**Description:**

: enforceable study in set of education and/or in industry (integrated with Practical field work) with Portofolio as principal instrument of assessment.

**B. Setting Contents of curriculum**

Curriculum planning having basic philosophic approach that will be coloured which confidence is selected to constitutes the curriculum. The curriculum designers need to have agreement of what believed whereof purpose of which will be reached after student graduated from the school, like told by Edward J. Power (1982:87) " the curriculum of all school must be broad and comprehensive". Sukanto (1988:91) arises "contents of the curriculum can be forecasted hardly predominated by growing transitional abilitylike how adapting with the environment, how to overcome problem work mobility, and ability in human relation skill".



Determines contents of curriculum VHS 4 years very difficult to be compared to VHS 3 years, but the success will grow confidence in performance of the educators. Contents of curriculum as a whole is system instructional which consciously applied in process of study with confidence can assist student develops the potency maximumly. A real important aspect is determination contents of curriculum that opens and identify concordance between conditions of studies with industrial working world.

### **C. Implementation of Curriculum**

Implementation of curriculum generally has become school responsibility that is headmaster, teacher, and public. Especially the teacher, who must draw up study activity, must be supported by leader with all facilities and condition required that study can run as planned and expected. Teacher's creativity that is supported by policy of constructive leader with all facilities and basic facilities required, will accompany study process needed to reach the expected purpose.

In implementation of curriculum the students expected to get experience of optimal learning so that the students at vocational and technological school especially will be able to have provision and experience to plunge into industrial world or corporate world.

In vocational learning, it is important for student to understand the meaning of the skill learning. The students must be able to be involved farther about benefit of the study. For student learning vocational in common school also needed to be taught by teacher about the meaning and efficacy, at least that vocational learning can be benefit for themselves and family.

## **III. RESEARCH METHOD**

This research is including descriptive research which is in the form of comparison of two independent samples as a mean to know comparison of implementation of curriculum Mechanical Engineering VHS 3 years and VHS 4 years at study process in school and industry in increasing quality of graduate at machining majors of VHS Negeri in Makassar. Data collecting technique are done by using a written set of question (questionnaire). Questionnaire is data collecting technique by giving a written set of question or statement to the respondents.

## **IV. RESULT AND DISCUSSION**

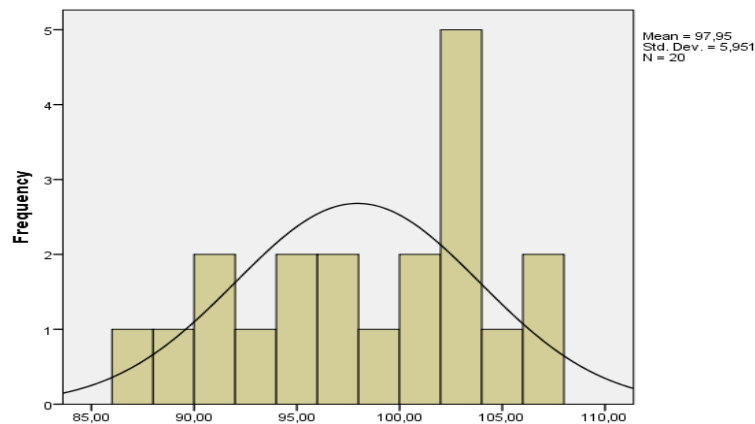
### **A. Result**

After data was obtained through questionnaire, it was analysed descriptively by the way of averaging of value from each aspect based on assessment criterion which has been specified before, then the data is presented as follows:

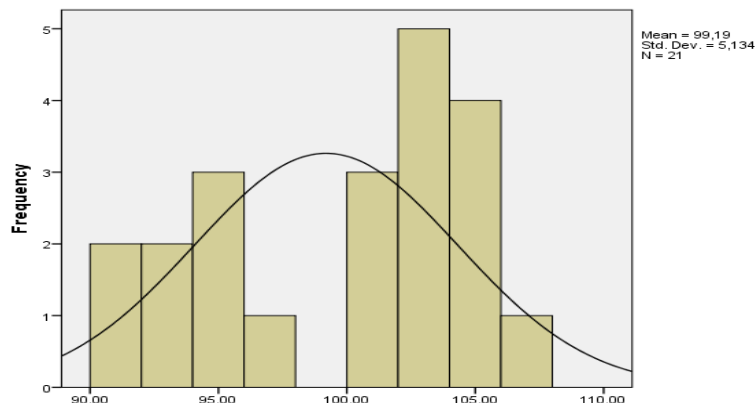
**Table 3.** Difference Reaction of Student in School and Industry at VHS 3 and VHS 4 years

One-Sample Test						
	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Reaction of Student at VHS 4 years	73,605	19	,000	97,95000	95,1647	100,7353
Reaction of Student at VHS 3 years	88,530	20	,000	99,19048	96,8533	101,5276

Table 1 above shows level of value significance is 0,000 with df 19 and 20. Significance value is consulted with value of 0,05. It indicates that value significance smaller than 0,05 expressed that there are difference (Santoso, 2014:79). Thereby, the result of t-test reaction of student at VHS 4 years and reaction of student at VHS 3 years indicates that there is a difference.



**Figure 1.** Reaction of Student in Industry and School at VHS 4 years

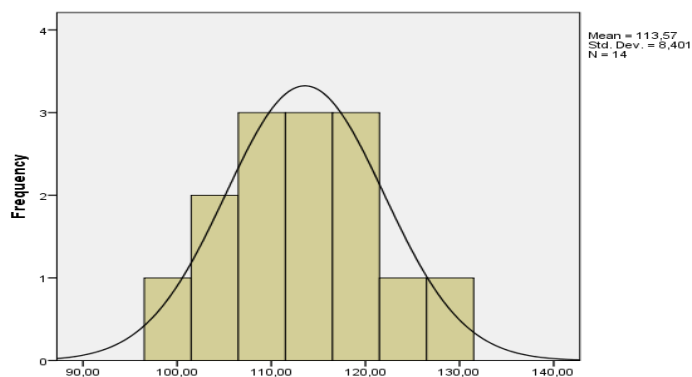


**Figure 2.** Reaction of Student in Industry and School at VHS 3 years

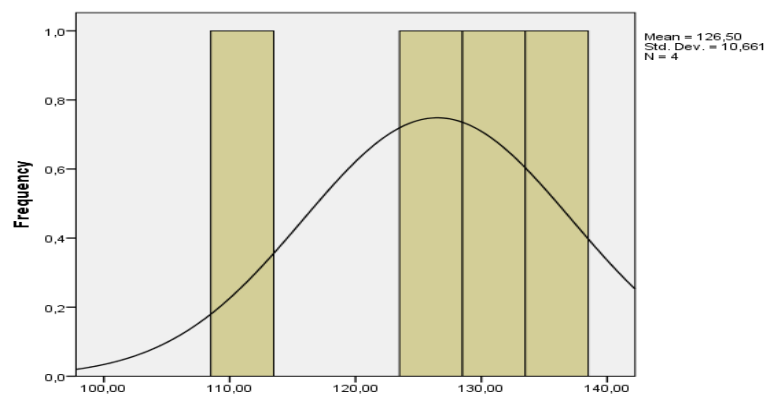
**Table 4.** Difference of Study Process by Teacher at VHS 3 and VHS 4 years

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Study Process by Teacher at VHS 4 years	50,585	13	,000	113,57143	108,7210	118,4218
Study Process by Teacher at VHS 3 years	23,730	3	,000	126,50000	109,5352	143,4648

Table 2 above shows level of value significance is 0,000 with df 13 and 3. Significance value is consulted with value significance 0,05. It indicates that value significance smaller than 0,05 expressed that there are difference (Santoso, 2014:79). Therefore, the result of study process t-test by teacher at VHS 4 years and study process by teacher at VHS 3 years shows there are difference.



**Figure 3.** Study Process by Teacher at VHS 4 Years



**Figure 4.** Study Process by Teacher at VHS 3 Years



## B. Discussion

The research results show that the result hypothesis is accepted because every aspect occurred is different significantly, it means that there are difference result of education design of multiple system (DMS) between VHS 4 years and VHS 3 years at this research selected VHS Negeri 5 Makassar (4-year VHS) while VHS Negeri 2 Makassar (3-year VHS) selected to represent VHS 3 years with consideration that VHS Negeri 2 Makassar and VHS Negeri 5 Makassar has the same DMS schedule and place.

From result of research of implementation of curriculum Mechanical Engineering VHS 3 years and VHS 4 years at study process in school and industry in increasing quality of graduate in era Asean Economic Community (AEC) in town Makassar at VHS Negeri 5 Makassar showed that the activity of study process in school and industry, the overall of education program (from planning to assessment) is done jointly coordinative between the schools and the partner institution. The study process in industry done by student class 4 in the beginning of odd semester for 7 months.

The path for students to do the practical study at the industry is to report to a teacher or head of the department that he wanted to carry out the study in preferred industries, then from the school authorities sent a letter to ask for permission to the company to accept students concerned to implement the learning process in the industry. Some of students which wish to do study process in industry doesn't choose place or school placing it at partner institution. Not all students class 4 can go out to industry to conduct study process in industry because there are clauses which must in fulfilling that is student must finalize the payment and must be complete of all the grades. Student's grade got from assessment in place of study process in industry and from teacher after student collects report.

The study process program in school and industry VHS Negeri 2 Makassar executed by student class 3 during odd semester. In order to do that, the student student must pass all the subjects. Then teacher sending letter to partner institution, then student sent to the industry. Supervisor teacher always watches the student by co-supervising with supervisor in industry. The duration of the study is 3 months. Student's grade got from assessment in place of study process in industry and from teacher after student collects report.

Based on result of research of difference aspect reaction of student in school and industry at VHS 3 years and VHS 4 years including student satisfaction whether student can be motivated by teacher in the learning, learning method applied in process of study at school, and education of machinery basis which student gets in school is not different far between VHS 4 years and VHS 3 years. However in the case of practice of student school VHS 4 years in this case VHS Negeri 5 Makassar of course more pre-eminently is compared to VHS 3 years in this case VHS Negeri 2 Makassar because there are machinery available in VHS Negeri 5 Makassar and student spending time more at the workshop to finish job given by the teacher.

At difference aspect of study process by teacher at VHS 3 years and VHS 4 years where including about way of teacher to teach about fundamental machinery to student, learning knowledge



gives to student before leaving study process in industry, things which student must fulfill before leaving study process in industry, and teaches student that always discipline and takes a care in doing job given. In this case not many difference between studies given to student VHS 4 years and VHS 3 years, therefore can be concluded that there is difference between VHS 4 years and VHS 3 years.

In reaching competence of attitude, knowledge and skill (vocational) graduate, especially vocational competence must fulfill vocational competence standard in Regulation of The Minister of Education and Culture Republic of Indonesia number 28 The year 2012 Section 1 of article 1s which says "( 1) Vocational competence standard of vocational high school (VHS)/MAK be education national standard complementing subject component standard for vocational high school (VHS)/MAK as arranged in Education Ministry National Republic of Indonesia number 22 The year 2006 about Content Standard for Elementary and Intermediate Education Unit.

In line with that, the demand resulted from the forming of Asean Economic Community (AEC), in Graduate Competency Standard (GCS) composed from requirement of public and subjects from competence that wish to be reached. So, VHS is one of set of formal education with aim to prepare the graduate is especially to have excellence in the working world. In curriculum 2013 core and fundamental competence has been arranged in Regulation of The Minister of Education and Culture Republic of Indonesia number 70 the year 2013 for program VHS 3 years, although programme VHS 4 years at all has not been arranged.

Technological advances and the existing information nowadays, obliges VHS to follows the direction of the working world, so that VHS need to do adapt to the competence design especially programme VHS 4 years by considering relevance to working world demand. One of policy of Culture and Education Departement in exploitation of Human Resource VHS introduced in the year 1993/1994 is education of Link and Match, that is education of VHS must have the character of link and match with good requirement of that is requirement of student and also requirement of public work world especially in present era Asean Economic Community (AEC).

By observing various problems of programme VHS 3 years and VHS 4 related years of curriculum 2013 being based on competence especially competence Mechanical Engineering at curriculum 2013, hence the thing that is must be done is accomplishment of competence which must be owned by program graduate VHS 3 years and VHS 4 years expertise area of Mechanical Engineering either competence of attitude, knowledge and also skill.

Based on result of reality is obtained by indication that, most of vocational education graduate especially programme VHS 3 years and VHS 4 years has not been able to match the expertise program demanded and inability to adapts to development of science and technology that is is not easy to trained.. The same thing is told also in study result performed a by Guidance Directorate VHS (2014: 135) that, there is still difference of competency between what given in vocational school with real requirement the side of industry. Concordance between competencies given in vocational school with



required by industrial world around 60% until 80%, with the biggest difference in huge industry and smallest difference at entrepreneurs level of activity.

## V. CONCLUSION

From results above can be concluded that there is difference of implementation of curriculum Mechanical Engineering VHS 3 years and VHS 4 years at study process in school and good industry based on result of t-test reaction of student at SMK 4 year and reaction of student at VHS 3 years indicates that there are difference and also result of study process t-test by teacher at VHS 4 years and study process by teacher at SMK 3 year shows there are difference. So graduate VHS 4 years more ready to overcome the challenges in era Asean Economic Community (AEC) compared to VHS 3 years.

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## LESSON STUDY IN MICRO TEACHING APPROACH TO IMPROVE TEACHING SKILLS FOR PRE SERVICE TEACHER IN VOCATIONAL EDUCATION TRAINING

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**ABSTRACT :** Preparation of professional teachers was a tough challenge in the future and is characterized by strong currents of globalization. The problem is whether the preparation of prospective teachers have been done properly in accordance with the demands of competence development. Learning management solutions are required to realize the professional competence of future teachers. Management of learning and interaction is one of the keys to success of learning. In addressing these problems, I elaborate a view of how the solutions to overcome these problems, especially in terms of learning management based on lesson study approach, what and how to operationalize the lesson study approach that can empower instructional components on the system in meaningful learning.

**Keywords:** lesson study approach, improving teaching professional skills, vocational teachers

### I. INTRODUCTION

The facts show that almost all regions in Indonesia are experiencing a shortage of teachers. The Ministry of Education and Culture (Kemendikbud) counts, lack of vocational and high school teachers reached 13 thousands people. Teacher shortage is greatest for the CMS. The government has prepared a number of scenarios to meet the shortage of teachers. The first way is the traditional way, that take advantage of the quota allocation or new employess of common selection. The next way is to recruit teachers earning of Professional Teacher Education (PPG), which every year on average quota only 6 thousand teachers for all levels of education. Thus, the need for teachers can not be expected a hundred percent from PPG. Instead, the fulfillment of a shortage of teachers will be sought from non-educational undergraduate . [www.jpnn.com](http://www.jpnn.com) accessed on June 17, 2016.

In addition to the existing conditions as mentioned above, the legal regulation of teachers has been set up by Act of the National Education System and the Law on Teachers and Lecturers. Basically both these laws provide an opportunity for all undergraduate courses to become a teacher. Thus, it was increasingly clear regulations and the process of establishing the existence of a professional teacher. However, there are problems encountered by LPTK as the only institution of higher education dealing with the regulation of all scholars can be become teachers through professional education of teachers (PPG) which brings the consequence of no difference treatment between the undergraduate education and the non-education. More than that, to prepare everything related to professional education of teachers is not easy. It takes a model of implementation, curriculum, and teachers (lecturers) are capable qualified in it.

In addition to the problems mentioned above, in a global perspective a professional teacher should have a number of competes in the global era . Yin Cheong Cheng, 2005: 397 in the concept of



an effective teacher mentions that a narrow concept of effective teacher must be turned into the broader concept of the educational process. Professional teacher should be planned and implemented in a team work. It is emphasized to improve the ability of schools and learning outcomes, and the classroom should not be handled by one person but involves team teaching or all teachers in the school.

Indeed a good teacher should have a broad knowledge and are able to apply their knowledge and skills into a job as a professional educator. The figure of the ideal teacher should be able to carry out a number of tasks. These tasks such as educators, teacher, coach, counselor, facilitator, mediator and catalyst professionals. Thus a good teacher candidates should be formed through a process of education (educated) and training (trained). So before becoming a professional teacher he had to undergo two processes in the body that has the authority and competence in the field of education, namely the Education and Personnel (LPTK). According to Law Number 14 Year 2005 on Teachers and Lecturers, kususnya in Chapter VI Section 3 mandated clearly on a number of competencies that must be owned by a teacher. The competence, among others: (1) pedagogical, (2) personal competence, (3) professional competence, and (4) social competence.

It takes a gradual process and integrated to have the competence, student teachers must undergo a process of education and training both to gain considerable learning experience before carrying out his professional duties. Some experience must be passed through a set of educational courses and areas of study subjects which are mixed in the form of courses in theory and practice courses prepared by LPTK. The accumulation of a number of subjects referred to above is Micro Teaching Course. Various efforts have been made by the university, faculty and department in order to improve the ability of graduates to compete and be the best in the world of work and in the wider society. However, several obstacles still exist that become obstacles to achieving that goal. For example, to prepare graduates, has been pursued with the best through the setup process as well as other supporting facilities, but in the middle of the development of science, technology and art so rapidly, is likely to require more effort to deal with it. Capabilities / competencies possessed by the graduates of today are the product of education obtained previously.

The changing structure of employment in the world of work , especially the impact of globalization can not be fully offset by the graduates . Change and the development of science and technology requires the understanding and behavior of higher employment of competencies that have been owned previously . Graduates produced in the form of the output of education we should also have the outcome that is more than just having basic capabilities, but in this context it is graduates who can adapt to the situation that developed keduniakerjaan . The point is to have the ability of lifelong learning , which is based on the ability beradaptasi with developments. This has become one of the challenges that have always faced by our graduates , particularly for graduates of the Faculty of Technical and Vocational .



One of the national strategic issues that develop adult education is still associated with the provision of teachers and quality improvement. The problem of teachers in Indonesia, both in quantity and quality can not be called adequate. In terms of quantity is required of teachers in the various regions in Indonesia. Specially for teachers of Vocational High School (SMK) in all areas of expertise merupakan still unresolved issues handled. With the realization of the government's policy to increase the number of vocational school more than the secondary school with the proportion of 50: 50 for the number of vocational school: School public in 2010, and even this proportion will be increased to 70: 30 in 2015 will have an impact on readiness various components of education in various aspects to support this program. (Data dikutip of document Road Map Directorate PSMK 2006-2010). In the action of this policy is mentioned one of which is associated with increasing the number of vocational teachers in various areas of expertise, in addition to a number of other programs in the action.

The problem of teachers nationally in Indonesia were raised by Bahr and Umar Hayat , cited by Fathurrohman and Suryana , 2010: 5-6 explains that : the quality of teachers in Indonesia from several studies are questionable , they show the average value of national tests prospective teachers PNS in elementary, junior high , high school and vocational school is still far from ideal limit ( 75 % ) so that someone could teach well . This further confirms that the teacher will not be able to accomplishing the tasks and challenges faced by both if professionalism is questioned. From the results of these studies are also mentioned ; professional teacher is able to perform tasks in a professional who has a characteristic , among others , an expert in the theory and practice of education. Professional teacher is a teacher with the greatest knowledge and expert pengetahuan taught to teach .

Related to this , the need for a positive response from educational institutions producing teachers , mainly related to how to prepare qualified teachers who are able to fill the existing needs. Very wise would if producers teacher education institutions to reflect on what has been done so far in the duties and responsibilities as part of the process of formation of the competence of graduates who have been scattered on the ground . This indicates that the prospective educator generated LPTK competencies needed to be improved .

## **II. LESSON STUDY A PRACTICAL APPROACH TO IMPROVING TEACHER READINESS**

Lesson study is a model professional guidance for educators through collaborative learning assessment and sustainable based on the principles of collegiality and mutual learning to build a learning community. Lesson study is not a method or strategy of learning, but the lesson study can apply various methods / learning strategies appropriate to the situation, and the problems faced by teachers . In the implementation of the learning program at the Institute of Higher Education Teaching ( LPTK ) , Lesson Study can be used as a model of teaching guidance for student teachers . Hendayana , 2006: 10 states , can stimulate innovation Study lesson learning in school because all the parties involved and concentrate towards improvement.



Lesson Study is one guidance in order to improve the learning process is carried out continuously in three stages namely planning (plan), implement (do), aligning the observation and reporting of learning outcomes / reflection (see). Lesson study, starting from planning (plan) which aims to plan learning to membelajarkan students. Good planning should be done jointly. Planning begins from the analysis of the problems faced in learning. Problems may include materials, methods of pedagogy, how to explain a concept, etc. The teacher jointly seek solutions to the problems faced poured into a lesson plan (lesson plans) and teaching material. The second step in the lesson study is the implementation of the (do) learning refers to the lesson plans that were formulated in the planning. One of the teachers implement instructional and other teachers as observers (observer) learning. This measure aims to implement the learning and piloting the effectiveness of learning designed. In activities do can invite colleagues, principals, professors to observe. But before learning begins should be briefing the observers to inform the planned learning activities and alert during the learning takes place, observers were not allowed to talk to each other observers that can interfere with learning activities, but observing the activity of student learning. Observers can record learning activities. The third step is the reflection (see) is through discussions between the teacher and the observer. Teachers initiate discussions with the impression conveyed in implementing the learning. Furthermore, observers take turns delivering comments and lessons learned from learning especially with respect to student activity. In principle, everyone involved in the lesson study activities must obtain a lesson learned and is therefore built a learning community.

Lewis, 2002: 1 suggests the two sides to be aware of the implementation of Lesson Study as follows ." Lesson study is a simple idea. If you want to improve instruction, what could be more obvious than collaborating with fellow teachers to plan , Observe , and reflect on lessons ? While it may be a simple idea, lesson study is a complex process , supported by collaborative goal setting , careful collection of data on student learning , and protocols that enable productive discussion of difficult, issues " .

Rustono 2008 mentions lesson study as a coaching model teacher collaborative and collegial can be used as a model for teaching faculty guidance to students . To be a professional teacher , not only armed with the understanding of teaching and academic course but need some experience in the form of guided practice activities . Through lesson study , students undertake teaching practice which involves not only the lecturer but the school authorities. Students gain knowledge and experience of the planning and implementation of innovative learning . Students also get feed back directly into the reflection . To conduct the lesson study guidance in order to teach students require preparations such as : determination of program guidance by lecturers are integrated in certain subjects and followed by students who take these courses .

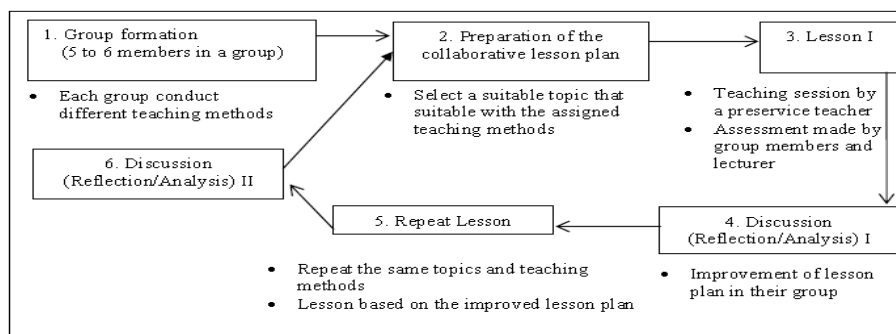
Subadi ,Khotimah , and Sutarni in his research that : Lesson study is very effective as a model of teacher professional development on teacher training associations , schools , collaborative peer (peer - collaboration) , and tutorial -based learning . Lesson study is implemented in a cycle of

planning, action and observation , and reflection and evaluation . So the lesson study process in the beginning of a study conducted in collaboration ( teachers discuss learning problems ) , create lesson plans , teaching and learning , which refers to a lesson plan , invite colleagues for observations, and create a reflection of learning .

The experimental results Sudirtha, 2016 shows the integration of the implementation of lesson study and cooperative learning in teaching micro teaching the students of the Faculty of Engineering and Vocational Undikshanenunjukkan learning outcomes micro teaching students enrolled in cooperative learning through the setting of lesson study is higher than the students who follow conventional teaching after controlling perceptions about the teaching profession. Another very interesting effect was also found among the lessons learned professors who follow the lesson study. Everyone involved in the lesson study activities gradually build up an understanding of the importance of collaboration in solving the problems of learning. Learning problems are not quite finished with the theoretical approach, but problems arise in the classroom learning should be resolved through reflection on the implementation of learning. From the analysis, reflection is at the core of all efforts made in improving the quality of learning. This is in line with the concept of lesson study which essentially is how we realize and understand the learning undertaken and should be reflected to continual improvement through collaboration with colleagues.

By teachers ( educators ) the reflection in teaching practice has not been widely used . Teachers prefer preparing , implementing the learning , and evaluate their own learning . This is becoming a very important issue to be discussed and resolved in order to improve the quality of learning . The presence of lesson study in Indonesia carries considerable influence both the development of the atmosphere and the learning paradigm several schools and universities in Indonesia . It is therefore very appropriate lesson study made approaches to improve learning for professional teachers , because the implementation of lesson study impacted heavily on the lessons learned among peer teachers .

A number of other studies and implementation of lesson study in several places in Indonesia showed good results and the impact on the occurrence of learning for teachers and also have an impact on improving the quality of teaching and learning outcomes of the pupil / student . Research conducted by Iksan , Nor and Nor , in 2013 developed a pattern approach to learning lesson study in micro teaching with the steps as shown in the following figure .



**Figure 1.** A Practical Approach To Improving Teacher Readiness

Furthermore, the results of the study found that, pre-service teacher demonstrated the ability to explore and build their skills in assessing the micro teaching activities during the lesson study approach. Through this approach, the evaluation is done not only by teachers who teach subjects but also by all group members. Findings from this study also showed that pre-service teachers' skills in making assessments for micro teaching could be improved by integrating lesson study.

Based on the view and the above results demonstrate the implementation of lesson study, provides an overview of how important reflection, interaction, sharing, and learning community in efforts to improve the performance of teachers in the classroom.

### III. REFLECTIONS ON LESSON STUDY

A reflective action of someone in general are doing an afterthought, rethink things have passed. In the context of learning, reflection conducted by educators is or the actions taken to reflect on the learning that has been done before in the context of continual improvement based on the weaknesses and strengths done previously. An educator may be tapping all aspects of learning. Reflection committed educators can refer to a number of questions related to the learning activities are carried out. In connection with the implementation of lesson study these questions can be used in further discussions and are expected to generate further learning improvement solutions.

Fendler, 2003; Hoffman, Artiles & Lopez, 2003, as dikutip by Tatang Suratno and Sopyan Iskandr explaining the reflection is very useful to support the professional development of teachers and teachers' efforts to improve student learning. Reflection can be used as a very meaningful way in the approach to learning about the practice of teaching to understand the basic knowledge of teaching. Through reflection, may consider, develop, and articulate the many aspects of the practice as part of their knowledge to be able to connect theory and practice.

Tatang Suratno, Sofyan Iskandar, 2010: 44 mentions reflection of teachers should be based on: (1) emphasis on observations of student learning, and (2) design a conducive discussion. Build reflection among teachers today shows the evolutionary effort and very meaningful and useful to improve teaching practice. This can be seen in terms of structure and content quality teacher reflection. In the context of teacher professional development, teacher reflection activities have been developed primarily through action research. Furthermore, the importance of reflection for teachers emerged since lesson study was introduced. Through phases in activity lesson study, teachers and educators have the opportunity to reflect on the lessons. Systematic approach which is based on the principles of cooperation and collegiality is seen as a key factor to improve the practice of teacher reflection.

Istamar Syamsuri and Ibrahim, 2008 says several things about the importance of reflection in lesson study activities as follows. Reflection is done as soon as possible after learning, with a view of all participants can still remember the atmosphere of learning that takes place. Reflection is important related to observations about learning to be analyzed, interpreted, and presented to all the participants, such as: what happens on the activities of students in learning and why it happens like that, how the solution sought for it, and what lessons can learned from the incident.

Thus, according to the principles of reflection in lesson study, reflection activities in order to develop the ability of prospective teachers is indispensable, particularly in terms of learning micro teaching which was held as part of the formation of candidates for professional teachers. Integrating learning lesson study into micro teaching is very important. Student teachers can do a lot more contemplation and reflection exercises learning through reflection and input of lesson study participants on an ongoing basis.



#### IV. CONCLUSION

From the foregoing it can be concluded as follows: ( 1 ) is very important to build a community of learning (learning community) among college / school by involving alumni and stakeholders to be invited to participate in thinking about upgrading or learning outcome quality , ( 2 ) Lesson study as one of the vehicles of communication to be able to realize these goals . But desperately needed a shared commitment to make it happen , because it will diperlukn time , energy and thoughts deeper implementation. ( 3 ) Reflection can be considered as a very important part is done in order to build and find solutions learning . Without reflection will not be possible to build the progress or quality . Quality built gradually and continuously. Reflection is a joint effort finding learning solutions .

In the context of the development of vocational teachers who incidentally has a quirk with others , such as vocational teacher candidates must be close to the industrial world . How to bring the industry as an observer / observer to come to campus in lesson study activities in order to contribute to learning. With a record of lesson study participants must understand the nature of lesson study.

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## IMPLEMENTATION OF MULTIMEDIA ANIMATION IN IMPROVING CONCEPT MASTERY ON THE MATERIAL ABOUT METAL REINFORCEMENT IN ENGINEERING MATERIALS COURSE

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*ABSTRACT: Based on research results conducted by the lecturers at Engineering Materials course, there are 20% of the students who have difficulty in mastering the subject of Metal Reinforcement. Difficulty on the subject of metal reinforcement is caused by this material's characteristics, which are abstract, dynamic and complex. This research aims to determine the effect of the use of multimedia animation in improving students' concept mastery in the learning of Metal Reinforcement material in DPTM UPI by implementing multimedia animation compared with the implementation of diktat media. The method used is quantitative method, using Nonequivalent Control Group Design pattern. The data was collected using different multiple choice tests, consisting of tests carried out before and after the students were given treatment. The average value of N-Gain from each group indicates the effect of the implementation of multimedia animation in improving concept mastery. The class that used multimedia animation is on medium category, while the class that used diktat media is on low category, so there is effect of the implementation of multimedia animation in improving concept mastery in the learning of Metal Reinforcement material.*

**Keywords:** Multimedia Animation, Concept Mastery, Metal Reinforcement, N-Gain.

### I. BACKGROUND

Engineering Materials Course is necessary and becomes the basic skill for mechanical engineering study program. Generally engineering materials are required especially in relation to mechanical properties, and technological properties of the materials, especially metals. All the material properties above are determined by the atomic micro-structure. Explanation of these concepts are represented in pictures and theories which generally describe abstract events. Difficulty in understanding abstract, complex and dynamic concepts are problems in the learning of engineering materials.

The abstract, complex and dynamic concepts of atoms are possible to be comprehended using multimedia animation on computers. Currently there has not yet been an animated media specific to that material. Based on these conditions, multimedia animation is very possible to become an alternative solution. Multimedia animation that becomes the alternative needs to be implemented in the learning process in order to prove its reliability.

Engineering Materials Course consists of several subjects, one of which is metal reinforcement. The subject of metal reinforcement consists of several sub-topics that should be presented to students, namely dislocation, grain refinement, heat treatment and integration. In lecturing process, explanation of these concepts are only described using images and text through diktat, while the problem in the learning of engineering materials is that the students have difficulty in understanding abstract and complex concepts, so that metal reinforcement material becomes a subject that is difficult to be comprehended by the students. The proof of this is that 20% of students have difficulty in mastering



the subject. This is due to students' low ability in mastering the concept of metal reinforcement material. The rest of the students encounter difficulties on other subjects. (Komaro, M., 2013, p.11)

Difficulty on the subject of metal reinforcement is considered quite high and can be a significant constraint on the learning process. Difficulty in metal reinforcement material is allegedly caused by several reasons, namely: (1) Abstract and complex characteristics of metal reinforcement subject, (2) lack of references possessed, (3) lack of instructional media that can overcome the existing obstacles so that students encounter difficulty in understanding it.

Metal reinforcement subject focuses on the type of relational concepts, which is a part of structural concept type where in this type of concept, student should be able to state the relationship occurring in every concept attribute. The concept must be mastered well, so that the students can understand the subject taught. Concept mastery is students' ability to understand the concepts after learning activities. Dahar (2011) stated that concept mastery can be defined as students' ability to scientifically understand meanings, both theoretical concepts and the application in daily life.

Concept mastery, according to Dahar (2011), is obtained from learning process, while learning is a cognitive process involving three nearly-simultaneous processes, namely acquisition of new information, transformation of information, and test of relevance of knowledge provision. Someone is said to master concepts if he/she clearly understands the concept learned so as to explain using his/her own words according to his/her knowledge. Concept mastery can be defined as one's ability to explain again a particular object based on its characteristics.

Given the importance of Engineering Material course, and based on the data showing that the students experience difficulty in metal reinforcement material, an improvement effort is required to make the process easy to understand. An attempt that can be conducted is using media that is not only theoretical, but also practical, economical, accessible and teachable, thus allowing the material to be studied repeatedly. The efforts to meet the practical, economical, accessible and teachable criteria will be performed by manipulating theoretical model (pictures) into realistic model in the form of multimedia animation (MMA). Multimedia animation has manipulative characteristic, which is being able to transform theoretical model into realistic model (animation), so it can draw attention in the learning process and make it easier to understand the learning materials.

Citing Rowntree's opinion, Syaodih, N.S (2000: 108-109) grouped teaching media into five categories and called them Modes, which include: human interaction, reality, pictures, written symbols, and sound recordings. Falvo (2008) stated that the development of learning tools is currently available and easier to use, so the trend of teachers designing and implementing their own homemade animation will continue. This development trend is combined with a broader understanding of how these tools can help learning process, so that the use of animation and simulations in the classroom will continue to grow. Multimedia in learning is widely used because it has many advantages (Berk, 2009). The same thing was stated by Widodo (2010), who said, "multimedia generally uses multiple media, including text, graphics, animation, images, videos, and sound to present information." Meanwhile, according to Munadi (2013), media in the context of learning is defined as a language, so multimedia in this context is defined as multilingual, i.e., there is a language that is easily understood by the sense of hearing, sight, smell, touch, and so forth.

Multimedia technology which contains multimedia animation is expected to overcome the obstacles in learning process (Munir, 2010). For example, the abstract movement of atoms is difficult to understand or comprehend only using symbols or theories written in the books. However, with the help of multimedia animation, it is expected to be easier to understand since the concept of abstract

movement can be observed. According Edgar Dale's learning cone, what is learned will likely be remembered better, up to 50% of the materials taught, even after two weeks if the lesson involves the media consisting of audio and visual (Visual Receiving) element. The mastery can even reach 70% when being involved in giving opinion or discussions, and could reach 90% if being involved in simulations or activities (Fadel 2008).

## II. RESEARCH METHODS

The method used in this study is Quasi Experimental Design in the form of Nonequivalent Control Group Design. The underlying reason for the selection of this research design is because the sample was not selected randomly. Another thing that underlies the selection of this research design is the difficulty of getting a control group who can function fully to control external variables that affect the implementation of the experiment (Sugiyono, 2014, p. 114).

Sugiyono (2014, p. 116) argued that this design (Nonequivalent Control Group Design) is almost the same as pretest-posttest control group design. However, in this design, both experimental and control groups are not chosen randomly. Design pattern design used in the study can be seen in Table 1, adapted from the design pattern developed by Sugiyono (2014, p. 116).

**Table 1.** *Nonequivalent Control Group Design*

Group	Pre-test	Treatment	Post-test
Eksperimen	$O_{E1}$	X	$O_{E2}$
Kontrol	$O_{K1}$	Y	$O_{K2}$

Information:

- X = Treatment in the form of learning using multimedia animation.
- Y = Treatment in the form of learning using diktat.
- $O_{E1}$  = Initial result/condition of experimental group before being given different treatment. Observed with pre-test to discover initial result.
- $O_{K1}$  = Initial result/condition of control group before being given different treatment. Observed with pre-test to discover initial result.
- $O_{E2}$  = Result of experiment class after being given treatment X.
- $O_{K2}$  = Result of control class after being given treatment X.

In this research design pattern, there are two groups, which are experimental and control groups, chosen randomly. Both groups were given pretest to discover differences in prior knowledge between the experimental group and the control group. After being given a pretest, both groups were given different treatments, which are learning using multimedia animation for the experimental group and learning using diktat media for the control class. Furthermore, they are given posttest to discover differences in learning outcome between these two groups. Questions in pretest and posttest are the same but the questions in posttest were modified by randomizing the question numbers in pretest. This randomization was implemented to both experimental class group and control group.

### III. RESEARCH RESULT

Based on homogeneity test result showing the second variant homogeneous group, the test in this study could be continued using data analysis of Statistical Parametric methods of t test and the number of sample members of  $n_1 = n_2$  and homogeneous variants ( $\sigma_1^2 = \sigma_2^2$ ), then t-test formula of 3:16 and 3:17 can be used. To see the values of t-table,  $df = n_1 + n_2 - 2$  is used. Result of data processing to answer the formulation of hypotheses, namely N-Gain test and t test, are presented in Table 2.

**Table 2:** Result of Data Processing to Answer the Formulation of Hypothesis

Group	N-Gain Test		t Test		Decision
	Average Gain Value	Average N-Gain Value	t Value	p-Value	
Control	5,33	0,283		p-Value = 0,0002	
			$t_{count} = 4,266$	$\alpha = 0,05$	Ho is rejected
Experiment	9,73	0,526	$t_{(0,95;28)} = 2,048$	p-Value < $\alpha$	H <sub>A</sub> is accepted

Based on calculation result in Table 2 above, the data processing can be divided into two analyses, namely N-Gain test and t test. Further explanation of the N-Gain test and t-test is as follows.

#### 1) N-Gain Test

Result data from pretest and posttest in control and the experimental groups were processed and produced an average Gain value of 5.33 for the control group and an average Gain value of 9.73 for the experimental group. The average gain of each group was further processed into N-Gain, which produced an average N-Gain of 0.283 for the control group, and the average N-Gain value of 0,526 for the experimental group.

Based on the calculation of N-Gain, when the average N-Gain of the two groups are compared, the average N-Gain of experimental group is on medium criteria because it is higher than average N-Gain of control group, which is on low criteria. Based on the calculation of N-Gain, it can be said that the increase of concept master of the experimental group is better than the increase of concept mastery of the control group.

#### 2) T Test

T test conducted on N-Gain data of control group and experimental group with a significance level of  $\alpha = 0.05$ ,  $df = 28$  and right-sided test, produced  $t_{count}$  of 4.266, and the t score  $t_{(0,95;28)}$  of 2.048. Based on the comparison of t score, which is  $t_{count} > t_{table}$ , then  $t_{count}$  is on the rejection are of Ho as shown in Figure 1.

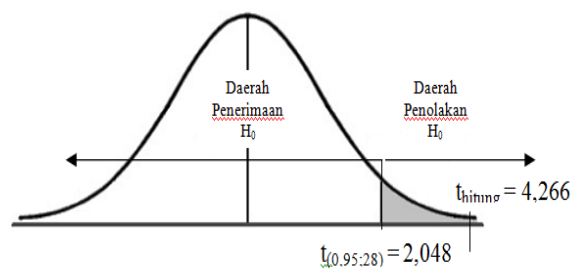


Figure 1. One-Sided Test Curve

Based on Figure 1 above,  $H_0$  is rejected and  $H_a$  is accepted, which means that the N-Gain of experimental group is better than the N-Gain of control group. This decision, which is rejection of  $H_0$  and acceptance of  $H_a$ , is supported by the calculation of p-value. Based on p-value of  $(0.0002) < \alpha$   $(0.05)$ , the author decided to reject  $H_0$  and accept  $H_a$ , because of the risk is 0.02%, smaller than the predetermined significance level of 5%. Based on the result of t test, it can be said that the use of multimedia animation influences students' concept mastery in the learning of Metal Reinforcement material.

#### IV. DISCUSSION

The result of data processing of pretest and posttest performed in this study shows that there is influence of learning using multimedia animation on students' concept mastery. This is shown by the results of post-test and the average N-Gain value of experimental class, which is higher than that of the control class. It is known that experimental class was given the learning using multimedia animation while control class was given learning using diktat. In the learning process of both groups, it is shown that there are increases in learning outcome indicated by the higher average scores in posttest than that of pretest in both groups.

Difference in the increases of learning outcome of the two groups is also in line with the result of calculations using the t test, which resulted in the decision that  $H_0$  is rejected and  $H_a$  is accepted, which means the N-Gain of experimental group is better than the N-Gain of control group. The decision to reject  $H_0$  and accept  $H_a$  is supported by the calculation of p-value at t test. Based on the p-value, which is lower than the value of  $\alpha$ , the authors decided to reject  $H_0$  and accept  $H_a$ . Considering this, the increase of students' concept mastery in Metal Reinforcement material using multimedia animation can be said to be better than the increase of students' concept mastery using diktat media, this means there is effect of the implementation of multimedia animation in improving students' concept mastery using multimedia animation in learning process compared with students' concept mastery using diktat.

Data discussion shows the effect of the implementation of multimedia animation in improving students' concept mastery using both multimedia animation and diktat media. The learning using multimedia animation can improve concept mastery better than the learning using diktat media. The increase of students' concept mastery using multimedia animation in the learning process is associated with features and characteristics of multimedia animation itself. Arsyad (2010, pp. 31-35) stated that multimedia animation belongs to the media that is an integration of printing and computer technology that combines text and images or static and dynamic visual as well as audio, all of which are controlled by computer, so the process involves a lot interactivity. Multimedia animation is also considered capable to stimulate to do exercises, simulations, etc., as proposed by Sudjana and Rival (1989, p. 137) that "... animation can add a sense of realism, stimulate the process of exercises, laboratory activities, simulations, etc." It is influenced by the result of the manipulation of theoretical (picture) media into realistic media that attracts animation users to learn.

Students who used diktat media in the learning process had the result of lower concept mastery compared with the result of students' concept mastery using animation. It is related to the characteristics of diktat as a learning media. Diktat is a media categorized into printing technology that has one characteristic, that is, containing text and visual displayed statically (stationary), as stated by Arsyad (2010, pp. 31-35). Due to this static characteristic of diktat, the appeal it generates is not adequate to make the students give attention to the learning process. Associated with engineering materials course, which explains many invisible or microscopic things, diktat media is not adequate to facilitate such circumstance, thus causing difficulty among the students in the materials presented.

Based on the description of learning media, it can be said that the use of diktat or multimedia animation on learning can increase students' concept mastery. This is supported by research data



which show the increase in scores of students' learning outcome after getting getting treatment, both in control group and experimental group. This is also consistent with Kemp and Dayton's (in Arsyad, 2010, p. 21) theory who argued that "media improves new readability". Difference in the use of diktat and multimedia animation in learning is found on the calculation of the result obtained, or it can be said that the difference is on the increase of the scores of learning outcome, which is the increased concept mastery in this study.

The low increase in learning outcome of control group using diktat media cannot be separated from the presentation of the media, which is not adequate to explain the theory of metal reinforcement. The animation media material about the definition of metal reinforcement gives the examples of the movement of atoms of the crystal structure, while the diktat media only presents a visualization of atoms in the form of still images. Animation of the movement of atoms will further clarify and facilitate the students to understand the learning material well. Based on the explanation of the presentation of the media, it can be said that the learning of metal reinforcement material, which contains the movement of atoms, can be understood if it is assisted with animation, while without animation media, the learning process of the movement of atoms cannot be done optimally. This is in line with the opinion of Susilana and Riyana (2009, p. 100) regarding the animation, that is, 'animation can assist learning process if the training participants are able to perform cognitive processes when being aided by animation, while without animation, the cognitive process cannot be performed'.

The increase of concept mastery of the experimental group cannot be separated from the explanation of multimedia animation, which is more concrete than diktat media. This is supported by Edgar Dale' (Arsyad 2010, hlm.10) experience cone, which shows that the more concrete the explanation of a learning media in learning process, the greater the experience gained by learners. It could be argued that the use of more concrete instructional media will result in better increase in concept mastery.

Abstract, dynamic and complex concepts are difficult to explain using pictures or words alone, thus the increase of concept mastery using multimedia animation will be better than the increase of concept mastery using diktat. The description of discussion above illustrates that there is effect of the use of Multimedia Animation on the increase of students' concept mastery in the learning of Metal Reinforcement material compared with the media previously used by lecturers in the form of diktat media.

## **V. CONCLUSIONS**

Based on the findings and discussion of the research results, the conclusions obtained are as follows:

1. Increase of students' concept mastery in the learning of Metal Reinforcement in Engineering Materials course using diktat media is on low category.
2. Increase of students' concept mastery in the learning of Metal Reinforcement in Engineering Materials course using multimedia animation is on medium category.
3. Learning using multimedia animation has effect on the increase of students' concept mastery in Metal Reinforcement material in Engineering Materials course.



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## THE INDUSTRIAL DEVELOPMENT OF LEARNING COMPETENCE BASED APPROACH ON SEWING IN SMK

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**ABSTRACT :** *The research is motivated by vocational graduates who have not yet optimal sewing competency skills in accordance with the demands of the workplace. This condition is used as the basis for efforts to improve the teacher's performance, especially in the learning process, one with a learning approach that is able to optimize the motivation and improve the student learning outcomes. The research approach used is the Research and Development (R & D), through the stages: Preliminary Study, Model Development and Validation Model. In accordance with the stages of the research that has been stated above. This research has targeted the following outcomes: (a) a model of in learning based approach to competency sewing industry, (b) completion of a model based approach to guide the sewing industry in competence, (c) the completion of a research article published in the accredited national journals.*

**Keywords:** Development, Industry Based Learning Approach, Competence, Sewing.

### I. INTRODUCTION

Educational effort is a major development in improving the quality of human resources to be a creative and independent person who can be reached through formal education. SMK as formal education, plays an important role in improving human resources, especially in preparing the workforce medium. Interests in SMK namely, are preparing students to become productive human beings who are, able to work independently, to fill vacancies that exist in the business world and the industrial world as a middle-level of manpower, in accordance with the competence in the skills program choices the Department of Education (2004: 7) including Tourism Group which develops vocational skills program on dressmaking. This implies the need to develop a form of vocational education graduates who have the qualifications required for the labor market in accordance with the objectives of each program has developed expertise in SMK.

Reality faced today in the learning system at SMK is felt that it does not deliver the results in accordance with the purpose of vocational education is evident that the employments generated so far do not yet have sufficient competence which ultimately creates unemployment, while on the other hand a lot of job opportunities are still not filled yet. This situation shows the low quality of employment generated through conventional learning approaches. (Directorate Dikmenjur, 2002).

One of the causes of our problems, presumably because learning in vocational, especially on learning approach on *Sewing Industry Based Learning* is still done conventionally, so that when the output graduates will enter the workforce they have not yet shown the outputs according to the results expected in the workplace. From the research Maeliah (2005: 3) that: "Students who complete the task





in clothing on the field is not yet as expected, one of them is a lack of understanding of the learning material ". The success of the quality of learning will be achieved to the maximum in accordance with the expected goals, if in the process of learning, one of them is accompanied by a learning approach that is able to evoke the students' learning motivation. The approach adopted will provide more values in addition to the acquisition of real facts, because the students to socialize, an ethic and practice. All of them contain the values of cooperation of the students, so as to improve the ability to work according to the demands of business and industry.

The selection of appropriate learning approach to curricular goals and national competency standards are the abilities and skills that should be owned by every teacher. The accuracy of the election by the teachers learning approach will affect the learning outcomes and employability of the students in the world of work. Djoyonegoro, W. (1998).

The learning approach that can help students to think conceptually the system and the master competencies in sewing (manufacture menswear), which can be used as an indicator of the quality of students' work ability program on dressmaking skills in vocational learning is the approach oriented world of work. Efforts to solve the above problems can be done through the implementation of *Industry Based Learning* approach, which is expected to improve the efficiency of the educational process and to contribute to produce the middle-level professional manpower. Interest in *Industry Based Learning* approach was proposed Geller, D. (2004), namely "Generating workers who have professional expertise with the good level of knowledge, skill and work ethic in accordance with the demands of the job". The learning approach used in an effort to improve the working ability as well as to support the achievement of the learning process in accordance with the demands of working industri, is one to develop the *Industry Based Learning* approach.

*Industry Based Learning* approach that is a base or orientation on the industry, therefore learners are given the knowledge and experience through practice that is conditioned in accordance with the situation in the industry, for example, pattern making, sewing techniques, and *finishing* are done with tools, working techniques corresponding standards in the garment industry, so that learners have the knowledge, skills and work ethic in accordance with the demands of business and industry.

Conditions that must be held in this vocational education, illustrating that learning approaches that are designed to be capable of preparing students for work and skills.

## **II. METHOD**

This research is ithe susing descriptive method with approach to research and development (Research and Development). Subjects ar selected teachers (team teaching) and students learning in vocational sewing competence. Research and development has a cycle consisting of 10 steps or stages (Borg & Gall, 1983: 775), as follows: 1) Reseach and collecting information; The first phase includes the literature that underlies the product to be developed for observations and prepare a draft framework. 2) Planning; At this stage we design various activities such as formulating the objectives to be achieved sequentially, estimate factors in designing a feasibility study for the test. 3)



Development of the preliminary form of product; This stage is the initial draft design education or learning products that will be developed, including the preparation of materials, hand books and forms of evaluation. 4) Preliminary field testing; At this stage the search field as a preliminary test that is limited to obtain a description of the background of the application or appropriateness of a product to be developed. Data were collected through interviews, observation, and questionnaires were then analyzed. 5) Main product revision; Preliminary results of the trial that is limited to use as ingredients to make revisions to the products developed. Implementation of limited testing can be performed several times to obtain a draft products ready tested on a wider scale. 6) Main field testing; The main test on a wider scale aims to determine whether the developed products have shown the performance as expected. 7) Operational product revision; The main trial results in a wider scale used to revise the product is ready to be validated. 8) Final product revision; This stage is the stage of validation of a product is developed, it is usually done in the form of experiments, so that the results can be truly ready for use. 9) Dissemination and implementation; Revised final or final product is done based on the results of the validation of the products developed. 10) Dissemination and implementation; This stage aims to make products that are developed to be used by the public, by way of dissemination same activities were developed, such as writing research reports, scientific journal that can be justified professionally. Based on the research and development measures proposed by Borg & Gall, then in this study the steps are simplified into two steps, namely: (1) Preliminary Study, (2) study the development through a limited trial and more widely. For more details, design research can be seen in Figure below.

### **III. DISCUSSION OF RESEARCH**

Development approach in this study are adjusted to the conditions and school environment that has been done through a preliminary study. Industry Based Learning approach is applied to the program dressmaking skills in class XI for sewing competence (Manufacture Clothing Men). Interest in Industry Based Learning approach to development is to improve the working ability of vocational students, so that its graduates have the necessary skills to the demands of business and industry that have been formulated in the National Competency Standards in clothing. Preliminary study results show that teachers have made arrangements to teach the form of Learning Implementation Plan (RPP) and teaching materials. Lesson plans and teaching materials are created by teachers before the implementation of the learning takes place, so that when applied to the development of Industry Based Learning, approach has been prepared with all the devices required in accordance with the competencies that will be delivered to the students. In developing the design of learning, teachers develop lessons that include objectives, materials, learning strategies and evaluation of learning outcomes. With the development of Industry-Based Learning approach, namely learning and doing is expected to provide opportunities for the students to do more, so that the students' ability to work in a sewing menswear with industry system can in develop in accordance with the demands of business and industry.



The research Activities Application Development Industry Based Learning approach is implemented on a limited scale with the test results as follows: The ability of the student's work originally only reached an average value of 60 and then increased to 68, while the speed of work time reaches 55 later increased to 71. The results of the first trials has been no increase in either the ability to work and the speed of the student's work related to knowledge and skills in tailoring menswear industrial systems in terms of the average grade even though the increase is not optimal and has not yet reached complete learn, process.

The second trial showed a higher increase compared with the first trial, when seen in the acquisition of the class average that is from 68 to 81 while the speed of work time reaches 71 later increased to 82. The average grade of this illustrates that sewing competence for every student has increased in accordance with the criteria of mastery learning outcomes.

The test result application development Industry Based Learning approach on competency Sewing (Men's Clothing) development can improve the speed and ability of the students' work. By applying this approach Industry Based Learning, it can cultivate and improve the students' motivation and seriousness as shown by those in work, so as to increase the ability of timer in accordance with the demands of business and industry.

#### **IV. THE CONCLUSIONS**

From all the research activities that have been conducted it can be summarized as follows:

1. The plan development approach Industry Based Learning arranged by curriculum and Standard Competence National field clothing are harmonized with needs students, which includes planning, implementation and assessment.
2. The approach development Industry Based Learning on competence of sewing are oriented on training based competence (Based Kompetensi Training) and training based production (Production Based Training).
3. The approach development Industry Based Learning, covers the media used for theory and practice. Media are required for competence in sewing consisting of media realia the form equipment for scale industrial and example clothing .
4. The approach development on Industry Based Learning is applied on competence of sewing, giving a chance to students for more works so that they produce the products that have value selling.
5. The development approach Industry Based Learning applied on competence in Sewing at SMK N 3 Cimahi Bandung regency, especially the dressmaking skills program could increase the ability and speed work of the students in the based industry.
6. The ability to work for students could be shown from the enhancement of the result of learning the from the knowledge, attitude and skills in sew based an industry designated similarly, products that have value selling has rawn Industry Based Learning on competence of sewing.



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## BETWEEN EXPECTATION AND REALITY, PROCESS OF LEARNING AND TRAINING IN VOCATIONAL HIGH SCHOOLS WEST SUMATERA

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**ABSTRACT :** *The aim of this research is to find out the discrepancy of learning and training process in vocational high schools, the gap between productive competencies expected and the current state achievement of vocational high school's students. This study focused on machine production program in vocational High Schools (SMK) in West Sumatera. Survey was conducted in 7 SMKs spread out on several main cities in West Sumatera. Representative samples were taken based on purposive random sampling, 161 teachers and 209 students were participated as respondents of this research. Instruments were developed based on dual response questionnaires. The result revealed that student's productive competencies were categorised mostly at the level of adequate, while students and teachers expectation were highly competent categorised. Meanwhile, the current state of learning process still tend to be teacher centered in the classroom, and practical work by jobsheet assignment in workshops and commonly at the level of fairly good. Most students feel confidence to operate machines but they do not able to overcome machines troubles. Students and teachers expected the process of learning to be more actual, authentic, and realities as a real job in the workplace. This reaseach recomended that project based learning model is one alternative to be developed as training and learning model in vocational and technical schools.*

**Keywords :** Expectation, current state, process of training and learning

### I. INTRODUCTION

Development programs to improve the quality of teaching and learning particularly productive competencies for machining technology among graduates of vocational schools (SMK), as well as vocational education at diploma level, now a day is very urgent to be realized. This is in line with the policy direction of vocational education in Indonesia. Law No. 20 of 2003 on National Education System Article 15, stated that “vocational education is secondary education that prepares students primarily for work in a particular field”. In particular destination competency skills Mechanical Machining is to equip students with the skills, knowledge and attitudes to be competent: (1) work either personally or fill vacancies that exist in the business and industrial world as a middle-level manpower in the field of Mechanical Machining, (2) choosing a career, compete, and develop a professional attitude in Mechanical and machinery, including welding fabrication techniques.

Professional attitude is the attitude, skills and knowledge of the content of education should be used for the life of at least one to two decades from now. That is, the educational content formulated in Competency Standards Graduates and developed in the curriculum should be the basis for learners to be developed and adapted for their lives as individuals, members of society, and as productive workforces and responsible citizens in the future. Finch and Crunkilton (1999,259) mentioned that “competencies for vocational and technical education are those tasks, skills, attitudes, values, and appreciations that are deemed critical to success in life and/or in earning a living”. This meaning can



be defined as the ability to act, to use the knowledge and skills to carry out an assignment in school, and tasks in the world of work in a community, and the environment in which the concerned interact. The curriculum is designed to provide the broadest possible learning experience for learners to develop the attitudes, skills and knowledge necessary to build those skills. Results of the learning experience is the study of students who portray human beings with qualities expressed in competencies standards.

Based on field observations, a large part of teachers and instructors in schools and institutions polytechnics or diploma in college, still mostly used conventional model of teaching. Teacher-centered learning approach, whereas the concept of Student Active Learning has sounded since 1980ies. As a matter of fact, Teacher centered Learning approach still in used widely in schools.

Students have difficulty understanding what is being taught by teachers, whereas reasoning and understanding are the ability which is very important for anyone who wants to be a professional in the field. Most teachers still commonly use presentation with media LCD and power point or video. So, this can be said that classroom still potentially on *teacher power* (the teacher as the ruling class). While students tend to be passive, a lot of listening and observing, they do not play an active role in the classroom, so that the development of student's innate ability cannot be optimized.

Passive learning culture, less participatory of students, lack of creativity, innovative crisis, they become less critical, weak in solving the problem, and do not care to take essential decisions. They will grow as a workforce depends on work patron standard, like a robot. However, They should have the opportunity to grow and develop their potential optimally, as qualified workers, independent, creative, risk-taking, and are able to learn independently in accordance with the new paradigm of learning, that students should be able to construct their own knowledge gained from the stimulus receiving from surroundings.

National Labor Forces Surveyed (Sakernas) in 2012 identifies the number of unemployed graduates of high schools and diploma reached 443.2 thousand people. (Periscope. 2013). This fact can not be denied that the reason of limited availability of job vacancy, and unreadiness of graduates entering the workforce is also becoming one of the factors increasing number of unemployed intellectuals. Koran Sindo in Periscope, (February 10, 2013). Kompas (2015) reported that competencies achievement by SMK graduates do not meet industrial needs, lack of practical facilities, and a limited of productive teachers.

These data revealed that graduates of vocational and also diplomas did not educate and train graduates to be ready entering the world of work. Competencies gap which is produced by educational institution do not comply with the required workforce, so that there are many constrained to enter the working world, especially to create jobs themselves become entrepreneurs, which requires competence qualified in production, they are also required to be creative, take risks, able to solve problems, seek opportunities and clever to make a right decision. This competencies less accommodated in learning process that takes place in schools today.

Competence in this study can be defined as competencies that can be used to produce the useful object or component in fitting machining as an occupation of mechanical work. According to Weinert (2001) competence is described as a roughly specialised system of ability proficiencies or skills that are necessary to reach specific goal. While Cedefop (Bjonovold and Tissot, 2000) in Straca (2004) define competence as an individual capacity to use knowledge, ability application of knowledge, behaviour and motivation structured in mastering specific situation. Others definition of competence is introduced by National Vocational Qualification(NVQ-UK, 1998), the term used is ‘Occupational Competences’, it is meant the ability to apply knowledge, understanding, practical and thinking skills to achieve effective performance to standard required in employment. Minister of education and Culture in Germany uses a term “action competence” as an ability of a person to behave in vocational societal as a professional. So, it is concluded that “productive competencies” mean the ability to apply knowledge, practical work, thinking skill and work attitude to produce the usefull object or component in fitting machining as an occupation in mechanical work.

Indicators which are developed as productive competency of mechanical work can be mentioned as follows

1. Competency to read and draw technical drawing.
2. Competency to operate the equipment and machining.
3. Competency to design and assemble equipment and machine components.
4. Competency to design and follow work instruction and procedure.
5. Competency to maintain and repair equipment and machines.
6. Ability to think creatively, solve problem of mechanical work.
7. Competency of work in team and safe.
8. Motivation and work ethics.

Education and training activities in Vocational and Technical education described as follow: Wenger (1998) in Cairns and Malloch (2011) provides two aspects of learning ; “Education, in its deepest sense at whatever age it takes place, concern the opening of identities-exploring new ways of being that lie beyond our current state. Whereas training aims to create an inbound trajectory targeted at competence in specific practice “(p.9). Education and training produces competencies through various student’s learning experiences in school or out of school. Learning is an interaction between individual’s mind and a socially constructed community of practice and learning can be viewed as the outcomes of an enabled active intentional interactional engagement in experience and thinking.

Learning can be done whenever, wherever and by various ways, such as self manage learning, classroom learning, or could be delivered through workshop activities, on the job training, self package learning, personal reading using text book, or modul, interaction with peers or trainers, or through e learning. Illeris (2011,35) mentioned that “the most fundamental of human learning is all learning includes two essentially different types of process : “an external process between the learner and his social, cultural and environment, and an internal psychological process of elaboration and

aquisition in which new impulses are connected with the result of prior learning”. This meaning could be resumed that learning is the process of change of human mind as an effect of interaction between individual’s mind and socio-cultural environment as well as elaboration and aquisition of knowledge, practical and thinking skill. Furthermore, Learning and training are designed by educators to improve the quality of student achievement, how the learning process run effectively and finally learning outcomes expected are achieved.

Indicators of learning and teaching process components are described as follow.

1. Lesson plan and materials
2. Teaching and learning strategy
3. Variety of methods
4. Learning and teaching approach
5. Variety of teaching aids
6. Assessment and evaluation
7. Skill and training (thinking skill development)
8. Work in team and communication training

The purpose of this research is to find out the descrepancy of learning and training process in vocational high schools, the gap between productive competencies expected and the current state achievement of vocational high school’s students. This study focused on machine production program in vocational High Schools (SMK)in West Sumatera. The result of this research is to figure out the effective learning and training model in which could be suitable for vocational and technical schools.

## II. RESEARCH METHOD

This research is a type of need assessment model, to describe the descrepancy between current state and expectation of students, teachers and industry concerning “productivecompetence” and process of learning and training in SMK in West Sumatera, specially in the field of mechanical and machining study. Survey was conducted in 7 SMKs spread out on several main cities in West Sumatera. Namely, Padang, Bukittinggi, Payakumbuh, Pariaman, Batusangkar and Padang Panjang. Representative samples were taken based on purposive random sampling, 161 teachers and 209 students were participated as respondents of this research. Instruments were developed based on dual response questionnaires.

**Table 1.** Student and Teacher Respondents

No	Nama Instansi	Jumlah Responden Guru	Jumlah Responden Siswa
Uji Coba Instrumen			
1	SMKN 1 Padang/FT UNP	30	30
Jumlah		30	30
Data Responden Penelitian			
1	SMKN 5 Padang	21	28



2	SMK Muhammadiyah	30	32
3	SMK Karya Padang Panjang	20	30
4	SMKN 1 Bukittinggi	24	30
5	SMKN 2 Payakumbuh	30	30
6	SMKN 1 Lintau Buo	19	29
7	SMKN 1 Pariaman	17	30
Jumlah		161	209

Tryout of instruments have been done by involving 30 students and 30 teachers from SMKN 1 Padang , The result can be seen in Table 2.

**Table 2.** Validating Instruments

Instrumens	Respondents	Validation	Reliablility
DRQ Teachers	30 Teachers	4 Items revised	0,971
DRQ Students	30 Students	8 items revised	0,898

DRQ – Dual Response Questionaires

Interviewed were conducted to collect information concerning industries expectations and their views to SMK’s graduates. Five industries of mechanical manufactures have been interviewed namely. Wohlrab, Infinion, Vortect technology, Epson, and SMOE Indonesia.

Quantitave Data were collected by Dual response Questionaire analysed by SPSS descriptive statistic using SPSS, and qualitative data were clasified, clarified, verified and concluded.

### III. RESULT AND DISCUSSION

#### A. Result

Results of data analysis compiled in the following ordered:

1. Description of productive competence of data based on the perceptions of teachers and students describe the productive competencies has been achieved today compared to the expected productive competencies.

**Table 3.** Student’s perception about the current state and expectation of competencies achievement in school.

Productive competencies	Current-State Competencies	Desired Competencies	Descrapancy/ Recomendation
Technical drawing competencies and designing the objects	3.44 (adequate ability to read and draw standart technical drawing)	4.42 (highly competent to read and draw standart technical drawing)	0.98 (get more experience to work with project assignment)
Plan, select and set mechanical tools and components	3.01 (adequate ability to plan ,select and set mechanical tools )	4.28 (highly competent to plan serlect and use mechanical object by order)	1.27 (get more assignment to design mechanical project)
Mechanical Calculation	3.25 (adequate ability to do simple mechanical calculation)	4.3 (highly competent to calculate machine design)	1.05 (need more experience and exercise to calculate machine design)

Machining operation	3.70 (feel confident to operate various machines)	4.42 (Highly competent in machining operation and work precisely)	0.72 ( get more experience to work with project)
Work procedure	3.77 (good enough to follow the Standart Operational Procedure)	4.5 (highly competent to create more effective SOP)	0.73 (need more experience to work with project assignment)
Cost and budgeting	3.05(adequate ability to calculate cost and budget)	4.45 (highly competent to calculate cost and budget appropriately)	1.40 (need more exercise and assignment to calculate cost and budgetting)
Problem solving at work	3.81 (nearly good ability to solve technical interference)	4.57 (highly competent to solve various problems in mechanical work)	0.76(get more assignment to solve various mechanical problems)
Creative thinking	3.25 (adequate creative thinking skill to do mechanical work)	4.43 (highly cretive to develop mechanical design)	1.18 (need more experience and assignment to work in project work)
Work in team	3.15 (adequate ability to work cooperatively)	4.45 (highly competent to manage team work)	1.30 (get more experience to work in team)
Work attitude and motivation	3.15 (good enough attitude and motivation)	4.37 (excellence work attitude and high motivation to work)	1.22 ( get more guidance and support to develop work habit)
Work Safety	3.89 (nearly good intention to work safety)	4.70 ( highly intention to work safety)	0.81 (get more experience to work )
Decision making thinking skill	3.12 (enough skill to make simple decision)	4.44 (highly skill to make a decision in work)	1.32 ( need more experience and assignment to make appropriate decision)
Using tools and gauges	3.43 (enough skill to use tools and gauges)	4.43 (highly skill is needed to ude tools and gauges for mechanical work)	1.00 (more exercise and work experience to use tools and gauges accurately)
Installing components of machine	3.21 (feel confident to set machine components)	4.42 (highly competent to instal a machine)	1.21 ( more practical experiences is needed)
Maintenance and repair	3.03 (Have enough competence to maintain and repair machine)	4.7 (highly care and competence to maintain and repair machine)	1.67 (More time to involve in mechanical work experience)

Table 3 showed data were intepreted in which the mean different between current state and expectation of student productive competencies in the field of fitting machining based on student perception. There is significant difference between current achievement of competencies and student expectation, the average different is 0.89 or current state is 3.59 and the expectation is about 4.59. This

can be taken to mean that the productive competencies of students in the current state can be interpreted at the level of adequate (well to do) it means that they feel confident to work in the machining occupation, but the expectation of student more than that, they are willing to be highly competent worker.

**Table 4.** Teacher's perception concerning student's productive competencies

Productive competencies	Current-State Competencies	Desired Competencies	Descrapancy/ Rekomendation
Technical drawing and designing	3.28 (adequate ability to read and draw standart technical drawing)	4.45 (highly competent to read and draw standart technical drawing)	1,17 (get more experience to work with project assignment)
Plan,select and set mechanical tools and components	3.45 (adequate ability to plan ,select and set mechanical tools)	4.55 (highly competent to plan serlect and use mechanical object by order)	1.05 (get more assignment to design mechanical project)
Mechanical Calculation	3.63 (adequate ability to do simple mechanical calculation)	4.6 (highly competent to calculate machine design)	0,97 (need more experience and exercise to calculate machine design)
Machining operation	3.39 (feel confident to operate various machines)	4.50 (Highly competent in machining operation and work precisely)	1,11 ( get more experience to work with project)
Work procedure	3.56 (good enough to follow the Standart Operational Procedure)	4.58 (highly competent to create more effective SOP)	1,02 (need more experience to work with project assignment)
Cost and budgeting	3.43 (adequate ability to calculate cost and budget)	4.57 (highly competent to calculate cost and budget appropriately)	1.14 (need more exercise and assignment to calculate cost and budgetting)
Problem solving at work	3.41 (nearly good ability to solve technical interference)	4.45 (highly competent to solve various problems in mechanical work)	1,04 (get more assignment to solve various mechanical problems)
Creative thinking	3.17 (adequate creative thinking skill to do mechanical work)	4.43 (highly creative to develop mechanical design)	1.26 (need more experience and assignment to work in project work)
Work in team	3.19(adequate ability to work cooperatively)	4.43 (highly competent to manage team work)	1.24 (get more experience to work in team)
Work attitude and motivation	2,93 (relatively lack attitude and motivation)	4.34 (excellence work attitude and high motivation to work)	1.41 ( get more guidance and support to develop work habit)
Work Safety	3.19 (nearly good intention to work safety)	4.48 (highly intention to work safety)	1,29 (get more experience to work)

Decision making thinking skill	3.13 (enough skill to make simple decision)	4.44 (highly skill to make a decision in work)	1.31 ( need more experience and assignment to make appropriate decision)
Using tools and gauges	3.51 (enough skill to use tools and gauges)	4.58 (highly skill is needed to ude tools and gauges for mechanical work)	1.07 (more exercise and work experience to use tools and gauges accurately)
Installing components of machine	3.34 (feel confident to set machine components )	4.54 (highly competent to instal a machine)	1.20 ( more practical experiences is needed)
Maintenance and repair	3.37 (Have enough competence to maintain and repair machine)	4.67( highly care and competence to maintain and repair machine)	1.30 (More time to involve in mechanical work experience)

Table 4. Figures out the perception of teachers concerning students' productive competencies. In comparison, both students and teachers perception on student's productive competencies in average are relatively equal. There is no significant different between teachers and students perception concerning productive competencies. Eventhough there is a significant differences between current state and expectation of productive competencies of students as a result of learning process (based on statistical test of wilcoxon). These were concluded that the gap between current state of students productive competency and the student' expectation. Student's expectation concerning their productive competencies were categorised at highly competent, meanwhile based on students and teacher's perception the current state of students productive competencies are at the level of fairly competent. Based on table 3 and 4, to overcome the discrepancy of student's productive competency, the school need to improve teaching and learning process more effective and efficient, they need more time to practice, to exercise, more experience in a real work. Work in team, as well as develop their creativity, their ability to solve mechanical work problems.

2. Description of the current state data and expectations concerning the implementation of learning and training experienced by students

**Table 5.** Student's perception of teaching and learning process in SMK

No.	Items	Current state average score X	Expectation average score Y	Mean diff
1	Appropriate lesson plan and standard competencies.	3,7 Fairly	4,6 Highly	0,9

2	Appropriate subject matters to wards the goals.	3,2 Fairly	4,6 Highly	1,4
3	Updating material.	3,5 Fairly	4,5 Highly	1
4	Variety of teaching methods.	3,5 Fairly	4,6 Highly	1,1
5	Using various multi media.	3,5 Fairly	4,5 Highly	1
6	Implement appropriate teaching strategies.	3,4 Fairly	4,6 Highly	1,2
7	Student's motivation.	3,7 Fairly	4,7 Highly	1
8	Student centered learning approach.	3,5 Fairly	4,6 Highly	1,1
9	Appropriate assignments.	3,1 Fairly	4,6 Highly	1,5
10	Effective and efficient skill training.	2,7 some what less	4,6 Highly	1,9
11	Fair and objective assessment and evaluation.	3,4 fairly	4,6 Highly	1
12	Appropriate practical work training.	3,2 Fairly	4,6 Highly	1,4
13	Train problem solving and creative thinking skill.	2,6 some what less	4,5 Highly	1,9
14	Train team work and communication.	3,5 Fairly	4,4 Highly	0,9
15	Develop productive competencies by Project based learning.	2,2 some what less	4,4 Highly	2,2
Total average		3,24 Fairly	4,56 Highly	1,32

**Keterangan:**

Rata-rata X: Kondisi Saat Ini

Rata-rata Y: Kondisi Harapan

Based on student's perception, table 5, figured out that the quality of teaching learning process at the current state commonly at the level of fairly good (3.24), however student expected the process of learning should be improved to the level high quality(4.56). Data also showed that three items about developing project based learning, train problem solving and creative thinking, and the effectiveness of skill training were at the level of somewhat less. Therefore, these are urgently needed to develop a model of instructional in which can improve the quality of teaching-learning process more effective and efficient. Because, students and teachers expected the process of learning to be more actual, authentic, and realities as a real job in the workplace.

Table.6. Teachers's Perception on teaching –learning process in Vocational Schools

No.	Items	Current state average score X	Expectation average score Y	Mean diff
1	Appropriate lesson plan and standard competencies.	3,6 Fairly	4,5 Highly	0,9
2	Appropriate subject matters towards the goals.	3,6 Fairly	4,5 Highly	0,9
3	Updating material.	3,5 Fairly	4,4 Highly	0,9
4	Variety of teaching methods.	3,6 Fairly	4,5 Highly	0,9
5	Using various multi media.	3,3 Fairly	4,4 Highly	1,1
6	Implement appropriate teaching strategies.	3,5 Fairly	4,3 Highly	0,8
7	Student's motivation.	3,5 Fairly	4,3 Highly	0,8
8	Student centered learning approach.	3,5 Fairly	4,4 Highly	0,9
9	Appropriate assignments.	3,9 Fairly	4,6 Highly	0,7
10	Effective and efficient skill training.	3,9 Fairly	4,6 Highly	0,7
11	Fair and objective assessment and evaluation.	3,7 Fairly	4,4 Highly	0,7

12	Appropriate practical work training.	3,6 Fairly	4,4 Highly	0,8
13	Train problem solving and creative thinking skill.	3,6 Fairly	4,4 Highly	0,8
14	Train team work and communication.	3,6 Fairly	4,4 Highly	0,8
15	Develop productive competencies by Project based learning.	3,7 Fairly	4,4 Highly	0,7
Total average		3,62 Fairly	4,43 Highly	0,81

**Keterangan:**

Average score X: current state

Average score Y: expectation

Table 6 delivered the score of current state of teaching and learning activities in comparison with the expectation scores. And also the gap between them (0.81) according to teachers' perception. These data can be taken to mean that the quality of teaching and learning process in vocational schools were relatively good, eventhough, teachers expected more or in the highly level of teaching –learning quality. Both teachers and students perception about teaching-learning process agree that there was a discrepancy between current state and expectation, and need to improve the quality of teaching-learning process more effective and efficient.

### 3. Industry Opinion

The qualitative data based on interviews with five industries in Batam namely Wohlrab, Infinion, Vortect, Epson, and SMOE Indonesia, which were conducted from June 29 to July 2, 2015. The conclusion of industries opinion about the productive competency needed were recomended as indispensable, namely

- a. Ability to design, read and draw mechanical drawing.
- b. Ability to work with simple mechanical calculation.
- c. Ability to estimate cost and material needed.
- d. Ability to set, assembly, and operate equipment and machine.
- e. Ability to maintain and repair tools, equipment and machines.
- f. Ability to work in team and safe.
- g. Having good work attitude.

Industries viewed that Vocational Schools have responsibility to improve their model of training to students to be linked and matched toward industrial needs. They also recomended to develop process of teaching –learning more effective and efficient by implement problem and project based



learning. Because , mainly jobs in mechanical work relate to tool design and project work as mentioned by Andi Mustakin and Nadirman (Infinion and Vortect Technology).

## **B. Discussion**

The discrepancy appeared in this study is between current state and expectation of students productive competency as well as teaching learning process in vocational schools in West Sumatra. The current state of productive competency was at level of adequate competent while students and teachers expectation at the level of highly competent. The need to improve the quality of teaching and learning to overcome the discrepancy is urgent.

According to Heywood (2005:221) “Project teaching is seen as powerful method of helping students to integrate their learning”. Its mean that many indicators of learning can be improved by implement a model of project based learning. Because projects involve solution of specific problem, design of innovation, solve calculation problem, critical thinking and creative thinking.

According to Purnawan (2007) field of engineering education should provide sufficient theories and gives examples of solving real projects. Thus, the development of natural engineering profession is simulated by technical problems in real situations. This is based on the premise that knowledge and skills are solid and meaningful-use (*meaningful-use*) can be constructed through the tasks and work that is authentic (Cord, 2001).

To overcome these problems, there should be an attempt to implement a model that allows the conducive learning by placing learners at the center of learning and the teacher’s role as facilitator, in spearheading the situation to enrich the learning experience of students. The learning experience gained through direct involvement of students in a series of activities to explore the environment and the interaction with the subject matter. Furthermore, learners construct their own knowledge based on learning experiences gained. One model of learning that learners to develop thinking ability to produce something tangible products by train them with the provision of project tasks.

Learning development by implementing project-based learning model (*project based learning*) with a contextual approach. Role in this case study is designed to confront the learner with the problems associated with the contextual learning materials and productive competencies that should be mastered. Learners are demanded to design a project, work and produce under the guidance of lectures, teachers or instructors to act more as a facilitator or mentor. Process design requires the ability to think creatively, critically, and ability to find solutions to problems that arise in the execution of the task. They are also required to be able to work together, share the same heavy duty, discuss and consult. Besides, directly they will learn how to make decisions with all the risks. Project work is an authentic learning, relatively similar to existing work in the world of work. Furthermore experience working on their projects will be stepped up in higher level, works by their own design. They will dare to accept orders according to the ordered of customer products .





Expectations further, they will be ready to enter the working world because it has a qualified productive competence, attitudes and work behaviors that have become habits (habit). Thinking productive with qualified skills is not difficult to get a job, or create jobs as entrepreneurs.

Implementation of *project-based-learning* in the learning process becomes very important to improve the ability of students to think critically and to give a sense of independence in learning. As a learning constructivist, *project-based-learning* provides learning situations real problem for students so that they can acquired permanent knowledge. *Project-based-learning* is a model that can organize projects in learning (Giilbahar & Tinmaz, 2006). *Project-based-learning* provides an opportunity to the learning system centered on the learner, more collaborative, learner actively involved complete projects independently and work together in teams and integrate real problems and practical.

The discrepancy of productive competency as well as teaching-learning process quality between reality and expectation according to teachers and students perception were relatively wide, it was about one level. (from adequate level to highly competent). Most students feel confidence to operate machines but they do not able to overcome machines troubles. A solution that can be taken into account is improving the quality of teaching and learning process by developed a model of instruction such as project based learning in order to meet industrial demands. So Educational Technology division Ministry of Education Malaysia (2006.6) answered a question of “why is Project based learning (PjBL) important?. It is important because PjBL helps students develop skills for living in a knowledge based and highly technological society. This statement means students need to develop their skill for living in global era or in digital era with competency to solve highly complex problem. PjBl is one of appropriate model of instructional to enable students to develop high performance skills needed to succeed in the high performance workplace. Jamal et al (2014) recommended that the Project Based Collaborative Learning (PBCL) promotes the collaborative building of knowledge, facilitating of knowledge sharing among students, and effective construction of higher order thinking skill, accountability skills, and collaborative skills (p.127). Noe and Stephen (2015) found that the emphasis for the project was strengthening the studentd’ critical thinking skills. Erdogen and Dede (2015.177) also indicates that the learning gains are higher when instruction is provided by computer assisted project based instruction than by the traditional method. Julie E Mills and Treagust (2003) recommended that the use of Project Based Learning as a key component of engineering programs should be promulgated as widely as possible. Suparat, Arnold and Klaysom (2015 ) also recommended that PjBl using ICT can help develop students’ abilities to communicate ideas, problem solving, life skills, and abilities to use technology and their learning quality in certain subject area. So that the Project based learning is one of effective instructional model to improve a quality of teaching-learning process and enhance the level of productive competencies of students as expected.



#### IV. CONCLUSION

The productive competencies should be improved as expected namely, competency to read and draw technical drawing, competency to operate the equipment and machining. Competency to design and assemble equipment and machine components, competency to design and follow work instruction and procedure, competency to maintain and repair equipment and machines, ability to think creatively, solve problem of mechanical work, competency of work in team and safe, and motivation and work ethics. These competencies relatively equal to industrial views.

As an conclusion the discrepancy between reality and expectation of productive competency and teaching learning process for fitting machining students in Vocational High Schools West Sumatera can be coped by improving and developing Project Based Learning instructional model.

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## IMPLEMENTATION OF META ROUTER MIKROTIK ON COURSE PRACTICUM LEARNING COMPUTER NETWORK

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**ABSTRACT** : Practical Computer network is one of the main subjects at the Department of Informatics, This course provides the basic concepts of how a computer network can be built and developed as an efficient and effective system. Practical Learning Computer Network will give students the knowledge and specific to the skills of the introduction of computer networks, Media Transmission, topology, subnetting, routing, network management and security. Process Practice often constrained by the availability of the number of physical router that is not proportional to the number of students, so that the material is not possessed and output learning is not achieved well, this research aims to improve students' ability in mastering the learning material Computer Networks that require a lot of routers, such as routing at which time practicum required the incorporation of a number of routers in implementing the appropriate configuration scenario learning materials. Mikrotik Router with virtual features Metarouter expected to facilitate students in learning networks, Implementation of metarouter mikrotik expected to increase increase student competence in terms of cognitive, psychomotor, and character of students in studying computer networks, computer networks so that learning outcomes are expected to be achieved with the maximum.

**Keywords:** Meta Router, routing, learning, computer network

### I. INTRODUCTION

Technological developments in this modern era requires the development of skills and competencies users. Communications and computer networks have spread and developed very rapidly and requires high maintenance costs, which makes the development of an optimization model for computer network design and routing is an important subject for researchers and practitioners. (Pióro & Medhi, 2004)

Laboratory is defined as: (1) place equipped for experimental studies in science or for testing and analysis; place provides an opportunity to experiment, observation, or practice in the field of study, or (2) academic periods set aside for laboratory work. (Jaya, 2013). In the process of learning, education institutions must be able to facilitate the learning activities that provide the ability applicable to students, so that one day when a plunge in the community perceived benefits. Achievement of these objectives can not be separated from the curriculum used educational institutions. Educational institutions as an educational institution in the service are required to provide supporting facilities, such as laboratory equipment were adequate. (Sonhadji, 2002)

Computer Networks course is compulsory subjects are presented in the sixth semester in the Faculty of Information Technology. It is associated with one of the competencies of graduates of the department, which is capable of designing and manipulating a computer network, including finding



the problems that exist on a computer network on a small scale and large scale. (Kurniawan & Pertiwi, 2014)

Direct experience may include laboratory work and field activities, as it would provide opportunities for learners to be able to observe an object, analyze, and prove and draw their own conclusions about an object, situation, and process things. (Nuramdiani, 2012). Learning must be packed into the process of "constructing" not "received knowledge". In the learning process, students construct their own knowledge through active involvement in the learning and teaching process. Students become the center of activity, not a teacher. (Trianto, 2007).

Virtualization is a concept of a platform running on other platforms. Platform generally refers to the OS (Operating System), which means that with an OS virtualization can run on any other OS. Virtualization method helps to use an application that can only be executed by the platform OS. Virtualization has a good development, many users and technology company engaged in fierce competition to develop and implement a virtual product in this environment (Barrett, 2008)

Implementation of virtual concept metarouter, is expected to overcome the limitations of the hardware and software resources, virtualization lab metarouter pengembangan models is expected to be an alternative to conventional lab previous models, without eliminating the weight of the material provided. Hopefully, through the implementation of learning Metarouter in Computer Networks, the material provided can be more varied and deep, so that students can better understand and master the workings of a computer network.

## **II. RESEARCH METHODOLOGY**

### **a. Design Research**

The method used in this research is the method of experimental research, whereas the research design used is *quasi-experimental design*. Form of quasi-experimental design used is nonequivalent control group design. Design nonequivalent control group design is almost the same as the pretest-posttest control group design in true experimental design. (Sugiyono, 2010)

### **b. Population and Sample**

Population is the generalization region consisting of objects or subjects that have certain qualities and characteristics defined by the researchers to learn and then drawn conclusions (Sarjono, Haryadi, & Julianita, 2013). The population in this study were all students of Semester 6 Department of Informatics University Dharma Indonesia who get teaching materials Practical Computer Network. The sample is part of the number and characteristics possessed by this population (Sugiyono, 2010). Sampling was conducted using purposive sampling technique. Sampling technique is purposive sampling technique with a certain considerations. In this study, consideration is carried out by taking classes who have the same number of students a lot. The selected sample is a student 6 Semester students of class A and class B.



### **c. Research Variables**

The variable is an attribute or the nature or value of a person, object or activity which may have certain variations defined by the researchers to learn and then draw conclusions (Sugiyono, 2010). The research variables in the study Variables include the model of learning virtualization using MetaRouter and dependent variable, in this study is the result of learning students Semester 6 University Dharmas Indonesia on subjects Practical Computer Network on the material routing..

### **d. Data Data Collection Methods**

Data Collection Methods in the study include the test method is a barrage of questions or exercises and other tools used to measure the skills, knowledge, intelligence, ability or talent possessed by individuals or groups (Suharsimi, 2013). The tests used in this study to measure learning outcomes in the experimental class and control class before and after getting treatment. The test was given to both classes which include the initial test and final test.

In this study also used observation method that aims to determine student results based on aspects of psychomotor and affective aspects. These observations were made during the learning process. Observations on the affective aspects include attendance, responsibility, activeness, and honesty of students. While observations on psychomotor aspects include students' ability to operate the computer, using software MetaRouter Mikrotik Os, konfigurai routing network, demonstrating the results of the experiment and after the learning activities. The results of observation and then analyzed to determine which class the better.

### **e. Instrument Research**

Instrumen penelitian adalah alat atau fasilitas yang digunakan oleh peneliti untuk memperoleh data yang diharapkan agar pekerjaan lebih mudah dan hasilnya lebih baik, dalam arti lebih cermat, tepat, lengkap, dan sistematis sehingga lebih mudah diolah (Suharsimi, 2013) Sebelum alat pengumpulan data yang berupa tes digunakan untuk pengambilan data, terlebih dahulu dilakukan uji coba. Hasil uji coba dianalisis untuk mengetahui apakah memenuhi syarat sebagai alat pengambil data atau tidak.

### **f. Data Analysis Methods**

Analysis of the data in the study include the initial data analysis and data analysis research results. Analysis of preliminary data was conducted to determine whether the initial ability of students of the experimental class and control class equivalent or not. In the early stages of analysis will be the normality test, homogeneity test and t test against replay value data on previous material. Analysis of research data in the form of data from the value pretest and posttest experimental class and control class. The data analysis research conducted to answer the research hypothesis (Sugiyono, 2010).

These results include data analysis Normality Test Data Test data normality was conducted to determine whether the pretest and posttest data of normal distribution or not. The data analysis to test for normality is taken from the value pretest and posttest results of the experimental class and a control class, then do Homogeneity test is performed to determine whether the sample group have the same



variance or not. The data used in this analysis is the result of pretest and posttest students. Furthermore, the Hypothesis test (t test) were conducted to determine learning outcomes which is better between classes using model virtualiasi MetaRouter with classes using lecture method. For t test, the data were tested namely pretest results data and data prosttest results in both classes..

## **g. Results and Discussion**

### **1. Research result**

The experiment was conducted on students of the Faculty of Information Technology Semester 6 Dharmas University of Indonesia, in the subject of Practical Computer Network. Research that has been done is a kind of experiment research. While the research design used in this study is quasi-experimental design. Form of quasi-experimental design is used, ie nonequivalent control group design. Desian divides the sample into two groups: the experimental group and the control group. Learning in the experimental group using virtualization MetaRouter learning model of learning while the control group using the lecture method. The sample used in the study of class A as an experimental class and class B as the control class.

The study begins with a test of equality of both classes by analyzing the ability of the initial experimental class and control class. The analysis used is normality test, homogeneity test, and t test. The data used in the analysis of the initial capabilities, the test results on the previous material. Based on preliminary analysis showed that both classes of normal distribution is homogeneous, and has the ability to average the same initial. So we can conclude that research can be done on these samples. After testing is then performed pretest equivalence (initial test), which aims to determine the initial value of the second sample before getting treatment. After pretest results are analyzed, the next step is to give treatment to both classes. Experimental class by learning model MetaRouter virtualization and control class by learning to use the lecture method. After the samples are subjected to the evaluation test is then performed or posttest. The final step is to analyze and compare data pretest and posttest results of the experimental class and the control class to the conclusion of the hypotheses that have been made previously.

## **h. Discussion and Material Testing Routing**

### **1. Design Creative Computer Networks**

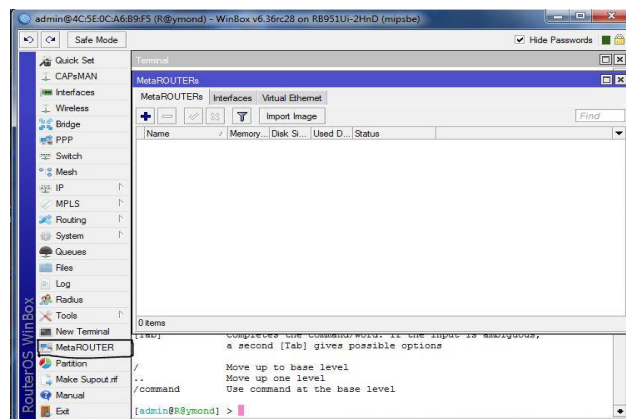
In this study, the test mastery of the material performed on the material routing, according to the learning outcomes set out in Unit Class event, the next stage of designing the testing materials that will serve as a research object of study. The design of specified materials include understanding and basic configuration MetaRouter and OSPF configuration (multi area).

Virtualization is a technique for creating a virtual version (not physical) of computer operating systems, computer networks and boast power storage device. In order to streamline the network resources, can be built rourter virtual, virtual switches, virtual servers and virtual technology. Virtual

network devices that may be located on a single physical device. In the MikroTik router can be configured through virtualization techniques many virtual router with only have a few a RouterBoard.

Gains in implementing virtualization in the network infrastructure very much at all. The main advantage is the savings and cost cuts network infrastructure. For example, bias imaginable for routing configurations that require a lot of physical router, Labor had to buy eight units router, when in fact it's good for the configuration of the lab and the real configuration, routers can be held in a router board. In addition, the network operating costs will also be dipangkas.Operasional electricity can be cut, because it only runs 8 (eight) units last router in one (1) physical router.

MetaROUTER itself is its own new features in v3.21 and RouterOS RouterOS 4.0 beta 1 (Power PC). Of course, to the latest version RouterOS MetaROUTER support already available. Q23 For writing this book, which is used is MetaROUTER on RouterOS v6.27.Untuk see if RouterBoard MetaRouter already support the application, can be viewed using the menus on Winbox as shown in Figure 1..



**Figure 1** Menu MetaRouter on WinBox

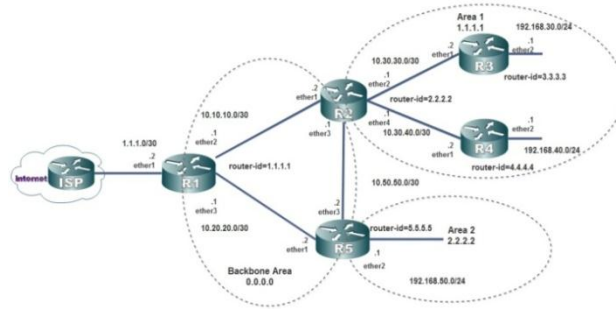
## 2. Implementation on Practical Meta Router OSPF Routing

Routing is the process of selecting paths in a network based on specific metrics.(K. Wang, Chai, & Wong, 2016). Routing Open Shortest Path First (OSPF) routing protocol is an open standard that has been implemented by a large number of network vendors. Reasons to configure OSPF in a topology is to reduce overhead (processing time) routing, accelerating convergence, as well as limiting instability disebuah area network within a network. Some of the latest research results show that the features of Equal Cost Multi-Protocol (ECMP) in OSPF can help to achieve (the hosts) were well planned destination. Ideally, if we assume that the routing path can be divided according to the scenario, the premises set the correct weights link, we can achieve load balancing in OSPF comparable to MPLS networks. (J. Wang, Yang, Xiao, & Nahrstedt, 2005)

Routing protocol is a protocol that manages communication between routers, routing protocol also allows routers to share information about the networks and connections between routers. The router uses this information to build and improve its routing table. Exchange of information in an internetwork regulated by the routing protocol defined in the network layer of the seven layer OSI



models. (Nurhayati & Sihaloho, n.d.). In simulation techniques routing using routing protocols such as OSPF, students should make a little complex topology. This caused no cost as a metric calculation parameters at the time of going to use OSPF (Towidjojo & Herman, 2016). In practical simulation techniques with Multi Area OSPF routing, we are required to present the amount of routers yang more, as in the following topology..



**Figure 2** Topology Implementation of Multi Area OSPF

From some of the above shows that the topology to simulate routing techniques, should be prepared several routers Mikro Tik. Similarly kabal-network cable must be used to connect the router to another. So be prepared for this purpose laboratory computer network with the number of routers MikroTik lot as shown in the picture below.



**Figure 3** Lab routing OSPF with RouterMikrotik

The number of routers that much like in the picture above, would require electrical power (power) is not small. So laboratories Mikro Tik above will also be enlivened with the power adapter plugs that much. Power adapter plugs that many will also make your laboratory no longer praktis. Dengan use MetaROUTER, virtual routers can be made so that the complexity and impractical practicum MikroTik can be overcome. With the help of MetaROUTER, MikroTik lab will be more simple and easy to do as the following picture.



**Figure 4** lab Routing with Metarouter

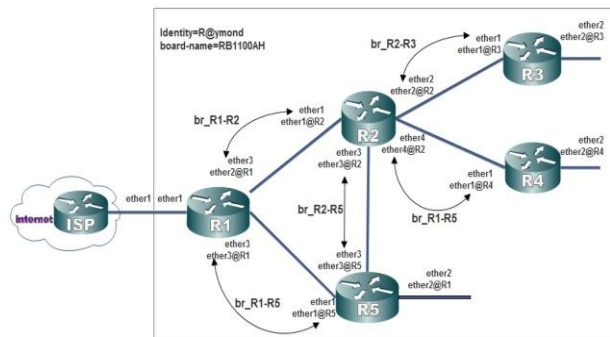
### 3. Configuring OSPF Routing Practicum (Multi Area)

#### a. Topology Routing Multi Area OSPF

Application of Multi Area OSPF should be taken into consideration when the network becomes larger. At the time of going to run OSPF Area Multi, it should be made several Regular Area, in addition to Backbone Area. So that there are several different routers in the backbone area and there are a few routers that are in Regular Area (Towidjojo & Herman, 2016).

By using MetaROUTER, simulation peneapan do OSPF Area Multi accordance with the topology in Figure 2 above, Router R1 also must redistribute the default route through OSPF. Implementation redistribute this will make other routers have a default route for entry to the Internet. Router R1 must also run masquerade NAT firewall configuration. On the other hand, Router R2, R3 and R4 must add configuration Regular Area, in this scenario Regular Such areas are Area 1 with prameter area-id = 1.1.1.1. As for Router R5, should be added Regular Area. On Router R5, Regular configuration Area must be added, in this scenario is the area 2 with the parameter area-id = 2.2.2.2. each router in this topology using router-id parameter as an identifier (ID) of masinng each router when running the OSPF routing protocol.

Topology in Figure 2 can be poured into the form of a virtual laboratory using MetaROUTER. With the help of MetsROUTER, sentence router running OSPF will be packed into a RouterBoart with identity = R @ ymond can be seen in Figure 5 below.



**Figure 5** Implementation Metarouter OSPF multi area

Stages Metarouter Configuration will start from making MetaROUTER, create virtual ethernet interface, provide the virtual interface to each MetaROUTER. This initial configuration is required in order MetaROUTER Ready for RouterOS configuration according to the desired scenario. Initial configuration (base) to be done is to make MetaROUTER in a RoadBoard. RouterBoard will be given identity as a router with the name R @ ymond. The first stage is to make the configuration of Meta ROUTER five (5) units MetaROUTER, respectively Router R1, R2, R3, R4 and R5. Then the virtual ethernet interface configuration for all MetaROUTER been made earlier. commands that can be used as picture 6.

```

.. Move up one level
/command Use command at the base level
[admin@R@ymond] > metarouter add name=R1
[admin@R@ymond] > metarouter add name=R2
[admin@R@ymond] > metarouter add name=R3
[admin@R@ymond] > metarouter add name=R4
[admin@R@ymond] > metarouter add name=R5
/command The command at the base level
[admin@R@ymond] > interface virtual-ethernet add name=ether2R1 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R1 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet print
[admin@R@ymond] > interface virtual-ethernet print

# NAME MTU ARP MAC-ADDRESS
0 ether1R2 1500 enabled 02:18:7E:1B:1B7:E2
1 ether1R3 1500 enabled 02:A7:6D:6A:F4:9B
2 ether1R4 1500 enabled 02:4C:8C:3A:137:43
3 ether1R5 1500 enabled 02:53:03:9A:E4:F3
4 ether2R1 1500 enabled 02:8B:7B:3C:33:80
5 ether2R2 1500 enabled 02:45:8F:1D:12:83
6 ether2R3 1500 enabled 02:1B:2D:53:71:BB
7 ether2R4 1500 enabled 02:1D:63:A2:ED:33
8 ether2R5 1500 enabled 02:A3:36:90:95:13
9 ether3R1 1500 enabled 02:49:EF:55:8E:8E
10 ether3R2 1500 enabled 02:16:16:90:EF:0E
11 ether3R3 1500 enabled 02:7F:3D:7B:EA:22
12 ether4R2 1500 enabled 02:52:9C:ED:DC:EF

```

Figure 6 Meta router configuration interface

The next step is to provide a virtual ethernet interface to each MetaROUTER. Ether1 interface of Router R1 must be connected ether1 out the interface of Router R @ ymond. Interface is the virtual laboratorium MetaRouter will connect to the Internet. Figure 7 shows the command to give Interface on Router R1, R2, R3, R4 and R5.

```

admin@11.11.11.1 (R@ymond) - WinBox v6.22 on RB1100AH (powerpc)
Terminal
.. Move up one level
/command Use command at the base level
[admin@R@ymond] > interface virtual-ethernet add name=ether2R1 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R1 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R2 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R3 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R4 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether1R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether2R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet add name=ether3R5 \ disabled-no
[admin@R@ymond] > interface virtual-ethernet print
[admin@R@ymond] > interface virtual-ethernet print

# NAME MTU ARP MAC-ADDRESS
0 ether1R2 1500 enabled 02:18:7E:1B:1B7:E2
1 ether1R3 1500 enabled 02:A7:6D:6A:F4:9B
2 ether1R4 1500 enabled 02:4C:8C:3A:137:43
3 ether1R5 1500 enabled 02:53:03:9A:E4:F3
4 ether2R1 1500 enabled 02:8B:7B:3C:33:80
5 ether2R2 1500 enabled 02:45:8F:1D:12:83
6 ether2R3 1500 enabled 02:1B:2D:53:71:BB
7 ether2R4 1500 enabled 02:1D:63:A2:ED:33
8 ether2R5 1500 enabled 02:A3:36:90:95:13
9 ether3R1 1500 enabled 02:49:EF:55:8E:8E
10 ether3R2 1500 enabled 02:16:16:90:EF:0E
11 ether3R3 1500 enabled 02:7F:3D:7B:EA:22
12 ether4R2 1500 enabled 02:52:9C:ED:DC:EF

```

Figure 7 interface Metarouter

The virtual interfaces to be connected to several bridge interface. In figure 8 which looks to be made five (5) interface bridge. Function Interface The bridge is connecting multiple interfaces of a router that will run OSPF. Figure 8 is a configuration commands and the results used to create interfaces bridge.

```

admin@11.11.11.1 (R@ymond) - WinBox v6.22 on RB1100AH (powerpc)
Terminal
[admin@R@ymond] > vnet-interface add virtual-machine-R1 \ type-static static-interface=ether1
[admin@R@ymond] > vnet-interface add virtual-machine-R1 \ type-static static-interface=ether2R1
[admin@R@ymond] > vnet-interface add virtual-machine-R1 \ type-static static-interface=ether3R1
[admin@R@ymond] > vnet-interface add virtual-machine-R2 \ type-static static-interface=ether1R2
[admin@R@ymond] > vnet-interface add virtual-machine-R2 \ type-static static-interface=ether2R2
[admin@R@ymond] > vnet-interface add virtual-machine-R2 \ type-static static-interface=ether3R2
[admin@R@ymond] > vnet-interface add virtual-machine-R3 \ type-static static-interface=ether1R3
[admin@R@ymond] > vnet-interface add virtual-machine-R3 \ type-static static-interface=ether2R3
[admin@R@ymond] > vnet-interface add virtual-machine-R3 \ type-static static-interface=ether3R3
[admin@R@ymond] > vnet-interface add virtual-machine-R4 \ type-static static-interface=ether1R4
[admin@R@ymond] > vnet-interface add virtual-machine-R4 \ type-static static-interface=ether2R4
[admin@R@ymond] > vnet-interface add virtual-machine-R4 \ type-static static-interface=ether3R4
[admin@R@ymond] > vnet-interface add virtual-machine-R5 \ type-static static-interface=ether1R5
[admin@R@ymond] > vnet-interface add virtual-machine-R5 \ type-static static-interface=ether2R5
[admin@R@ymond] > vnet-interface add virtual-machine-R5 \ type-static static-interface=ether3R5
[admin@R@ymond] > vnet-interface print
[admin@R@ymond] > vnet-interface print

# VIRTUAL-INTERFACE TYPE STATIC-INTERFACE VM MAC-ADDRESS
0 A R1 static ether1 02:46:18:08:C8:22
1 A R1 static ether2R1 02:7F:3D:4E:02:3F
2 A R1 static ether3R1 02:78:4C:8D:14:48
3 A R2 static ether1R2 02:7F:3D:4E:02:3F
4 A R2 static ether2R2 02:46:18:08:C8:22
5 A R2 static ether3R2 02:78:4C:8D:14:48
6 A R3 static ether1R3 02:7F:3D:4E:02:3F
7 A R3 static ether2R3 02:46:18:08:C8:22
8 A R3 static ether3R3 02:78:4C:8D:14:48
9 A R4 static ether1R4 02:7F:3D:4E:02:3F
10 A R4 static ether2R4 02:46:18:08:C8:22
11 A R5 static ether1R5 02:7F:3D:4E:02:3F
12 A R5 static ether2R5 02:46:18:08:C8:22
13 A R5 static ether3R5 02:78:4C:8D:14:48

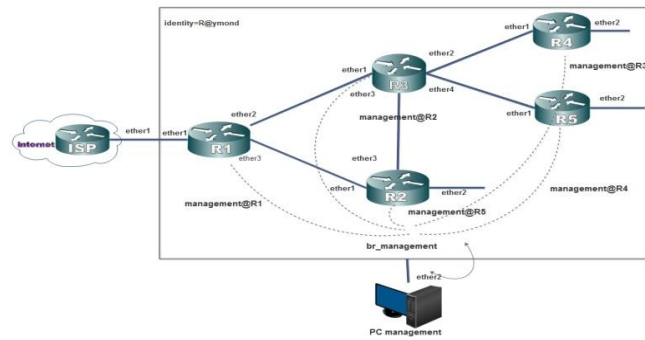
```

Figure 8 virtual Ethernet Interface Configuration

### b. Konfigurasi Management Interface

To make it easier to control the configuration of the MetaROUTER, then the management interface is added to the routers. The function is the management interface for easy configuration with less use WinBox, then at the last MetaRouter fifth may be added to the management interface

connected nantinya ether2 out the interface of the router R @ ymond. The illustrations can be seen in Figure 9



**Figure 9** Interface for configuration management for OSPF multi area

Figure 9 is a configuration commands and results to provide management interface on Router R1, R2, R3, R4 and R5. Virtual ethernet interfaces each with the name of management@R1, management @R2, management@R3, management@R4 and management@R5.

```
[admin@R@ymond] > interface virtual-ethernet add name-management@R1 \ disabled
[admin@R@ymond] > interface virtual-ethernet add name-management@R2 \ disabled
[admin@R@ymond] > interface virtual-ethernet add name-management@R3 \ disabled
[admin@R@ymond] > interface virtual-ethernet add name-management@R4 \ disabled
[admin@R@ymond] > interface virtual-ethernet add name-management@R5 \ disabled

[admin@R@ymond] > setrouter interface add virtual-machine@R1 \ type-static static-interface-management@R1
[admin@R@ymond] > setrouter interface add virtual-machine@R2 \ type-static static-interface-management@R2
[admin@R@ymond] > setrouter interface add virtual-machine@R3 \ type-static static-interface-management@R3
[admin@R@ymond] > setrouter interface add virtual-machine@R4 \ type-static static-interface-management@R4
[admin@R@ymond] > setrouter interface add virtual-machine@R5 \ type-static static-interface-management@R5
```

```
admin@R@ymond > showrouter interface print
Flags: X - disabled, A - active
#  VIRTUAL-INTERFACE  TYPE  STATIC-INTERFACE  VM-00C-ADDRESS
0  A  R1  static  ether1  02:14:00:00:00:02
1  A  R1  static  ether2@R1  02:17:17:14:00:17
2  A  R1  static  ether3@R1  02:19:4C:1E:91:149
3  A  R2  static  ether1@R2  02:10:34:19:1E:170
4  A  R2  static  ether2@R2  02:14:00:00:19:149
5  A  R2  static  ether3@R2  02:02:05:0F:1A:104
6  A  R2  static  ether4@R2  02:19:10:10:10:107
7  A  R3  static  ether1@R3  02:10:34:19:1E:170
8  A  R3  static  ether2@R3  02:10:34:19:1E:170
9  A  R4  static  ether1@R4  02:10:34:19:1E:170
10  A  R4  static  ether2@R4  02:12:17:14:00:17
11  A  R5  static  ether1@R5  02:10:34:19:1E:170
12  A  R5  static  ether2@R5  02:17:17:14:00:17
13  A  R5  static  management@R1  02:14:00:00:00:02
14  A  R1  static  management@R1  02:10:34:19:1E:170
15  A  R2  static  management@R2  02:14:00:00:00:02
16  A  R3  static  management@R3  02:10:34:19:1E:170
17  A  R4  static  management@R4  02:19:10:10:10:107
18  A  R5  static  management@R5  02:10:34:19:1E:170
```

**Figure 10** Configuration Management Interface

The management interface can dibridge with ether2 interface belongs Router R @ ymond. Seen in the picture bridging this can be done with the help of br\_management bridge interface. Commands that can be used as the figure 11.

```
Command Use command at the base level
[admin@R@ymond] > interface bridge add name-br_management
[admin@R@ymond] > interface bridge port add \ interface-management@R1
bridge-br_management
[admin@R@ymond] > interface bridge port add \ interface-management@R2
bridge-br_management
[admin@R@ymond] > interface bridge port add \ interface-management@R3
bridge-br_management
[admin@R@ymond] > interface bridge port add \ interface-management@R4
bridge-br_management
[admin@R@ymond] > interface bridge port add \ interface-management@R5
bridge-br_management
[admin@R@ymond] > interface bridge port print
Flags: X - disabled, I - inactive, D - dynamic
#  INTERFACE  BRIDGE  PRIORITY  PATH-COST  HORIZON
0  ether2@R1  br_R1-R2  0x80  10  none
1  ether3@R1  br_R1-R5  0x80  10  none
2  ether1@R2  br_R1-R2  0x80  10  none
3  ether2@R2  br_R2-R3  0x80  10  none
4  ether3@R2  br_R2-R5  0x80  10  none
5  ether4@R2  br_R2-R4  0x80  10  none
6  ether1@R3  br_R2-R3  0x80  10  none
7  ether1@R4  br_R2-R4  0x80  10  none
8  ether1@R5  br_R1-R5  0x80  10  none
9  ether3@R5  br_R2-R5  0x80  10  none
10  management@R1  br_management  0x80  10  none
11  management@R2  br_management  0x80  10  none
12  management@R3  br_management  0x80  10  none
13  management@R4  br_management  0x80  10  none
14  management@R5  br_management  0x80  10  none
[admin@R@ymond] >
```

**Figure 12** Bridge Interface Configuration Management

.Multi OSPF Area Configuration in this scenario would also be started with configuring IP addresses on each interface, add the router ID, enable protocol OSPF router, add Regular Area on multiple routers and configure network advertise on each router. Figure 12 is a command that applies to all virtual routers.

```

..          Move up one level
/command    Use command at the base level
[admin@R1] > ip address add address=1.1.1.2/30 interface=ether1
[admin@R1] > ip address add address=10.10.10.1/30 interface=ether2
[admin@R1] > ip address add address=10.20.20.1/30 interface=ether3
[admin@R1] > routing ospf instance set default router-id=1.1.1.1
[admin@R1] > routing ospf instance print
Flags: X - disabled, * - default
0 * name="default" router-id=1.1.1.1 distribute-default=always-as-type-1 redistribut
  redistribute-other-ospf=no metric-default=1 metric-connected=20 metric-static=20
  out-filter=ospf-out
[admin@R1] > routing ospf interface add interface=ether2
[admin@R1] > routing ospf interface add interface=ether3
[admin@R1] > routing ospf network add network=10.10.10.0/30 area=backbone
[admin@R1] > routing ospf network add network=10.20.20.0/30 area=backbone

```

Figure 12 Configuring OSPF

Router R1 duty Single Area OSPF network connects to the Internet so it must be added default router on this router. Entry of the default router to be distributed (in-redistribute) to other routers. Router R1 must also run a masquerade with parameter-ether1 out interface. The next stage in the DNS Server Configuration, so that all the routers can ping the Internet by using a domain. The commands that can be used for the above configuration as in Figure 13.

```

Terminal
..          Move up one level
/command    Use command at the base level
[admin@R1] > ip route add gateway=1.1.1.1
[admin@R1] > routing ospf instance set default distribute-default=always-as-type-1
[admin@R1] > routing ospf instance print
Flags: X - disabled, * - default
0 * name="default" router-id=0.0.0.0 distribute-default=always-as-type-1
  redistribute-connected=no redistribute-static=no redistribute-rip=no
  redistribute-bgp=no redistribute-other-ospf=no metric-default=1
  metric-connected=20 metric-static=20 metric-rip=20 metric-bgp=auto
  metric-other-ospf=auto in-filter=ospf-in out-filter=ospf-out
[admin@R1] > ip firewall nat add chain=srcnat out-interface=ether1 action=masquerade
[admin@R1] > ip dns set server=1.1.1.1,8.8.8.8 allow-remote-request=yes
[admin@R1] > █

```

Figure 13 Configure router and DNS Server

After all configurations are completed, the final stage is simulation testing Multi Area OSPF Routing, then it can be seen in the routing table of each router. This indicates that the configuration has been successful. The test also can be done by pinging from a router to the IP address that is on the router-router interface to another. For example, testing of Router R1 ping, ping can be made to the IP address on the interface ether2 of Router R2, R3, R4 and R5.

```

Terminal
/          Move up to base level
..          Move up one level
/command    Use command at the base level
[admin@R1] > ping 10.30.30.1
HOST
10.30.30.1          SIZE TTL TIME STATUS
10.30.30.1          56 64 2ms
sent=2 received=2 packet-loss=0% min-rtt=0ms avg-rtt=1ms max-rtt=2ms

[admin@R1] > ping 192.168.40.1
HOST
192.168.40.1       SIZE TTL TIME STATUS
192.168.40.1       56 64 0ms
sent=2 received=2 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms

[admin@R1] > ping 192.168.40.1
HOST
192.168.40.1       SIZE TTL TIME STATUS
192.168.40.1       56 64 2ms
sent=2 received=2 packet-loss=0% min-rtt=0ms avg-rtt=1ms max-rtt=2ms

[admin@R1] > ping 192.168.50.1
HOST
192.168.50.1       SIZE TTL TIME STATUS
192.168.50.1       56 64 0ms
sent=2 received=2 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms

[admin@R1] > █

```

Figure 14 Testing Connections OSPF



### III. CONCLUSION

Results "Implementation MetaRouter Mikrotik on practical learning of Computer Networks" can be concluded:

1. Practical Learning Network requires creativity and innovation of teaching by utilizing applications with features such as virtual Mikrotik MetaRouter if hardware resources provided by educational institutions can not meet the needs according to the number of students there.
2. Implementation Metarouter proxy, generally can reduce the burden of cost of procurement of computer networking devices are quite expensive, without reducing the weight of the materials provided to the students. Even for some of the cases are complex and difficult to be presented in the form of conventional lab, through virtual simulation metarouter these problems can be solved.
3. This study proves that the media router Mikrotik with MetaRouter features utilized in the process of learning about Routing material related to student learning outcomes. It means also that media MetaRouter virtualization can help the student needs to achieve optimal learning results.
4. Further development of alternative models of this lab is necessary, the authors suggest that further research and innovation in the form of project-based learning model, in which students are expected to be more active and have competence in accordance with the existing technological development.



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EI-02-036

## DESIGN AND DEVELOPMENT OF COMPUTER BASED TEST (CBT) FOR NEW STUDENT RECEPTION AT MUHAMMADIYAH RIAU UNIVERSITY

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**ABSTRACT :** *Acceptance tests of new students integrated, online learning, and academic evaluation is currently mediated by ICT. The need for ICT in education is so high, it is intended that education becomes limitless and can be done anywhere and anytime. Computer Based Test (CBT) is an effective solution for mass education evaluation. Although, a variety of e-assessment approaches and systems have been developed in recent times, but there are still many weaknesses. Some of the flaws found in the previously developed CBT is timing, flexibility, ease of use, robustness and scalability, human error and system security tests used. In this paper, a web-based online examination system is developed to address the aforementioned reviews these drawbacks. The system is designed to facilitate the examination processes and manage the challenges surrounding the conduct of examination, auto-submission, automarking and examination result report generation. The conceptual design including the Data Flow Diagrams (DFD), the Use Cases and the Entity Relationship Model (ERM) for the system developed is also presented. The method used is research and development with model 4 D.*

**Keywords:** CBT, 4D models, new admissions test, web based examination

### I. INTRODUCTION

Technology and entrepreneurship are two different things, but it becomes one and needed in education today. Muhammadiyah Riau University try to collaborate on these two elements and make it as a featured program at the Muhammadiyah Riau University (UMRI), it is done in an effort to realize the vision and mission of the Muhammadiyah Riau University as technopreneurship generation. Make students independent in a manner mastering technology and entrepreneurship is the main goal of human development at the Muhammadiyah Riau University. The key point in creating human resources and independent and entrepreneurship is selection process, one of them through the test. Based on the results tracer study conducted by the Institute of Internal Quality Assurance (LPMI) UMRI to alumni in 2014, the obtained results the number of alumni who became entrepreneurship is still low and does not meet the expectations and objectives of the Muhammadiyah Riau University who want human resources to master the technology and entrepreneurship.

Muhammadiyah Riau University need appropriate tools to support and realize the flagship program of the Technopreneurship field. CBT-EP (Computer Based Test for Entrepreneurship Personality) is an appropriate means as a first step in helping the Muhammadiyah Riau University make the selection of depressed individuals-individuals who self and personality entrepreneurship to succeed the flagship program of the Muhammadiyah Riau University of achieving the vision and mission of the Muhammadiyah Riau University.

CBT-EP (Computer Based Test for Entrepreneurship Personality) is an entrepreneurial personality measurement tool that is packed into a computer-based software applications. Personality





tests are required in entrepreneurship also gives an overview of one's career, especially in the field of entrepreneurship in accordance with the character it has. Holland vocational personality theory also explains that when people with the same type of personality that is collected in a similar environment and work according to their personality, the success rate will be higher (Nauta, 2010).

Model tests that have been used in the selection of new admissions at the Muhammadiyah Riau University is a test model intelligensi or general abilities and TKD, so inadequate in view of the attitude, the nature and orientation of a person in entrepreneurship. The above statement is also supported by some psychologists as Anastasi (2007: 44), and Aeni (2012: 67), which assumes that the concept of aptitude tests, personality and interests arising from dissatisfaction with the intelligence test which produces a single score that IQ. Originally an IQ test is used as a basis for consideration in the planning of various fields, but IQ tests inadequate in providing information about the object to be selected. When someone wants to see the attitude, someone in the nature of work then it's all related to one's personality, (Aeni, 2012).

Based on some of the explanations above, the general issues envisaged in general can be disclosed are (1) has not reached the desired primary goal is to produce graduates who are independent and entrepreneurial; (2) Muhammadiyah Riau University want output that is independent individuals and entrepreneurship, but the tools and selection process input (prospective students) used is still not right; (3) tes personality that have so far still provide information about the nature of man in general, not the nature of one's tendency to specific sectors as has been depicted in the flagship UMRI's program; (4) model tests were not valid, practical, effective and efficient. Based on the problems described earlier, then the problem in this research is How to design and develop a personality test validity, practical, effective and efficient. The purpose of this research is to produce a computer-based test application that is valid, practical, effective and efficient.

## **II. METHODOLOGY**

The study was conducted in December 2015, at the Muhammadiyah Riau University. The method used in this research is the method of research and development, with four D models. The steps performed are as follows : 1) Define, this stage starts from determining potential problems, literatures review of CBT and entrepreneurship personality, needs analysis; 2) Design, this stage starts from design of the instrument test; 3) Develop, this stage of the trial initiated by experts in the field of instrument and psychology, after testing is completed expert, then be revised in accordance reference instrument experts, for the development phase to the on-line test, 4) Disseminate, entrepreneurship personality test final products. Personality measurement can be done through some means or methods, among which direct observation, interviewing, projective tests, and personality inventory

### III. RESULTS AND DISCUSSION

#### A. Application Need Analysis

Application must have compatibility with conditions, criteria, requirements or ability to be owned by an expert system for the entrepreneurship tests fulfill what was required and needed by the user. The design of this application has the ability to validate all inputs data, the conversion of answers with the data value, matching the total score data with the data base of the rules of the knowledge base. Require the support of hardware, software and base elements data. Meets the aspect of speed, accuracy and reliability in the distribution of information.

#### B. Architectural Design Of Expert System

Application of expert system tests entrepreneurship built using the programming language Visual Basic .Net 2008 are realized through user interface (Figure 1). At the interface users, general users (non-admin) can enter information in the form of facts, then by will be processed through the tracking system with forward-chaining methods (Figure 2) through the machine inference. Information obtained from users is matched to the knowledge base are represented through *if-then* rules. From the process, the system will do the interpretation to produce results. On the other hand, the admin can do improvement of knowledge of the results also form information or facts. Including the form of rule or production rules in the form of *if-then*. as media to accommodate the knowledge base, improvement knowledge, user data, the data admin, or conclusion of the test, then added component separately, namely My SQL. These components are connected to the system via the interface users.

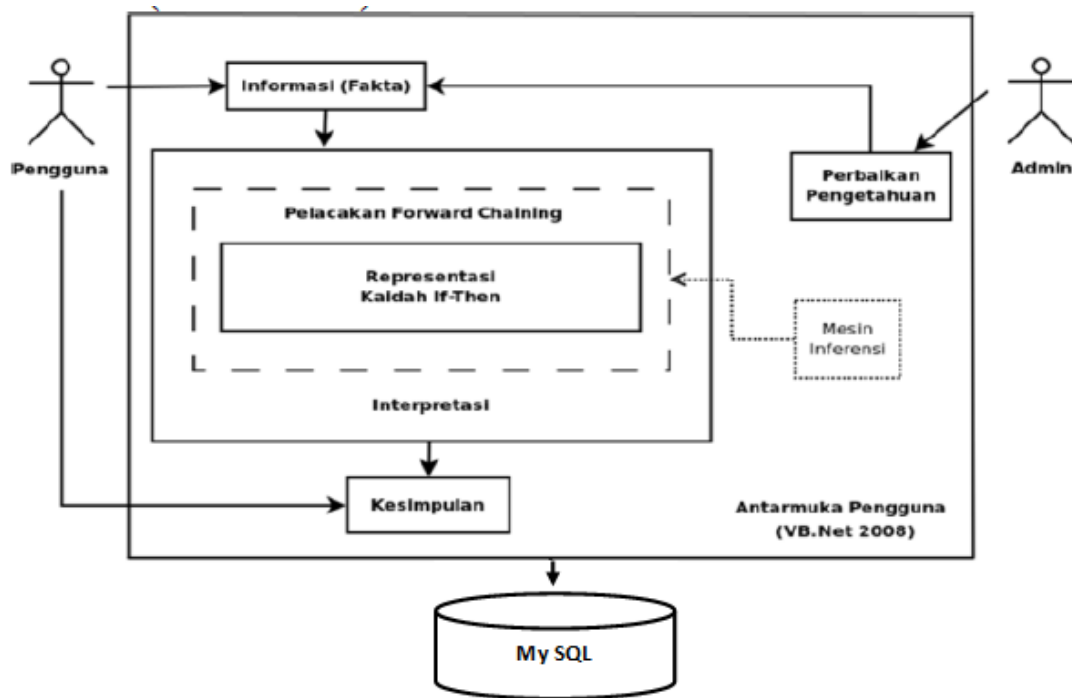


Figure 1 . Architectural Design Of Expert System Entrepreneurship Test

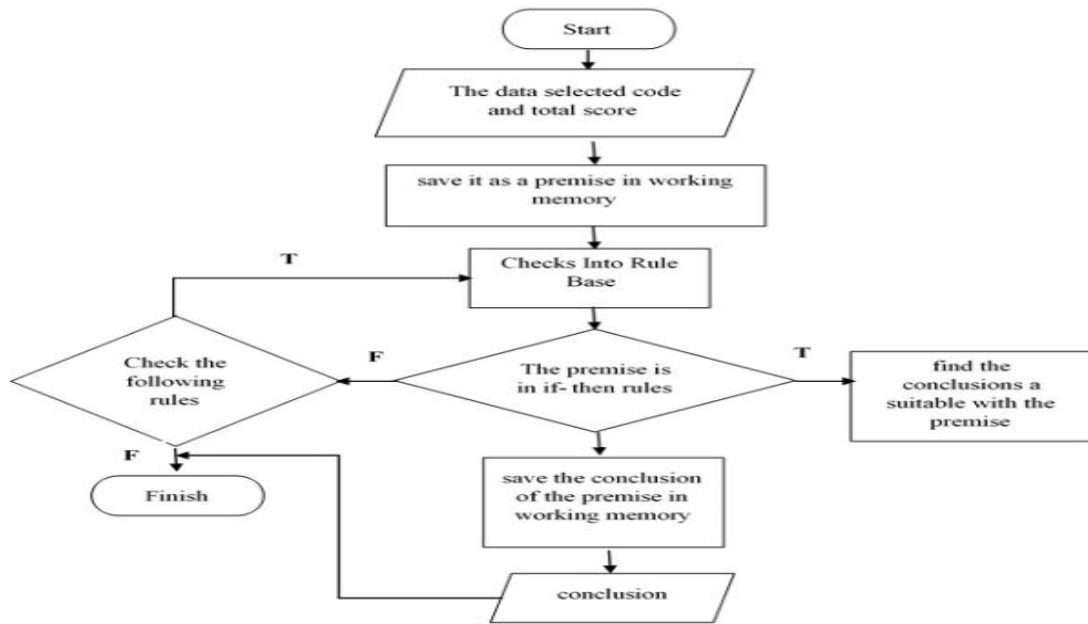


Figure 2 . Forward Chaining Algorithm

### C. Design Knowledge Base

The knowledge base (knowledge base) is the main kompenen of an expert system applications. This knowledge base derived from the knowledge acquisition process (Figure 3) and knowledge representation, namely in the form of facts and rules (Figure 4).

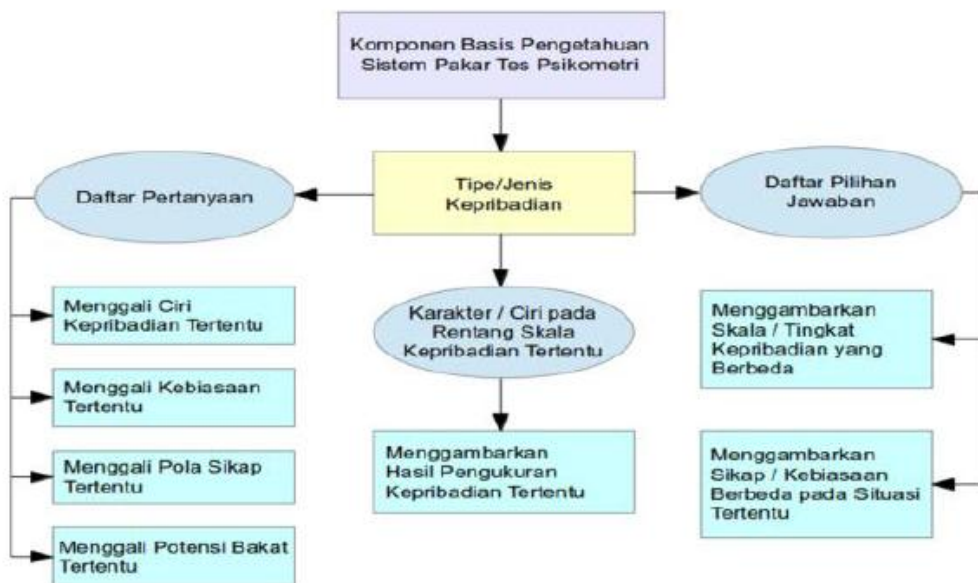


Figure 3. Knowledge Acquisition Process

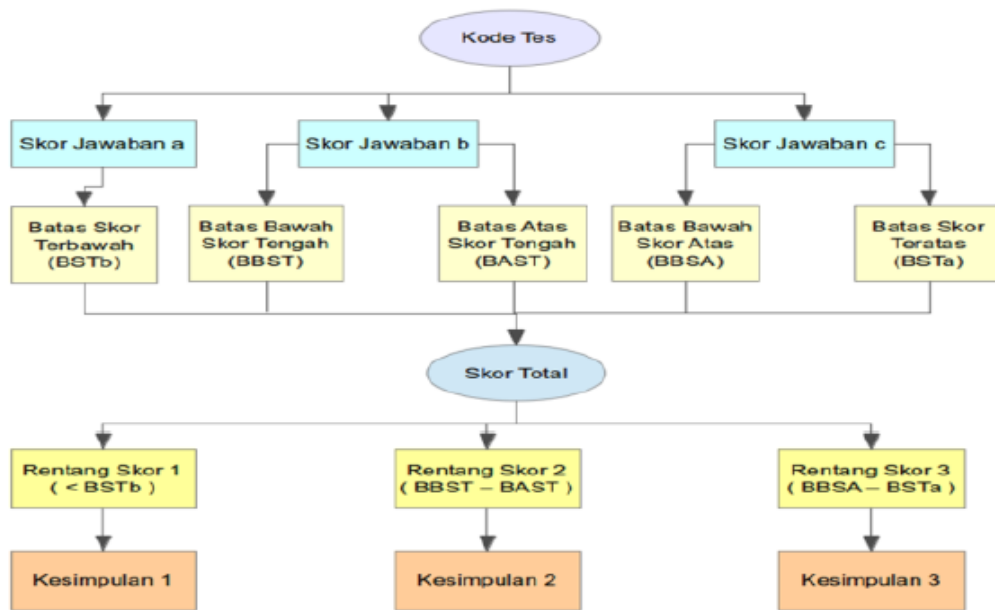


Figure 4. Process Knowledge Representation

#### D. Mechanism Design Inference

Expert system inference mechanism for entrepreneurship test refers to the inference method is used, the forward-chaining (tracking forward or trace forward). In this case, the conclusions drawn by the data or inputs that have been entered by the user through the application interface. Inference mechanisms, namely: (a) the user selects entrepreneurship tests are provided. (b) the user answered all the questions test with how to tick one of the options they provide answers to each question selected test. (c) the last user clicks the button view results test.

#### E. Class Diagram

In this case there are eight main class that will draft the class diagram of this application. Each class are: User, Login, Undergoing Tests, Admin, Admin Registration, Login Admin, Modify Facts and Modification Rules. The following class diagram that shows the relationship between the class eight. (figure. 5)

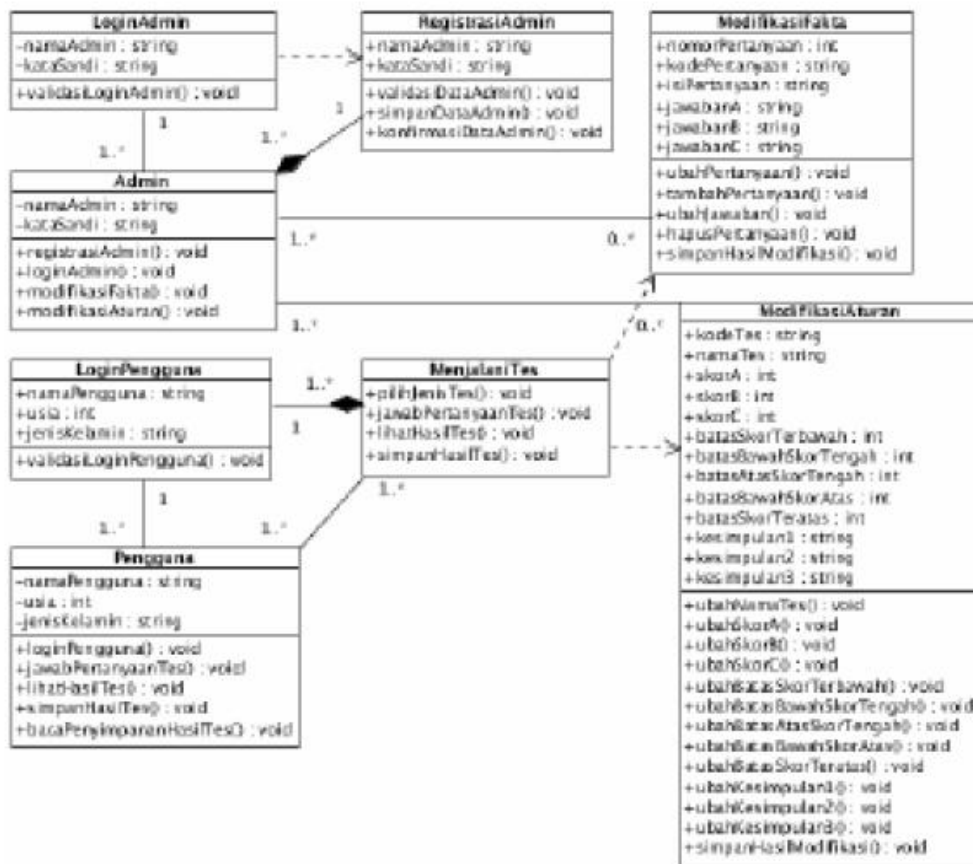


Figure 5. Class Diagram Expert System Entrepreneurship Personality Test

### F. Results Design Expert Systems Applications

Here is a prototype design of an expert system application entrepreneurship personality test. This application has a main form to display a list of support menus to help users in understanding the interfaces provided. Form personality entrepreneurship tests, form the conclusion of the test, the test result data storage form, edit form a collection of facts, and the edit form a list of rules.

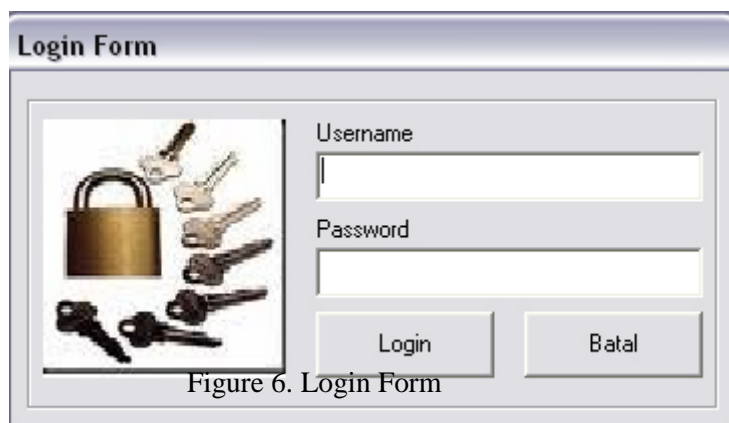


Figure 6. Login Form

Tes Kepribadian Entrepreneurship Universitas Muhammadiyah Riau

**Pernyataan**  
1. Saya merasa paling nyaman ketika saya memiliki rutinitas sehari-hari.

**Pilihan**

Sangat Tidak Setuju  
 Tidak Setuju  
 Agak Setuju  
 Setuju  
 Sangat Setuju

Kode Peserta: P116022208  
 Nama Peserta: Sri Yulastri  
 Jenis Kelamin: P  
 Program Studi: Pendidikan Informatika

DAFTAR PILIHAN PERNYATAAN

Lembar Jawaban	1	2	3	4	5	6	7	8	9	10
	11	12	13	14	15	16	17	18	19	20
	21	22	23	24	25	26	27	28	29	30
Akhiri Pengerjaan	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47	48	49	50

**Figure 7.** Personality Entrepreneurship Tests Form

Tes Kepribadian Entrepreneurship Universitas Muhammadiyah Riau

Hasil Tes Kepribadian Entrepreneurship

Selamat anda adalah orang yang memiliki kemampuan dalam meyakinkan seseorang. Kemampuan anda dalam berkomunikasi dan ketajaman dalam menganalisa menjadi kekuatan utama anda dalam berentrepreneurship

Score  
**72**

Menu Utama Keluar

**Figure 8.** Score and Result of Entrepreneurship Tests Form

#### IV. CONCLUSION

Based on the implementation and results of the testing has been conducted on the application of expert systems entrepreneurship personality test to measure aspects of the human personality shows that all the functions and needs required by the analysis phase is already well underway in accordance with what is expected. In this case, the application is already able to deny access logins valid, storing registration data admin, processing the input in the form of answers to users, as well as produce the output of the test conclusion fast and accurate.



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EI- 02 -040

## THE DESIGN AND THE IMPLEMENTATION OF 3D EDUCATION GAME BY USING UNITY 3D GAME ENGINE

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**ABSTRACT :** *Game development is currently dominated by action and fantasy game genre. Game is considered not to have education for its users because it contains fantasies that sometimes do not make sense. With the current developments, the games rated more negative impacts than positive impacts. To overcome this obstacle then 3D educational games is designed by using Unity 3D game engine. The use of 3D technology for game development education is considered very good, so that children do not get bored while playing.*

**Keywords :** Game, Education, Educational Games

### I. INTRODUCTION

Game has a special attraction for most people because by playing a game they feel can eliminate boredom, relieve fatigue or indeed be a pleasure and satisfaction when playing a game. However, essentially playing a game would give effect to the users either positive or negative effects that will be caused by playing a game.

Basically a game can provide a positive impact for users when the game can give an instruction is sometimes not obtained from the learning process at school or at home, to play the game will be able to add a lot of friends and relationships, or the game will use a landing gamers such as how to manage the economy themselves, how to work in groups and so forth. When gamers understand that the learning process is sometimes not realized directly by gamers, it will lead to a positive habit for gamers in running their lives.

If the views of game development today is the gaming world dominated by action and fantasy game genre. Game genre is judged not to have education for its users because it contains fantasies that sometimes do not make sense. Most games that are now just a game that serve as a means of entertainment and play alone. And with the high public interest in playing the game is supposed to be a container or a means for people to gain more knowledge. With its development, the game is considered more to bring many negative impacts than positive impacts. Therefore, to take advantage of the high public interest and changing the mindset of the community will be gaming, then this present moment takes an educational game genre or the games that have the education and teaching in it.

Educational games aim to provoke children's interest in learning the subject matter as you play, so with a sense of excitement expected that children can more easily understand the subject matter presented. This type is actually referring to the content and purpose of the game, not the kind of true. At the present time it is still rare 3D-based educational game, most existing games based 2D. This will reduce the interest of children to play the game because the game is very minimal 2D animation and less interactive.

In making the game this time the software is used to create a game by using Unity 3D. Games created genre adventure/ adventure 3D where the player must find his grandfather farm equipment and answer questions about the lesson Elementary School 4th grade in order to pave the way for the next stage



in order to continue the adventure to complete. If the player choose the wrong answer, then have to repeat the adventure from the beginning

This topic was chosen to create a fun learning tool to create an educational game based on 3D, so children do not get bored while playing. During this game the original artwork Indonesia still largely based 2D. Though there is now a game engine like Unity 3D gives more convenience in making the game and minimizing resource costs due to expensive system

Based on the description above, the writer is interested to try to give an idea of making a 3D game using the Unity 3D game engine, with the title "The Design and Implementation of 3D Educational Game by Using Unity 3D Game Engine". Expected to provide educational value, motivation and inspiration in making a 3D-based games

Based on the above, there are several issues that will be described in this study, namely:

1. How to design the shape and design of educational games that can be used as a medium of learning?
2. How to create 3D games Educational using Unity 3D game engine?

Based on the problems of the above topics, the aim of this study is:

1. Create a plan and design educational games for education.
2. Creating 3D games Education to help children to learn favored.

## **II. Theory**

### **A. Definition Game**

Games or games is an application that can be played by certain rules that have stories, the value of history or educational value, packed in a mission that must be completed so that there are no winners and losers. The game also is a tool created to meet the human need for entertainment or educational purposes so as to date, the game continues to evolve according to the needs and can not be separated by man. To make an advance games makers have to create a description that tells the game to be made, here are some definitions of the game:

*"Game is a program or system in which one or more players make decisions through control of the objects in the game for a particular purpose. If you want to explore the use of animation must understand the making of the game. if you want to make a game, he must understand the techniques and methods of animation, because both are interrelated. (Jasson: 2009)*

*A game is a system in which players engage in an artificial konfilk, defined by rules, that produce measurable results. (Katie Salen and Eric Zimmerman: 2003)*

### **B. Types of Games**

Several types of games include:

1. Action games, usually includes physical challenges, puzzles, races and several other conflicts. May also include a simple economic problem, such as collecting objects.
2. Real Time Strategy (RTS) is a game that involves a matter of strategy, tactics and logic, examples of this type of game is Age of Empire, War Craft.
3. Racing Role Playing Games (RPG) involves engineering problems, logic and exploration or exploration and also sometimes includes puzzles and economic problems because in this game usually involves the collection of looted goods and sell them to earn better weapons, an example of this is a Final Fantasy game, Ragnarok, The Lord of The Rings.
4. Fighting Real Word Simulation, Covering sports games and simulation of vehicle problems including military vehicles. This game mostly involving physical problems and tactics, such as Championship Manager game.



5. Adventure games / Action Adventure is a game where users can explore one place or more, against the enemies encountered, interact with characters encountered, and sometimes solve puzzles, games example: Summoner Saga
6. Shooting games are games that type of shooting an enemy or a specific goal, examples of games: Time Crisis, House of The Dead
7. Logic game is a game that requires the user to think using logic to be able to complete these games, example games: Jeu Kakuro, Smart Kittio.
8. Casual gaming is a game created for all people and can be played everyone without having to have special abilities, examples of games: Abduction World.

### **C. Game Education**

Educational game is a game that has educational purposes, or which have incidental or secondary educational value. All types of games can be used in educational environments. As meaning of educational game is a game designed to help people to learn about certain subjects, expand concepts, reinforce development, understand an historical event or culture, or assist them in learning a skill as they play.

The understanding of educational games according to the experts as follows:

1. Educational game is a competitive exercise where the goal is to win and the player must apply the subject matter or other relevant knowledge. (Gredler 2004)
2. Educational game features, structures, and elements of the media that make the game fun from different motivations and perspective fantasy, curiosity, challenge, and control. (Malone: 1980)
3. Educational game only digital games designed specifically for the purpose of learning. (Michael & Chen: 2006)

An educational game is designed to teach people about a certain subject and to teach them skills. Game is a game that teaches us goals, rules, adaptability, problem solving, interaction, all represented as a story. They meet our basic needs for learning by providing enjoyment, passionate engagement, structure, motivation, ego satisfaction, adrenaline, creativity, social interaction and emotion in the game itself.

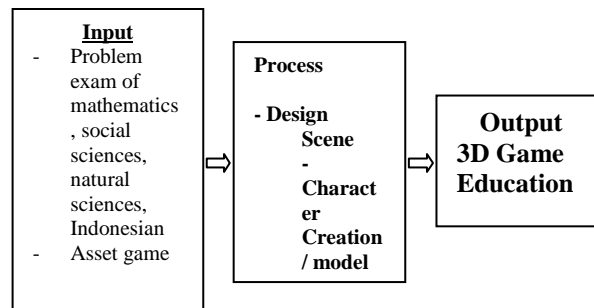
Characteristics of educational game that is fun, motivating, and there is a positive learning, so the potential to regrow learning motivation of children has decreased. The reality educational game successfully applied to the simulation exercise or even particularly military training. United States military use games to educate people about the military world. One game that sponsored the US military is "America's Army".

### **D. Game Engine**

Game Engine is a software system designed for creating and developing video games. There are many game engines that are designed to work on video games and desktop operating systems such as Microsoft Windows, Linux, Mac OS X. The core functionality typically provided by a game engine which already includes a rendering engine to render 2D or 3D graphics, a physics engine or collision, sound, scripting, animation, artificial intelligence (AI), networking, streaming, memory management, threading, localization, and scene graph. The process of game development is often saved by reusing the same game engine to create different games.

### **E. Conceptual Framework**

The conceptual framework of this research consists of three parts including: Input, Process and Output.



**Figure. 1** Conceptual Framework

Input is an activity of data to be processed. In this activity is the collection of activities carried forming gaming assets and problems of grade 4 elementary school lessons. These activities are carried out at the beginning of manufacture used for further activities that process. The process is an activity to process the data that will be used as a game. The data or assets that have been entered at the time of input will be compiled, processed and given a script using Unity 3D. The output is the result of the data that has been processed. In this study, the resulting output is a 3D educational game.

### III. METHODOLOGY

#### A. Types of Research

This study is a research development. Research development is the process of translating the design specifications into physical form. In the area of development there is a complex relationship between technology and design theory that control messages and learning strategies. (Seels & Richey, 1994).

As for the other sense of the research is the study of the development of a systematic way to designing, developing, and evaluating programs, processes and outcomes of learning that must meet the criteria of consistency and effectiveness internally. Research development research is not intended to produce a theory but rather to produce a particular product. This study aims to provide insight into the development of a product.

#### B. Time and Place Research

The timing of the research carried out in the month of December 2015 until January 2016, and the place of Student Research was conducted in 14 Public Elementary School district. Lubuk Begalung in Padang, West Sumatra.

#### C. Steps Research Method

Because this study using this type of research as for the development of the steps in making the game include:

##### 1. Conceptualization

Conceptualization is the process of pouring concepts to create a game, such as determining ideas, game genre and theme of the game. Conceptualization is very important in making a game, it is meant for making the game more clearly its objectives and have clear boundaries.

##### 2. Design

Design is an important stage in the creation of a game. The design includes system design, manufacture game play, character / model, make maps, animations, scenes and interface design.

##### 3. Implementation

Implementation is the implementation phase of the design process has been carried out, at this stage of the design that includes characters, game play, maps, scane, game play and interface is made to be real in the world of gaming.

4. Testing

The main purpose of testing is to make sure this game serves as a destination. Testing also as a method to determine the extent of the response of the players, as well as to know the shortcomings of the game and then fix it.

5. Use

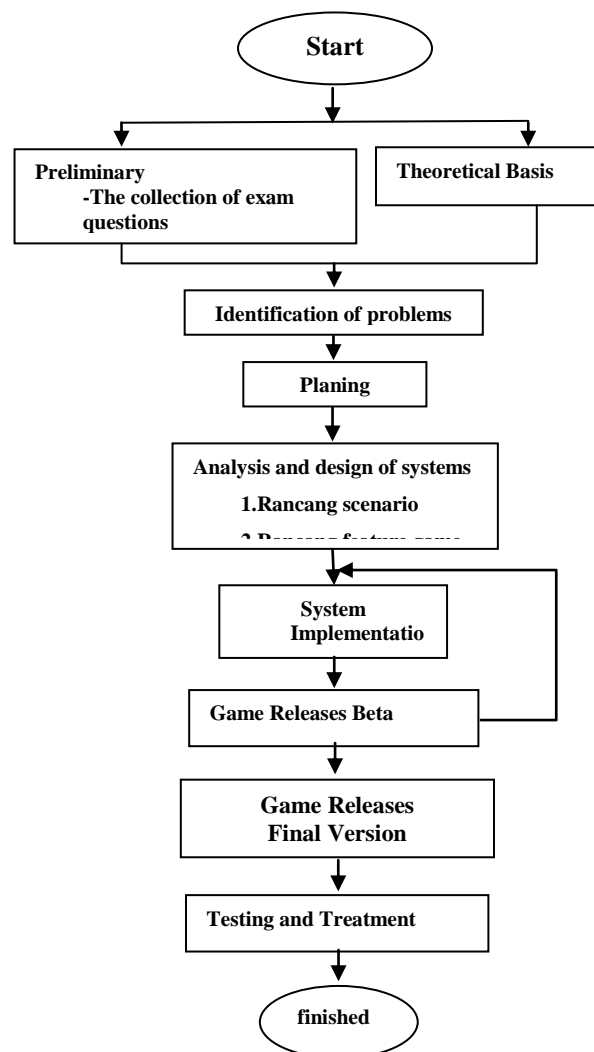
After the game is done testing and feasible for use, then the game can be played.

6. Maintenance

Maintenance intended to exercise care and maintenance as well as update the system to maintain the consistency of the game.

**D. Framework Methodology**

To clarify the directions of this research, can be seen in the picture frame of the following methodology:



**Figure. 2** Framework Research Methodology

**E. Analysis System**

Analysis of the system is needed in order to maximize the development activities of the system, thus in the making of this game. Analysis of the system is the decomposition of a complete system with a view to knowing the needs required of the system, identify and evaluate the work of the running system which will be obtained a conclusion on whether the system is fit for use or not. The purpose of the analysis system is a good understanding of the needs of the system. The system requirements can be

interpreted on what should be done by the system and the characteristics that should be owned by the system.

a. **Hardware Requirements**

In the making of this game takes hardware computers used to process modeling, Scripting and testing games. The specifications of the hardware requirements for making this game as follows: Processor : Intel(R) Core i3, Memory : 2048 Megabyte RAM, GPU : DX9, Keyboard, Mouse

b. **Software Requirements**

Needs software used in the making of this game is: Microsoft Windows 7 Ultimate 32-bit, Unity 3D Game Engine, MonoDevelove

**F. 3D Game Design Education Scenario**

3D educational game created a game that is presented using a three-dimensional visual perspective where the player can see 360 degrees. This is a good strategy to suppress boredom in children when playing 3D games this education.

The focus in this educational 3D game development is the scenery shown in the scene game, game texture detail, the use of particle systems. This has created a shortage of computers in terms of specifications suggest. Obviously with such focus that the specifications required to run a 3D educational game is quite high. The story and missions are also the most important thing for the mission that please children will feel excited to play this game.

3D educational game tells the story of an old man who lived in a small mountain where the journey to return home carrying her garden equipment. In the course of this old man collided with a couple of young men who caused the vessels crashed and torn bags. Grandpa was surprised when she reached home, because the bag is empty utensils and turns the contents of her purse spilled along the road to his house because his bag was torn.

In this educational 3D game will be made of two characters boys and girls where the task is to find and collect the scattered garden tools grandfather along the road to the grandparents' house. When the goods are found, then the user is given a question in order to bring home and garden equipment grandfather opened the door in order to get to the grandparents' house. Users can choose a character that will be used, and the grandfather in the game act as an NPC game.

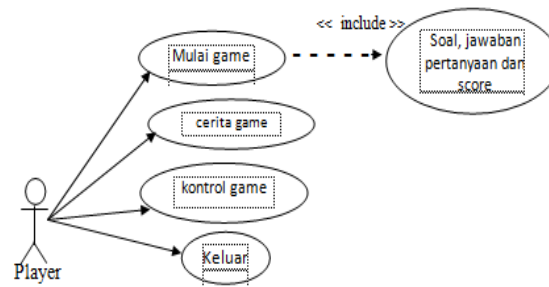
Moral message conveyed in this game are as children should be developed empathy from an early age, with this empathy child will be sensitive to the surrounding environment. A child who has a high empathy will care for about, like helping people in distress especially the elderly. Besides children must be smarter and smarter in order to succeed later in life and be happy parents.

**G. System Design**

The system design is the stage in the form of depiction, planning and manufacturing by integrating several separate elements into a unified whole to clarify the structure of the system.

1. *Use Case Diagram*

Use Case Diagram is a diagram viewed from the standpoint of the dynamic of the class and show how the system and class changes every time. Use case tells of system usage scenarios and each scenario outlining the sequence of events. For more details can be seen in the Figure. 3. below.

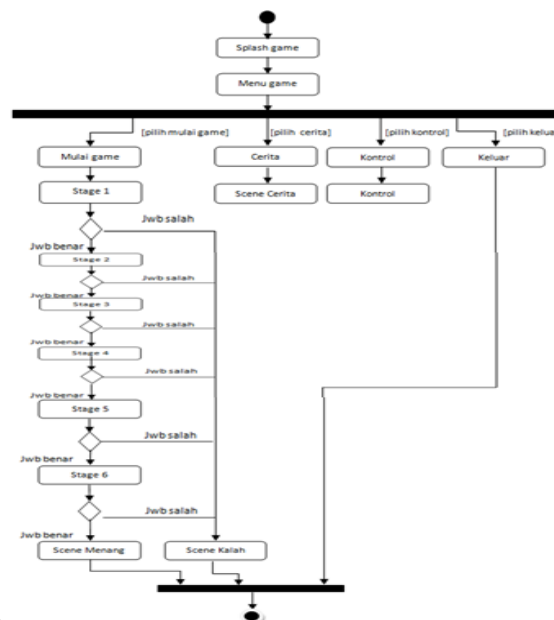


**Figure 3.** Use Case Diagram

When the user or player started playing there include the use case use case start the game with questions, answers and score. When the game is played, the use case questions, answers and the score will be called when the use case started to run the game. While the use case narrative, the user can read the game's story and mission that must be completed. In use case control game, the user can view the input controls that are used in the game, such as the control keyboard, and mouse. Last user exit provides functions to get out of the game.

2. *Activity Diagram*

This diagram illustrates the flow of activities in a system that is designed, namely how each flow starts, selection (decision) that may occur and how the end of the activity, for more details can be seen in Figure 4. Below



**Figure 4.** Activity Diagram

User activity begins with the opening game, then go to the game menu to see where the game menu, there are four options like start a game, a story, and out of control. When a user selects the menu button start the game, the user will move the scene to stage 1, if the user successfully answered correctly then it will move on to stage 2, if the answer is wrong then the user will move to the scene lost that displays information about the last value collected, on stage 6 or the last stage if the answer selected user is true then the user will move to scene winning, and back to the main menu by pressing the escape key and if the user answers one scene to scene will move loses.

Furthermore, the user can select the story that contains the scene menu introduction of the game's story, and the mission must be completed by the user. The menu button controls contain instructions scene input control on the game.



### 3. Desain *Interface Game*

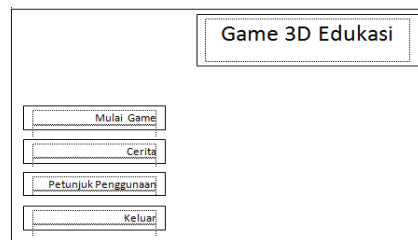
Interface design is design for software that focuses on the user experience and interaction. The purpose of User Interface Design is to make the user's interaction as simple and efficient as possible, in terms of achieving the goals of users. Good User Interface Design can provide the completion of work by hand without drawing unnecessary attention to itself.

The design process must be balanced between technical functionality and visual elements to create a system that not only operate but also can be used and adapted to the needs of users. For the design and manufacture using the game interface features provided in the unity that is Guiskin.

Guiskin there is a setting in the layout or interface position, background, and font. Below is a display interface design in 3D games Education.

### 4. Start Menu Design

Design the start menu is the design of interface design on the menu game In this scene will show the title game, the menu button start the game to start playing the game, the menu key stories to display the scene the game's story and mission, the menu button usage instructions to view the input controls that are used during play game, and exit the menu button to exit the game. The design of the initial menu design can be seen in Figure 5.



**Figure. 5.** Start Menu Design

### 5. Desain *Interface Game Play*

Play game design is the design of the interface while playing the game. There are interfaces score, matter, and life. Interface of the game play is made simple and clean so as not obstructing the user when searching for items or goods game missions.

### 6. Interface Design Lost

Scene losing to appear when users answered wrong twice or about the time runs out. In this scene featuring writing the game is over and the last value collected from answering questions. Instructions escape key to return to the main menu or the start menu is placed on the lower left side of the screen to inform the user if they want to repeat a new game or exit.

### 7. Interface Design Win

Won the same interface design interface design sengan lose. At the scene to see win featuring posts congratulations you succeed, the value obtained, as well as writings that contain instructions for the information if the user wants to go back to the main menu to start a new game or exit the game.

## IV. RESULTS AND DISCUSSION

### A. Implementation System

Implementation is an implementation or application of a system design that carefully drafted and detailed. To perform implementation activities will require three components: hardware, software and brain-ware. The function and details of three components to implement 3D game development system Education as follows:

#### 1. Software

In the manufacture of 3D games Educational there are two software that is used is Unity 3D Game Engine, MonoDevelove 2.4.2.

2. Hardware

Hardware used in making 3D games Education is one computer with processor specifications Intel (R) Core i3, at least 2 GB memory, 320 GB hard drive.

3. Brainware

Brainware is a user operating a computer. To conduct the implementation of these systems could be a programmer who is an expert in computer programming languages.

**B. Testing Systems**

System testing is done to see whether running game created in accordance with the system design. In testing the system will get information about the quality of the game with the aim to find a bug (error system) in the game. The following is an explanation and images from 3D games Education.

**C. Scene Splash Screen Game**

Scene splash game displays the name of the game development team and support in making the game. The splash screen of this game will disappear when the scene menu is game ready.

**D. The Game Menu Scene**

In the game there are four scene menu navigation buttons which have their respective functions: the start button game play, story, instructions for use, out. Display scene menu can be seen in Figure 6.



**Figure 6.** Scene Menu

The function menu button and the order of scenes in 3D games Education will be explained as follows:

a. Button Start Game

To start the game press the start button game that scene to scene select menu switch characters. Once a character is selected, then the scene will move to the character select scene stage 1. In stage 1 the player must find garden equipment grandfather who fell in the township of China. Items sought in stage 1 is a shovel. If the player can find a shovel and answer the questions correctly then the player can continue the game to a second stage, to help grandparents collect garden equipment. Display scene stage 1 can be seen in Figure 7.



**Figure 7.** Scene Stage

Scene game over will show if within  $2 \times 45$  seconds can not be answered or the player gives the wrong answer twice in one stage. Players can return to the main menu by pressing the escape key to repeat the game. Views over game scene can be seen in the figure. 8.



**Figure. 8** Scene Game Over

If the player can complete all the missions and deliver equipment to the home gardener grandfather, then the winning scene will appear. Views winning scene can be seen in Figure 9.



**Figure 9** Scene Win

b. Button Stories

Button serves to show the story scenes stories that contain explanations about the story and missions in the game are complete. See story scene can be seen in Figure 10.



**Figure 10** Scene Stories

c. Button Instructions for Use

At the hint button serves to display the scene using the control input on the game. See story scene can be seen in Figure 11.



**Figure 11.** Scene Instructions for Use



d. Exit button

If players want to get out of the game, the player can press the exit button that is on the menu.

#### E. Character Game

In the cast of characters consists of a female character models, male and grandfather.

#### F. Testing Game

Application testing is done to see if the game is running in accordance with the system design. By doing the test will make the game more perfect and assured that the game created is completely ready for use. Besides the testing of the application is intended to ascertain whether the application is eligible or not.

If there is a bug, it will soon be repaired, either the system or interface. Application testing is done on computers using Operating system Windows 7 32 bit dengan spesifikasi sebagai berikut: *Processor*: Intel Core i3, *Memory* : 2 GB, *VGA*: Intel HD family 3000

The specification above is recommended that the lowest standard games can run well that has been tested in advance. Here are the results of the test applications that run on Windows 7:

**Table 5.1 Table** Testing Results

No	Function	Results achieved
1	Button	Function
2	Figure	Good
3	Sound	Function
4	Text	Good
5	Graphic	Good

#### G. Field Testing

Field testing is testing conducted directly to the user by using a questionnaire on user responses to the game that has been built.

From 5 users who play the game, the entire user stated that 3D games education has good graphics, control buttons games can run well, agree that 3D games education have education, music on 3D gaming education function properly and agreed love games 3D education while 1 user does not like the game 3d education

#### V. CONCLUSION

Based on the analysis, design, implementation and discussion, it can be concluded that:

1. By using the Unity 3D game engine, Blender and Photoshop can be designed an educational game for unacceptable user / student.
2. The process of designing and making games is quite complicated, require special skills, especially in the field of modeling and animation characters.
3. Educational 3D games were made very pleasant, so as to attract students to learn.



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## TEACHING PHYSICS IN ENGINEERING FACULTY (REVIEW)

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**ABSTRACT :** This paper examine primary research and review articles published between 2010 until 2015 that focused on the issues teaching physics in engineering faculty. The literature was systematically reviewed, critically appraised and thematically analyzed. Data source from Online databases including ProQuest, Procedia, Energy Education Science and Technology (EEST)Part B , Journal of Education and Practice , TOJET: The Turkish Online Journal of Educational Technology , Informatics in Education,, European J of Physics Education , and Jurnal Pendidikan Fisika Indonesia and ScienceDirect and ERIC were used. The criteria used for selecting studies reviewed were : primary focus on TeachingPhysics application and issues on engineering faculty. Result review analysis of the 11 reviewed studies revealed the following three themes : issues relating models, methods and assesment teaching physics on engineering faculty.The review highlighted that some models can used to applied, like Integrative exploratory , problem based learning via online and classroom. Methods support was multimedia, applied physics with students skills, integrative computer simulations, critical thinking, and Mathematics Literacy Self-Efficacy to physics problems solving skills. Such assesment for effective of physics animationsand assesment to determine students' misconceptions.

**Key words :** Models, Methods and Assesment in Physics Learning

### I. INTRODUCTION

The main objectives of university education; give a good basic education, develop analysis, thinking, research and inquiry skills, generate ideas, develop teamwork and communication skills, thinking on a global level, be able to organize information in a particular field and develop the ability to solve problems in that area can be listed. The process of learning in College wants learning programs that have goals, steps and activities in a clear and systematic way. The role of the teacher as the lecturer's have not intervention, only as a facilitator. In the process of learning, students prefer to participate actively in their own learning activities.

Students are individuals who have the potential for independent study, either from written sources, the mass media or the environment. Lecturer more facilitating and creating a learning climate that is conducive to such potential so that it can develop optimally. Because the study in college student is considered adult so has the maturity in thinking and specify options in the learning process.

Engineering students enrolled in universities have strong mathematics and physics background primarily becauseengineering curriculum strongly depends on these two fundamental sciences. Many engineering core courses offeredare very intense in mathematics and fundamental physic sciences.

As Physics is a common course for all departments at engineering faculty, it has the same course content for all departments in which it is given. Mining department, civil engineering, machine engineering, and electrical engineering should have differences in the granting of material physics. Because the awarding examples specification to the skills expected of graduates. However, while lecturing, the instructor could provide examples related to that field, and may pose questions and prepare activities which establish links between the field and Physics. Learning about analytical thinking starts with learning Physics. That students should turn Physics into a way of thinking in order to find solutions to any kind of problems.

The explanations mostly pointed to the fact that the Physics education given at universities was the continuation of the Physics education they received at high schools. The students saw the Physics



instruction at university as a system based on memorization and problem solving, similar to high school instruction. Physics is lectured as a theoretical class and lacked practical work and physics instruction does not have a content related to their occupation (Zadeh & Satır, 2014).

Physics should be given more with the help of examples from everyday life besides mathematical data and theoretical lectures. Concepts of Physics should be supported with applied activities.

Engineering education should be based on a strong science and mathematics education. On the other hand, a well-trained engineer to issues outside their own discipline is often emphasized in familiarity. Engineering education should be designed according to this approach: equipped with basic knowledge and skills in the field of, analysis, synthesis, design capable, have acquired the habit of lifelong learning to educate individuals (İbrahim Güneş et al, 2015).

#### A. Fundamental Problems in Physics Education

Physics is the most fundamental science and it is a science which, as everyone knows, has deep philosophical implications. And it is not only an ordinary field of research but it has, by its ontological and epistemological aspects a compelling power today to thoroughly transform our intellectual life. Therefore, it is a necessity that we have to attach great importance to physics.

The students frequently complain is that they fail to understand physics. Indeed they do because it does not make sense to them at all. The instructors are often surprised by how their students seem to know so little mathematics despite successful performance in mathematics classes. The reason is that the symbols used in physics, unlike mathematics, are not arbitrarily chosen and thereby represent certain physical quantities and are loaded by certain physical meanings. It follows that physics students fail to attach the physical meanings to the symbols of equations and formulae. In other words, the problems of physics are not like those of mathematics and one cannot solve a physics problem like solving a purely mathematical one. Thus, a difficulty met in physics education is that the students are not capable of interpreting the symbols occurred in equations (Kabil O, 2015). According to them, a majority of teachers just concentrates on mathematical calculations rather than on actual scientific concepts and hence students cannot comprehend the meaning behind the formulae.

Physics is conveyed by the instructors as if it is full of mathematical formulae to be memorized. The students believe that physics is merely the totality of various abstract equations and formulae. That is why so many students, despite successful performance in mathematics, fail in physics classes and get disappointed. Since students perceive physics as consisting of certain abstract formulae they cannot identify the core information of a problem at all. It must be stated that science is not a repository of readymade information but is a vivid and ever growing activity.

For these reasons students also are not capable of comprehending the applicability of these formulae to reality due to isolated universe of mathematics to which they are introduced. Physics cannot be reduced only to the mathematical formalism as mentioned above. And each symbol used in a formula represents a physical concept and has a certain meaning. It is not only enough to define those concepts but the teacher must show the physical meaning underlies these concepts. The students need learn the physical concepts apart from their occurrence in purely mathematical formulations. Therefore physics education must improve students' conceptual understandings of physical terms. Instead of giving students only the content of physics, the instructors must focus on the logic of scientific discovery, in other words, on the

way that science works. Put it differently they need to undergo a process of scientific enculturation by means of which only a philosophical look can provide.

## B. AIMS

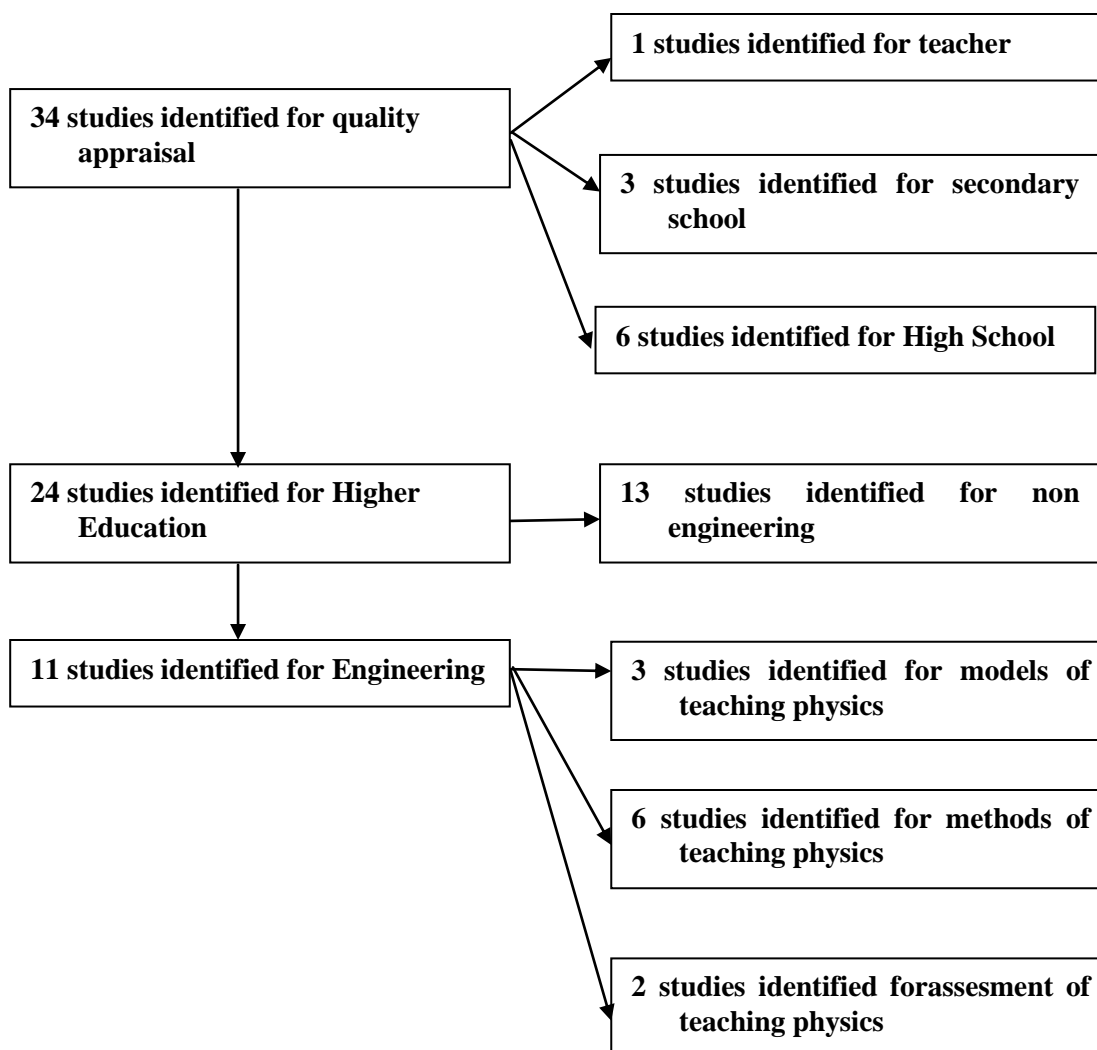
This research aims to study how models or methods of learning physics at the Faculty of engineering who has researched in the world. Whether learning physics had been loading in accordance with the learning skills of the students and how the assessment was done.

## II. METHODS

A systematic search of primary research literature was performed using a selection of electronic search tools over broad all about physics learning in engineering aculty. On line databases including ProQuest, Procedia, Energy Education Science and Technology (EEST) Part B , Journal of Education and Practice , TOJET: The Turkish Online Journal of Educational Technology , Informatics in Education,, *European J of Physics Education* , and Jurnal Pendidikan Fisika Indonesia and ScienceDirect and ERIC were used. The following keywords incorporating “Teaching Physics ” as part of the search were used : Teaching, Models, Strategy and Methods. Studies in languages other than English were not included in this review.

## III. RESULT

Initial search identified 65 studies for possible review. The title and abstract then were read to determine relevance; 31 studies were discarded as not being directly relevant to the review, leaving 34 for more detailed examination. See fig 1.



**Fig. 1.** Summary of search and appraisal process





## A. Study Location

The studies produced were located United States, Russia, Mexico, Malaysia, Indonesia, Thailand, Taiwan, Czech Republic, Spain, Kazakhstan, Italy, Tripoli, Slovakia, Canada, and Turkey.

## IV. JOURNAL ANALYSIS

### A. Models

1. Torres M. J et al (2013) used models The Integrative exploratory for exploring the teaching of Physics concepts with the solar water heater. 25 students in the Chapingo Autonomous University participated in manufacturing the prototype a solar water heater that uses CPC (Compound Parabolic Concentrator). The project will develop and evaluate a solar water heater that uses CPC (Compound Parabolic Concentrator), related to the concepts of physics through the worksheets that were designed previously.

The exploration of the learning process related to the concepts of physics, during the development of the project in each worksheet contains six elements: 1) The Problem, 2) The situation 3) The Experimentation 4) The prediction, 5) The Comparison, and 6) The Conclusion. The Integrative exploratory *worksheets* were analyzed with rubrics of control and these were assessed on the understanding of the concepts of energy and its transformation. Videos, photographs, tests, questionnaires, readings, instructions, links, feedback activities, exploratory integrative worksheets and other resources that are going to be incorporated. Four solar heaters were manufactured: from dimensioning, assembly and characterization. 20 integrative exploratory activities were applied in order to study physical concepts involved in the operation of the solar heater.

Overall, the findings revealed that there were compared by means of an analysis of the information gathered, were provided by the worksheets applied in order to evaluate the proposal., promote the development of a collaborative environment for learning physics at the precollege level and once the information is reviewed and analyzed, decisions can be made based on the proposal of learning for understanding.

The manufacturing of a prototype with educational applications enriches the study of Physics concepts, considering that the application in context means a higher level of comprehension and the different communication media (videos, photos, texts, animations and tests feedback) help the construction and transformation of conceptual representations that are necessary in the Physics teaching-learning process.

2. Sulaiman Faizah (2010) researched about PBL via online learning. The researcher prepared and organized the LMS followed the PBL (including the problem's design) approach to fulfilled the learning and teaching activities via online learning. There were 50 students who took part in the study. The students were separated into two main groups. One group formed the PBL group for SST (School of Science and Technology (N= 30) and the rest formed the PBL group for SESD (School of Education and Social Development) (N=20).

There were five problems need to be solved by each group. The students learned in collaborative groups of 4-5 students, and there were a total of 10 groups involved all together (6 group from SST and 4 groups from SESD). Students were engaged in variety of synchronous and asynchronous PBL learning activities, such as chat rooms; forum; sending and receiving e-mail from group members and facilitator; uploading their own materials to be used by other friends; downloading materials from the Internet; sending assignments and also get feed-back from facilitator. Since there were no fix times during the



learning process, they can choose their own flexible time to carry out all the activities by online. A facilitator guided the PBL groups cognitively in collaborative atmosphere all the way throughout the semester, in a very minimum direction.

The findings of this study the students gained benefits through this PBL approach. The findings come up with several themes focused on their communication skills improved, knowledge they able shared together, it help in to understanding concepts in Modern Physics/ Physics content knowledge. Whilst majority of science physics students agreed that they were able to apply skills in solving problems and being able to connect and build different ideas.

3. Jaedun (2010) was observed the students taking physics courses has a low learning activities; most students have a low learning motivation or lazy; students generally do not have the reference books and lecture notes; efforts to figure out less; and the ability of the students in the lecture material understanding and solving problems is generally lower. To improve student understanding and learning activities will be learning model Problem Based Learning. The subject of research is the Physics courses participants students on semester Special (short semester) held in 2010, which amounted to 40 students, consisting of 21 undergraduate students and 19 students D3.

Class action research (PTK). Steps Of PBL:a. Granting a brief orientation (preview) about the lecture material,b. the formation of the group,c. the granting of a problem or a question of the applicative,d. implementation of group discussion,e. solving in groups,f. Observation activities in the student discussion groups by the researchers,g. presented the results of the Working Group, 8) assessment of the performance of the Group.

Application of PBL learning model proved to be quite effective to improve the learning, both aspects of the process as well as product. Upgrade application physics concepts in the analysis of the structure of the building can be reached via:(1) the grant of questions done in practice to the Group;(2) the grant of questions on each group with a different but equivalent;(3) the grant guidance when students are having difficulty; (4) the repetition of the exercises.

## **B. Methods**

1. Mulop et al (2012) had review 15 published papers from 1993 to 2009 about methods on enhancing the teaching and learning of thermodynamics and two books about thermodynamics to solve problem about Students have misunderstanding or misconceptions about terms such as work, heat, internal energy, enthalpy, entropy, first law of thermodynamics and their use for concrete applications. To Enhancing the Teaching and Learning of Thermodynamics , lecturer use most of the methods developed use computer technology and multimedia to give interactivity and visualization. The methods do improved students' performance and developed skill among students.

2. Zadeh and Satir (2015) research about the objective of the present study is to inspect IPD (Industrial Product Design) education in Turkey in terms of its association with the main laws and concepts of applied Physics and the efficiency of its presentation as lectures. Instrument tool were survey to student on the content and instruction of applied physics and interview with Head of Department and instructor of physics. The findings were Physics should be given more with the help of examples from everyday life besides mathematical data and theoretical lectures, Concepts of Physics should be supported with applied activities, Instructors teaching Physics at IPD Department should be knowledgeable about design, its process, safer and more economical products, should teach the application of Physics by giving examples.



3. Krobthong (2015) was experimental researched that studied and compared the achievement of students who took the Fundamentals of Physics Course. They were designated in the treatment and control groups taught by the Interactive Science Simulations and by traditional methods, respectively. The treatment group's higher achievement in the Fundamentals of Physics Course when compared to the control group may be the evidence affirming that the use of Computer Simulations enhances the students' understanding of physics, especially the virtually invisible content. In addition to the tradition lectures, the instruction of physics should also include the experiments and demonstrations using proper learning materials.

4. Özsoy-Güneş et al (2015) were researched about the reflection of critical thinking dispositions on operational chemistry and physics problems solving of engineering faculty. Engineering faculty students in solving operational problems plays a crucial role in the educational process. Much of the problem solving is quantitative, involving formulae and the application of mathematics, and is a source of great difficulty for many students.

For research a three fold form has been created. In the first part personal data like the gender, department and graduated secondary school have been collected. Second part includes "The California Critical Thinking Disposition Inventory" (CCTDI-R) Third part includes Mathematics usage scale in Operational Chemistry and Physics Problems" (MUSOPCP) scale for define mathematics usage inclinations in operational chemistry and physics problems of students.

The students are conscious of Conceptual knowledge and Mathematics Knowledge Relation in Operational Physics and Chemistry but they have higher Mathematics anxiety than expected while solving operational Physics and Chemistry problems. Chemistry engineering students was found to be significantly higher scores in comparison with the students of Electric-Electronics Engineering and Chemistry Department. This situation shows the differences between methods and perspectives of those disciplines. For Analyticity and Inquisitiveness factors, critical thinking dispositions of students were found to be higher compared to other factors.

5. Gunes Ibrahim et al (2015) study about the connections between operational chemistry and physics problems solving skills and Mathematics Literacy Self-Efficacy of Engineering Faculty students. The sample of this study is formed by 214 senior students taking "General Chemistry" and "General Physics" course from departments of Chemistry, Chemical Engineering and Electrical-Electronics Engineering at Engineering Faculty.

Quantitative research method and relational screening model. For research a three fold form has been created. In the first part personal data like the gender, department and graduated secondary school have been collected. Second part includes Mathematics usage scale in Operational Chemistry and Physics Problems (MUSOPCP) scale for define mathematics usage inclinations in operational chemistry and physics problems of students. Third part includes Mathematical Literacy Self efficacy Scale (MLSS).

The findings students are conscious of Conceptual knowledge and Mathematics Knowledge Relation in Operational Physics and Chemistry but they have higher Mathematics anxiety than expected while solving operational Physics and Chemistry problems. There is no difference between the strategy preference of males and females and also between the students of Physics, Chemistry, Biology and Science Departments.

6. Hutem and Kerdmee (2013) study about Physics Learning Achievement Study Projectile, using Mathematica program of Faculty of Science and Technology Phetchabun Rajabhat University. Fifty



students of experiment group study projectile motion by using Mathematica program and fifty students of controlled group study projectile motion by using projectile motion experiment.

Get both experiment group and controlled group to take pre-test by using 30 items of achievement test. Let experiment group study projectile motion, using Mathematica program and controlled group study projectile motion, using projectile motion experiment set. Get both experiment group and controlled group to take 60 minutes post-test by using 30 items of achievement test.

This paper helps inform Students who use Mathematica program is higher than the achievement students studying projectile motion by using projectile motion experiment set.

### **C. Assesment**

1. Su and Yeh (2015) was done study dealt with effective assessments of physics animations to upgrade college students' learning performance. There were four major assessment tools in the data collection and analyses stages: namely, (a) pretests, (b) physics instruction of three integrated animation units (kinematics, arrangements and movements for the ray passing from medium V1 into medium V2, and conservation principle of mechanical energy), (c) posttests, and (d) a follow-up questionnaire. All tests with computer-based analyses were focused on three categories: knowledge, comprehension, and applications. The questionnaire included six aspects as the following descriptions:

(S1) Learning Attitude towards Integrated Physics Units

(S2) Learning Attitude towards Physics Instructors

(S3) Learning Attitude towards Integrated Physics Learning Environment

(S4) Learning Attitude towards Students' Interactions

(S5) Learning Attitude towards Self-evaluations

(S6) Learning Attitude towards Integrated Physics Learning Results

Three integrated physics units were conducted for effective learning assessments. These integrated physics units normally involved 3 hours of lecture demonstrations and 3 hours of laboratory hand-work each week. The lecture demonstrations programs were redesigned to be enriched with supplemental programs. The supplementary materials (such as animations and slides), lectures, and demonstrations all combined within an integrated learning environment in well-equipped facilities.

The integrated statistic results of three animation units in this study were well-organized and helpful for most college students' effective physics learning. It would significantly make a positive contribution to students' physics learning attitudes.

2. Yilmaz and Ince (2012) researched about distance education assessment to determine students' misconceptions in the electromagnetic field-magnetism contents and at the second stage, effects of video-based experiments on students' achievement were examined at distance physics course.

Students' misconceptions were determined using by alternative assessment techniques which are branched diagnostic trees, structured grid and concept map constructed and used as pre-test by researchers electromagnetic field-magnetism concepts. The prepared alternative assessment techniques' scores classified as correct (1 point), incorrect (0 points) and blank answer (0 points). Each of the answers was evaluated by the researchers and the scores were compared and discussed until an agreement was reached.

Then, 3 different experiment videos which are prepared by researchers were used to teach more detailed for each concept. After the video-based experiments, the alternative assessment techniques were conducted to students as post-test.



Students had 7 misconceptions about magnets, magnetic field, magnetic poles, charged particle in a magnetic field, magnetic field of a wire, magnetism properties of the matter, magnetic field effect of electric current concepts. In this study, alternative assessment techniques were used to determine students' concepts in detailed. After the determination of the misconceptions, 3 different experiment videos which are prepared by researchers were used to teach more detailed for each concept and alternative assessment techniques were conducted to students as post-test. The results showed that determined misconceptions were not seen as much as after the detailed video based instruction.

## V. CONCLUSION

The learning model used in this review was the PBL and Integrative exploratory, while still open research learning model to another. If we used PBL in the classroom, we must noted the condition of the Lecture Hall and seating cannot be arranged in free, the researcher must prepare equal questions as much as the amount of existing groups, the application of PBL learning model is quite time-consuming lecture.

As for the models, methods and assessment of learning physics for students in Faculty of engineering should be able to make students can implement in their respective expertise. Students majoring in mechanical engineering, mining engineering, electrical engineering and others, although have the same material physics but the sample must be adjusted in each skills.

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## LEARNING CYCLE: LEARNING MODEL FOR MECHANICAL ENGINEERING IN VOCATIONAL HIGH SCHOOL

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**ABSTRACT :** *One of problems that is faced by a vocational high school (SMK) graduates is the lack of vocational competence that expected by the industry. Although such considerable efforts undertaken by the government through the revision of the curriculum, but in reality there are many graduates of vocational school in mechanical engineering competence that have not been appropriate with the industry expectation. Besides, the role of teachers also determines the success of the learning process. Teachers are too dominant in the learning process, so the student's activity in the class is low. Very dominant behaviorist approach used by the teacher in the learning process, it is give the less provide opportunities for students to construct reviews for their own knowledge. To solve this problem, it takes a model and learning strategy that can enhance the vocational competence high school (SMK) students. The strategy is by developing the learning model for mechanics engineering in mechanical engineering of vocational programs based on learning cycle. This paper is the finding about learning development model for mechanics engineering in mechanical engineering program of vocational based learning cycle is performed at the first step. Activities undertaken in the first step are: (1) designing the learning device that includes: syllabus, lesson plan (RPP), teaching materials, and learning competency tests; (2) The expert validation; (3) small groups tests through the users validation (teachers and students).*

**Keywords:** Learning Cycle, Mechanical Engineering

### I. INTRODUCTION

Vocational High School (SMK) is known as an educational institution that is responsible for creating human resources who have the ability, skill and expertise. Thus, graduates can develop performance when entering the world of work. The purpose of vocational secondary education itself is to improve the ability of students to develop themselves in line with the development of science, technology and the arts, as well as preparing students to enter the workforce and develop a professional attitude.

So far, the reality shows that there is still a very rare graduate of vocational high technology skills, especially the skills to cope with life as people in the field of technology. Information about low competence of students can be seen from the number of vocational school graduates who do not work in accordance with their fields, even unemployment for vocational graduates that is still quite high.

Results of research by Abas Ghozali (2004)<sup>[1]</sup>, found that the proportion of competence in vocational education levels among produced by the school with the expectation by the industry / company. On knowledge and skills, institutions of Vocational High School (SMK) is already giving knowledge as high as 7.92 points, graduates / employees feel to have it as high as 7.22 points, the company considers a score of knowledge and skills of graduates / employees is 7.47 points, and industry / enterprise requires a level of knowledge and skills of graduates / employees is higher, at 8.11 points.

Low competencies that are felt by the industry / company felt the need for teaching design, especially regarding the strategy adopted in the learning program productive, such as on Basic Mechanics for Mechanical Engineering Program at SMK. One of the strategies that are offered in this study was based learning approach learning cycle supported constructivist learning theory. Based learning approach learning cycle can be seen as one approach to creating a learning environment that can encourage students to build knowledge and personal skills.

Why using a learning cycle, it should be emphasized, because according to the learning theories of Piaget, based constructivism learning theory, which states that learning is the development of the



cognitive aspects include: structure, content, and functionality. Implementation of Piaget's theory by Karplus developed into the exploration phase, introduction of the concept and application of concepts. The elements of learning theory of Piaget (assimilation, accommodation, and organization) have correspondence with the phases in the learning cycle (Abraham et al, 1986)<sup>[2]</sup>.

Although the phases of the learning cycle can be explained by the Piaget theory, learning cycle is also basically born of constructivism learning the other is the theory of social constructivism of Vygotsky. Learning cycle is done through each phase of activity in which facilitate students to actively construct their own concepts by interacting with the physical and social environment. According to Herman Hudoyo (2001)<sup>[7]</sup>, implementation of the learning cycle of learning that correspond with the views constructivist, namely: (1) students learn actively, learn the material significantly by working and thinking, and knowledge are constructed from the experience of students, (2) new information associated with scheme that has been owned by the students, new information of the students come from individual interpretations, (3) learning orientation is the investigation and discovery that is solving the problem.

Thus, the learning process is no longer merely a transfer of knowledge from teacher to student, as in the philosophy of behaviorism, but it is a derivation process-oriented concept of student involvement actively and directly. The learning process will thus be more meaningful and make the scheme self-learners become functional knowledge that at any moment can be organized by the learners to solve the problems faced.

Meanwhile, the results of research in universities and secondary schools on the implementation of learning cycle in the science learning demonstrates the success of this model in improving the quality of processes and student learning outcomes (Budiasih and Widarti, 2004)<sup>[5]</sup>. Students whose teachers have the skills to implement learning cycle explain better than students of teachers who apply the expository method.

Learning cycle is a surefire strategy for teaching science in secondary schools because it can be done flexibly and meet the real needs of teachers and students. Judging from the dimensions of teacher implementation of this strategy broaden horizons and increase teachers' creativity in designing learning activities. While looking at the dimensions of the students, the implementation of this strategy gives the following advantages: (1) increase learning motivation because learners are actively involved in the learning process, (2) help learners develop a scientific attitude, (3) learning becomes more meaningful.

Learning cycle is a model of student-centered learning. The model was developed by Robert Karplus in the 1970s. Learning cycle is a series of stages of activities (phase) is organized such that students can master the competencies that must be achieved in learning with the active role. At first, this model has three phases, namely exploration, invention, and discovery. The term was later turned into exploration, introduction of the concept, application of the concept. Although it has different terms, but the purpose and the meaning is the same (Rahayu, 2002)<sup>[13]</sup>. Then education experts to develop the stages in the learning cycle to 4 phases up to 7 phases.

As a constructivist-oriented learning model, learning cycle places the students as the primary focus in the learning activities. Through its phases, students are given the opportunity to actively and continuously build their own knowledge, both personally and socially, so it always changes the concept leading to the concept of a more detailed, complete, and in accordance with the scientific concept. The use of learning cycle can realize regularity in the learning process so that students easily understand a concept as well as more mengatifkan students.



Learning cycle first was developed by three phases: exploration, development concept, and the concept application. Then Lorscheid (2002)<sup>[8]</sup> developed into five phases: engage, explore, explain, extend, and Evaluate. (1) Engage (invite), interest and curiosity (curiosity) students about the topics that will be taught trying resurrected. In this phase, students are also invited to make predictions about the phenomenon to be studied and proven in the exploration stage; (2) explore, students are given the opportunity to work together in small groups without direct instruction from the teacher to test the predictions, perform and record observations and ideas through activities such as lab and literature review; (3) explain, teachers should encourage students to explain concepts in their own words, ask for evidence and clarification of their explanations, and directing the discussion. At this stage the students find the terms of the concepts learned; (4) Extend (developing), the students apply the concepts and skills in new situations through activities such as advanced practicum and problem solving; and (5) evaluate, the evaluation of the effectiveness of the previous phases and also evaluation of the knowledge, understanding concepts or competence of students through problem solving in a new context which sometimes encourages students to investigate further.

Based on the stages in a cyclical learning method as described above, students are expected not only to hear the statements of teachers but it can play an active role to explore and enrich their understanding of the concepts learned. Based on the above, learning the learning cycle can be implemented in the areas of science and social.

## **II. METHOD**

This research method refers to research and development (R & D) from Borg and Gall (1983)<sup>[4]</sup> that has been modified. The targets are: (1) models and learning tools for Mechanic Engineering for Mechanics Engineering Program at SMK based on learning cycle; and (2) determine the feasibility of learning tools for Mechanical Engineering. Research steps that will be implemented are: a preliminary study and program design, product development early drafts, expert testing, user testing, product revision. The subjects were expert to assess learning software products for Mechanical Engineering. Data collected by assessment by experts' feasibility assessment instruments learning device products for Mechanical Engineering. The purpose of expert test is to get input while eliminating error learning model developed. The data collected in this phase such as: (1) clarity, whether the message is clear instructional materials; (2) the impact, whether the impact of learning materials on the progress of the performance of students and the extent to which learning objectives are achieved; and (3) the feasibility, how decent the developed learning materials as a learning resource. Small group trial was intended to obtain information on: (1) whether the content more interesting field of study; (2) whether the quality of the task able to build knowledge in a more meaningful; (3) whether sufficient quantity of exercises; and (4) how the learning objectives achieved. Data obtained from assessment and feedback by experts, teachers and students on the feasibility study model for Mechanical expertise at SMK then analyzed with descriptive analysis, by calculating the percentage and mean. Descriptive analysis technique is also used to analyze the data for the implementation of learning model that obtained through questionnaires, observation, and interviews.

## **III. FINDINGS AND DISCUSSION**

Based on the results of data analysis feedback / assessment syllabus and lesson plan generated the following matters: (1) the syllabus and lesson plan are according to expert assessment of learning technology components that were assessed: (a) the identity of the subjects rated 4, (b) the basic competencies and indicators of learning outcomes assessed 4, (c) material, media and learning resources





rated 3.66, (d) the activity of learners in the learning assessed 3.66, (e) the activities of teachers in teaching was rated 4, and (f) in the assessment of lesson plan is rated 4; and (2) based on the feedback / assessment components contained in the syllabus and lesson plan as a whole can be said to be very precise, very appropriate, very clear, and very suitable for use in the development of learning model for Mechanics Engineering in SMK. Only a few components that needs improvement is the school's identity has not appeared identity of the school, the use of instructional media is not yet clear, and the role of learners in learning a lesser role as a subject in the study.

The results of data analysis feedback / ratings contents of engineering mechanics teaching materials produced following matters: (1) Eligibility contents of teaching materials is evidenced from the Engineering Mechanics expert assessment of the contents of the components that are assessed: (a) the cover rated 3.66, (b ) destination rated 3.66, (c) material rated 3.75, (d) exercise was rated 4, (e) the key answers rated 3.75, and (f) a list of references rated 3.75; and (2) Based on the feedback / assessment components contained in teaching materials as a whole can be said to be very precise, very appropriate, very clear, and very suitable for use in the development of learning models of Engineering Mechanics in SMK. Only a few components that need improvement is on several symbols, images need revision, reference standards and basic competencies need to be included, and the lay-out placement suggestions competence standard, basic competence, and destination should not be fused with the material.

The results of data analysis feedback / assessment syllabus and lesson plan that was carried out by the teacher produced the following matters: (1) eligibility of syllabus and lesson plan can be seen from the teachers' assessment that the components are assessed: (a) the identity of the subjects rated 3, 75, (b) basic competencies and indicators of learning outcomes assessed 4, (c) material, media and learning resources assessed 3, (d) the activity of learners in the learning assessed 3, (e) the activities of teachers in teaching was rated 3, and ( f) learning assessment rated 3.25; and (2) based on the feedback / assessment components contained in the syllabus and lesson plan as a whole can be said to be very precise, very appropriate, very clear, and very suitable for use in the development of learning models of Engineering Mechanics in SMK. Only a few components that need improvement: the use of learning media has not been close to the environment of the learners, and affective aspects votes yet visible.

The results of data analysis and the feasibility of teaching materials considered / addressed by the teacher produced the following matters: (1) contents eligibility of teaching materials can beseen from the teachers' assessment from the assessed components: (a) the cover was rated 4, (b) the purpose rated 4, (c) material rated 3.87, (d) exercise was rated 3, (e) the key answer was rated 3, and (f) a list of references rated 3; and (2) based on the feedback / assessment components contained in teaching materials as a whole can be said to be very precise, very appropriate, very clear, and very suitable for use in the development of learning models. Only a few components contained in teaching materials as a whole can be said to have been appropriate, clear, and appropriate for use in the development of learning models for Mechanics Engineering in SMK. Only a few components need improvement that is the learning objectives, materials (symbols, pictures) and a few typo words.

The results of data analysis feedback / ratings contents of teaching materials mechanics technique performed by the students produced the following matters: contents feasibility of teaching materials can be seen from the assessment of learners that of the components assessed: (a) the cover design rated 3.6, ( b) the clarity of the instructions at the beginning of the chapter rated 2.8, (c) the size and typeface in teaching materials rated 3, (d) a level of clarity 3.2, (e) the clarity of exposure to the material in each



chapter was rated 3, (f) the suitability of the picture with the material in the teaching materials rated 3.6, (g) examples of problems can help understand the material was rated 3, (i) where the learning objectives at the beginning of each chapter section 3.2, (j) the clarity of the sentence in about- exercises rated 3, (k) the clarity of formulas can help understand the material rated 3.4, (l) about the teaching materials can help improve understanding of the material rated 3.2, (m) the answer key can help to solve problems assessed 2.8, (n) teaching materials easier to understand the material rated 3, (o) the use of language makes it easy to understand the contents of the materials rated 3.4, (p) draw attention to the illustrations 3.4, (q) the entire contents attract attention 3.2, (r) material to motivate students to learn 3.6.

Lesson plan and teaching materials for mechanics engineering by expert instructional technology, expert content, teachers and learners are feasible for use in vocational using learning model learning cycle. Students using learning model learning cycle will perform an active role in the learning activities.

Researchers also can be very interes with the learning cycle as a learning model of science and technology. Learning cycle is a form of constructive process that can facilitate the conversion of conception and construction process knowledge. Studies Abraham & Renner (1986)<sup>21</sup> in chemistry teaching in high school is done by developing a learning cycle in three stages: exploration, the introduction of the concept. Through three stages, learning scientific concepts takes place as a whole, so that the process of validation of the concept and construction of knowledge takes place the better. Scharmann (1992)<sup>[10]</sup> also provides the rationale for using the learning cycle as a learning strategy. He put pressure on the need to think about the exploration stage of the learning cycle as activity manipulation is not "hands-on" only, but includes the "minds-on" that provides cognitive experience in forms such as analogy, statements of opinion, taking decisions, and analyzes the situational context.

Learning cycle model that will be developed in this study rests on the main root, namely exploration - discovery concept - extension of the concept, which in the various phases of the learning cycle developed important issues relating to the meaningfulness of knowledge, identification of concepts or ideas were supports the idea that the meaningfulness of knowledge, and identification of extension activities concepts or ideas, or knowledge. Through this learning cycle, students in the cognitive negotiations ongoing intensive development of the concept, so that more careful in constructing knowledge.

Learning cycle as a method of teaching science is consistent with modern learning theories about how students learn. The learning cycle consists of three phases, namely the exploration, invention and expansion. In the exploration phase students are given the opportunity to work together without any direction from the teacher. Teachers only serve as facilitators who are helping students to frame questions through observation and administration questions. Along with learning theories of Piaget, this phase is a phase of disequilibrium. In this phase, students had the opportunity to test the predictions and hypotheses, try alternatives and discuss with the group of their friends, record their observations and ideas and make decisions.

In the invention phase, teachers invite students to: (1) explain the concept of using their own language, (2) looking for evidence and clarify the explanation, (3) listen critically opinion group of their friends and teachers. Therefore, in this phase, students must make observations and record their explanations. In this phase, the teacher should use the definitions and explanations based on knowledge or experience of students as a basis of discussion.



In the expansion phase, the students apply the concepts and skills of thinking in new situations that are similar and use the definitions and formal label. In this phase also, the students apply the information obtained beforehand, to ask questions, express exit, make a decision, conducting experiments and record the results of observation.

The term learning outcome is identical with the acquisition of learning refers to a student's mastery of the teaching objectives that have been set. Viewed from a psychological dimension, mainly refers to the opinion of Gagne (1995)<sup>[6]</sup>, learning outcomes can dipisahkan into the dimension (1) verbal information, (2) intellectual ability, (3) cognitive strategies, (4) attitudes, and (5) motor skills.

Mechanic engineering is a basic subject in vocational skills program that contains key concepts that are important / essential competency that supports working as a technician. Judging from the psychological dimensions associated with the opinion of Gagne (1995)<sup>[6]</sup> above, the mechanics of this technique, including the dimensions of intellectual abilities. Therefore, several sub-dimensions include (1) discrimination, (2) the concept of concrete, (3) the concept of a well-defined, and (4) rules. In more detail can be explained, that of the four sub-dimensions mentioned above, automotive vocational training eye contains all the components. Thus, not only at the lowest level, but this field up to the highest levels of rules, in accordance with the development of vocational students. Thus, the automotive vocational learning outcome is the acquisition of learning, which is characterized by the mastery of students to the machining of vocational teaching purposes. The results of this study are included in the dimensions of intellectual abilities, competence in engineering.

Research conducted by Kurnia (2010)<sup>[9]</sup>, concluded the applicability of the concept of junior high school students from the seventh grade does not differ significantly between groups of delivery strategy learning cycles using different media (SB-hypermedia and SB-Nonhypermedia), and group learning styles dimensional verbal-visual. Research conducted by Setia Relly (2012)<sup>[11]</sup>, summed up the learning cycle model-aided learning mind mapping technique is more effective than conventional learning to mastery of concepts of physics to students who have lower science process skills. Research conducted by Suprata (2006)<sup>[12]</sup>, summed up the effect of the method of learning (learning cycle vs. conventional) competence and motivation for learning outcomes on biology student for the first grade students of SMPN Wajo Dompnu.

Learning cycle has several advantages, both teachers and students. The advantage for teachers is more encouraging teachers broaden their horizons and be more creative in planning learning activities. While the advantages for students: (1) increase the motivation of learning because students are given the opportunity to be actively involved in learning; (2) help develop a scientific attitude and process skills in students; and (3) the learning more meaningful for students directly experience the process of acquiring the concept and understand its application in everyday life.

Learning cycle should put forward, because according to the learning theories of Piaget (Renner et al, 1988)<sup>[14]</sup>, based constructivism learning theory. Piaget stated that learning is the development of cognitive aspects includeS: structure, content, and functionality.

Intellectual structure is mental organizations, high level of the individual to solve problems. The contents are the typical behavior of individuals in responding to the problems encountered. Meanwhile, the function is a process that includes the intellectual development and organizational adaptation (Arifin, 1995)<sup>[3]</sup>. Adaptation consists of assimilation and accommodation. In the process of assimilation of



individuals using existing cognitive structure to respond to stimuli it receives. In the assimilation of individuals interact with data in the environment to be processed in the mental structure.

In this process an individual's mental structure may change, resulting in accommodation. In this condition the individual performing the modification of the existing structure, resulting in the development of mental structures. Acquiring new concept will have an impact on the concept that has been owned by individuals. Individuals must be able to connect new concepts learned with other concepts in a relationship between concepts. The new concept should be organized with other concepts that have been owned. Good organization of intellectual person will be reflected in the response given in dealing with problems. Karplus and Their (the Renner et al, 1988)[14] develop learning strategies in accordance with the idea of Piaget above.

In this case, the student is given the opportunity to assimilate information by exploring the environment, accommodate information by developing concepts, organize information and connect new concepts with the use or extending the concept held to explain a different phenomenon. Implementation of Piaget's theory by Karplus developed into the exploration phase, introduction of the concept and the concept. The elements of learning theory by Piaget (assimilation, accommodation, and organization) have correspondence with the phases in the learning cycle (Abraham & Renner, 1986)<sup>[2]</sup>.

#### **IV. CONCLUSION**

This research resulted in products such as learning devices for Mechanical Engineering Program which includes: syllabus, lesson plan (RPP), and teaching materials that have been validated by learning experts, subject material experts, and teachers. From the results of the validation, the learning tool for mechanical engineering is feasible to be used for learning cycle model in vocational high school.



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## OPTIMIZING FASHION LABORATORY MANAGEMENT IN EFFORTS TO IMPROVE GRADUATES' QUALITY

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**ABSTRACT :** *In instructional context, laboratory serves to provide students with particular skills and specific, hand-on experience. Learning conducted in laboratory is a type of structured experiential learning in accordance with the applicable curriculum. Laboratory management includes several aspects: planning, organization, administration, security, care and supervision, and by considering occupational safety and health. Fashion laboratory management is a strategy to achieve the objectives of educational laboratory utilization through planning, organizing, driving, and supervising all resources in a fashion laboratory to create efficient, effective, and optimal learning process. It in turn improves the quality of graduates who are professional in the field of fashion.*

**Keywords:** *optimizing, fashion laboratory management*

### I. INTRODUCTION

Graduates quality is indispensable from how instructional process is executed, which is dependent to a number of factors such as curriculum, teaching staff, learning activities, and facilities and infrastructures. When facilities and infrastructures are adequate, one can expect that education and training will result in quality graduates. One of the critical facilities in the instructional process is educational laboratory. By having laboratory practices, learners will be able to understand and get insights and skills relevant to their field.

In instructional context, laboratory serves to provide students with particular skills and specific, hand-on experience. Learning conducted in laboratory is a type of structured experiential learning in accordance with the applicable curriculum (Sonhadji<sup>8</sup>, 2002: 9). Similarly, Sumarjo<sup>10</sup> (2006:2) states that workshop is a learning support facility which enables learners to gain insights and skills, as well as to innovate in their specific fields of expertise necessary for carrying out field jobs. In laboratories – including workshops and studios, known also as *general shop training station* – tests, research, and job practices are carried out.

Management is driving human and financial resources, equipment, facilities, and/or any physical object in an effective and efficient way to achieve a set of objectives and goals optimally. In laboratory context, the management includes a number of aspects: planning, organization, administration, security, care, and supervision (Rumbinah<sup>7</sup>).

Currently, departments and study programs have some variations: one department oversees several study programs, and one department offers several majors. Fashion is a study program which is aimed at equipping students with insights, understanding, and skills in the field of fashion, so that they will be able to work in the field professionally after graduating.

Fashion laboratory management is a strategy to achieve the objectives of educational laboratory utilization through planning, organizing, driving, and supervising all resources in a fashion laboratory to create efficient, effective, and optimal learning process to produce graduates who are professional in the field of fashion.

Workshop management includes (1) learning program management and (2) laboratory governance consisting the management of its (a) organization, (b) human resources, (c) equipment and material control, (d) technician duties, (e) occupational safety and health, and (f) graduate quality.



## II. DISCUSSION

### A. Management of Learning Program

#### 1. Analysis on the Setting of Laboratory Competences

Analysis on the setting of laboratory competences include several aspects as below.

##### a) Types of Competence

“Competence is individual capacity in doing work, covering aspects of knowledge, skills, and behaviors appropriate with the established standards” (Law No. 13/2003<sup>11)</sup> on Labor article 1.10). There are five dimensions of competence: (1) task skills – ability to perform task by task, (2) task management skills – ability to manage different tasks within a job, (3) contingency management skills – ability to respond to anomalies or breakdowns in work routine, (4) environment skills/job role – ability to assume responsibility for and expectation from work environment/ability to adapt to environment, and (5) transfer skills – ability to transfer mastered competence to different situations (new situations/places).

In laboratory, students will be trained with several competences related to fashion. To accommodate the activities, different laboratories are needed, such as production lab, industrial lab, design lab, and female cloth draping lab.

##### b) Origin of Competence

Competence in the field of fashion is derived from the demands of business/industrial worlds, both small scale (dress makers, boutiques, tailoring, and *sangga busana*) and large scale (garment industry).

##### c) Formulation of Competence

Formulation of competence covers competence standards, basic competences, learning material essentials, and competence analysis: breaking down cluster analysis.

Table 1 below displays example of competence standards and basic competences of female cloth draping.

**Table 1.** Competence Standard

Competence Standard	Basic Competence
To have knowledge and are skillful in creating cloth draping, drapery draping, and applying draping pattern to gown	a. Cloth draping b. Technique of cloth draping c. Technique of drapery draping d. Draping pattern application to gown

##### d) Equipment and Material Needs

Equipment and material needs are determined based on: (a) types of practice equipment needed, (b) number of students or student groups, (c) time allocation to gain competence, (d) time allocation (in hour) for tools operated, and (e) tool functions (efficiency) (Sumarjo<sup>10)</sup>, 2006:2).

#### 2. Analysis on Laboratory Learning Process

##### a) Formulation of Objective

The first step necessary in laboratory learning is setting objectives, ones that are related to fashion. Setting learning objectives is one of critical tasks teachers should do in managing learning process. Within the framework of the national education policy, as stipulated in Minister of National Education’s regulation No. 52 Year 2008 on Standards of Process, setting of learning objectives is aimed at providing instructions in selecting subject contents, arranging topic sequence, allocating time, selecting

instructional tools and teaching procedures, as well as providing measurement (standard) in assessing students' achievement.

There are several benefits in formulating learning objectives, both for teachers and students. Nana Syaodih Sukmadinata, 2002 (in Sudrajat<sup>9</sup>, 2009) identifies four benefits, they are: 1) helping teachers in communicating instructional goals to students, so that they have more independent learning behaviors, 2) helping teachers in selecting and arranging teaching materials, 3) helping teachers in determining learning activities and learning media, and 4) helping teachers in conducting assessment.

b) Learning Approach

Learning approach is a starting point by which learning process is viewed, referring to how the process in general occurs. It covers, inspires, and strengthens particular theoretical scopes. Learning approach used in improving competences in creating female cloth draping is *student centered approach*.

c) Learning Materials

Learning materials include all materials to be presented in accordance with the learning objectives. They are a set of subjects systematically arranged so that students can find environments and conditions which enable them to learn. Learning materials can at least be classified into four groups: printed, audio, audio-visual, and interactive materials.

Learning materials are designed to help students learn something, to provide students with different types of materials to choose from, to help teacher in carrying out learning process, and to create interesting learning activities.

d) Learning Methods

Learning methods refer to how established plans are implemented in the forms of real and practical activities to achieve learning objectives. Teachers need to master various teaching methods because learners' success in learning process is highly dependent on the right methods used by the teacher (kriptk.blogspot.com<sup>5</sup>).

Learning methods used in improving draping competence are 1) lectures, 2) demos, 3) discussions, 4) simulations, and 5) assignments.

e) Learning Media

Media have multiple meanings both in limited and extended contexts. Media refers to every object that can be manipulated, seen, heard, read, or discussed, as well instruments used in learning activities. Media is learning resource to stimulate students learning.

Some people differentiate media from displays, but some use the two terms interchangeably. Media and displays are only different in their functions, not in their true meanings. *Displays* function as learning aids only; *media* functions as an integral part of the whole learning process and implies a kind of division of responsibility between teacher in one hand and other resource (media) on the other.

Media in narrower sense is learning aids. They are used to aid teacher in motivating students, clarifying information/teaching messages, emphasizing important parts, giving teaching variations, and clarifying teaching structures.

Studies show that instructional activities will be more effective and easier if visual media are used. The effectiveness of teaching aided by visual media reaches 83%, compared to 11% when audio is the only media used. In addition, studies suggest that people can remember 50% of what they see and hear, and 20% of what they hear only (Mustolih<sup>4</sup>, 007).



## B. Types of Media

There are many kinds of media. Some can only be used when there is a teacher, tutor, or guide. Some are not teacher-dependent and commonly called *self-contained* instructional media, meaning that learning information, examples, tasks, exercises, and feedback have been programmed in an integrated manner.

Based on the types, learning media can be classified into (a) audio media: radios, disks, audio tapes, tape recorders, and telephones; (b) visual media: photos, books, encyclopedias, magazines, newspapers, reference books and other printed materials, pictures, illustrations, scrap-books, slides, filmstrips, transparencies, microfiches, overhead projector slides, graphs, charts, diagrams, sketches, posters, cartoons, maps, globes, and films; (c) audio-visual media: televisions, computers, slides with audio, filmstrips with audio, audio books, video CDs; and (d) other media: boards and displays, 3D media, and dramatization technique media.

### 1. Learning Cycles

Learning cycles for competences in the field of fashion include introduction, verbal cognitive stage, motor stage, autonomous stage, and test. Table 2 below summarized the cycle.

**Table 2.** Example of Learning Cycle

Cycle	Activity
Introduction	Showing off
Verbal Cognitive Stage	Demonstration
Motor Stage	Students mimicking
Autonomous Stage	Repetition
Test	At workshops

## C. Laboratory Governance

Governancerefers to coordinating all resources through the process of planning, organizing, workforce assignment, coaching, and monitoring to achieve established objectives. The principles of management laboratory are efficient, supportive, maintained, ready-to-use, orderly, healthy, and safe.

### 1. Planning

Planning is the first step in any activity, including laboratory management. Planning is a process of thinking systematically, analytically, and logically about an activity to be performed, steps, methods, human resource, manpower, and funds necessary to achieve established objectives in an effective and efficient manner.

### 2. Human Resource

Human resource is one of important aspects in management with regards to implementing activities to achieve established goals. Human resource management concerns with utilizing, developing, assessing, giving rewards, and nurturing both individual organization members and worker groups (Admin<sup>2</sup>), 2009).

Human resource management is a science focusing on the study of humans with all of their activities. Human becomes very important, as capital, methods, and even technology will be useless if there is no quality human resource behind them. It thus can be said that human is the key to determining an organization success.



In the context of this study, human resource refers to people in charge of the laboratory (teaching staff). An educational laboratory requires people capable of managing all aspects of the lab, both technical (facilities, equipment, tools) and non-technical (man-power).

### 3. Organization

In general, a laboratory requires the following organizations.

1) **Work Structure:** Work structure is the arrangement of components (working units) within an organization. Work structure shows division of work that illustrates how different functions or activities are integrated (coordinated). In addition, work structure also shows work specializations, chain of commands, and reporting line (Ramandika, 2009).

2) **Work Mechanism:** Work mechanism refers to steps in carrying out tasks and functions, as well as action plan managers/persons-in-charge need to execute.

3) **Division of Work:** Division of work in an organization must closely follow the principles of coordination indicating interrelation between elements in achieving the objectives.

### 4. Laboratory Administration

Laboratory administration refers to a process by which laboratory facilities and activities are recorded. Proper administration ensures that all lab facilities and activities are systematically recorded.

The following assets need to be recorded in laboratory administration: lists of equipment, organization structure, rules and regulations, activity schedules, reports of equipment and machine maintenance/repairs, equipment SOP, stock cards, lists of equipment and materials in accordance with worksheets (LKS), labels, equipment request/lending forms, biannual activity plans, activity daily logs, and repair cards.

There are two types of laboratory administrations: (1) material administration, including lists of material requests, purchase of materials, material inventory book, material utilization book, lists of residues, and (2) equipment administration, including lists of tool sets and equipment and material mechanisms.

### 5. Equipment and Material Ordering

Equipment and material ordering refers to the process of arranging lab equipment and materials so that they are in a good orderly fashion. Ordering is closely related with orderliness in safe-keeping and easiness in maintaining assets. Before ordering, the following needs to be discovered: equipment and their functions, material properties, equipment quality including their sophistication, precision, price, quality, and scarcity, basic materials composing the equipment, and form, size, and weight of the equipment.

### 6. Laboratory Layout Management

According to Strom (in Sonhadji<sup>8</sup>), 2002:15), laboratory layout refers to floor setting by taking into account specifications of rooms, windows, doors, and traffic. It also covers rooms for tools and equipment, warehouse, and instructor/technician.

A number of working conditions need to be considered in planning laboratory layout, including lightning and air circulation, cleanliness, and efficiency and completeness of workshop facilities. Equipment should be able to support all kinds of jobs, and be subject to short, mid, and long-term maintenance and reparations.

Room dimension must be suitable with activities carried out inside. As a minimum requirement, there should be a space of 2.5 m<sup>2</sup> per student, windows allowing sunlight on both sides of the walls,



natural ventilation, permanent tables, drawers underneath the tables, and two main doors which are wide enough. Other infrastructures such as electricity, water, gas, and lights must always be present.

## **7. Production Facility Layouts**

In general, there are three types of production facility layouts: (1) production line layout, (2) process layout, and (3) fixed position layout (Adi<sup>1</sup>).

### **1) Production Line Layout**

In production line layout, machines and other production facilities are set based on "machine after machine" principles, regardless the types used. Using this layout, all facilities to carry out production process (manufacturing and assembly) will be set in accordance with the flow lines of a given product. Several product flow lines are commonly used: *straight line*, *U-shaped line*, *L-shaped line*, *S-shaped line*, and *O-shaped line*. Product is handled based on production line, from start to finish in one department without moving equipment or materials. All facilities required for production activity must be put in one department.

The advantage of using this layout is material handling cost can be minimized as material movements happen based on the shortest distance. Total time used for production process is relatively short. Work-in process storage is hardly needed because production tracks have been balanced and output from one process will be fed as input for the next. This layout can also minimize operator cost, as there is no need to use highly skilled operators. Space requirement for every production unit or work station is minimum, because there is no need for work-in process storage. Production planning and control can be executed easily.

The downside of this layout is breaking down in one machine will stop the whole production line, which may not be transferred to other production line. Because the layout is set based on type of product to be made, change in product design will cause overhaul to production line or its layout. Production process speed or cycle is determined by the slowest machine process, resulting in high machine investment (special purpose machine).

### **2) Process Layout**

Process layout, also known as functional layout, is the methods of arranging and placing machines and production facilities based on similarities of types. Using this layout, all machines and production facilities sharing common characteristics or job functions will be placed in one department. Process layout is commonly used in industries with relatively low production volume and unstandardized product types. Process layout is more flexible than production line layout. Industries working based on job order will be greatly helped with this type of layout.

The advantage of using process layout is low total investment. Machine breakdown will be easier to handle, so is supervision activity. This layout also allows for activity diversification. The disadvantage is much longer production line, resulting in higher material handling cost. Total production time is longer and highly skilled operators are needed. Production planning and control are more complex and require rigorous analysis.

### **3) Fixed Position Layout**

In this layout, materials and main production components stay in fixed locations, while other production elements such as tools, machines, personnel, and other smaller components move towards where the materials and main production components are located.



## **8. Equipment and Material Controls**

“Equipment and material controls cover the methods of storing, distributing, controlling, and recording” (Strom, in Sonhadji<sup>8)</sup>, 2002:16). Equipment and materials can be stored in specialized room, on shelves, in tool boxes, or other places with keys. Points to consider in placing and storing equipment are as follows: place frequently used equipment and materials in accessible places, and place portable equipment and instruments frequently assigned to students at the beginning of a session to avoid interruption.

According to Sonhadji<sup>8)</sup> (2002:16), distribution methods commonly used at workshops are:

“...cards made of metal, plastic, or fiberglass plates. However, many labs still use cards made of paper to be completed by students borrowing equipment. Regarding card recording methods, the most commonly used method is the one that enables recordings of consumable, tools, equipment, and audio-visual aids (AVA). Today, more and more labs use computerized system to record equipment and materials”.

## **9. Lab Technician Duties**

Lab technicians are responsible for handling administrative tasks, keeping all equipment and materials properly according to their types, preparing and re-storing equipment and materials that have been used, maintaining all lab equipment/materials/ facilities, and being in charge of the cleanliness of equipment, lab space, and other instruments.

## **10. Occupational Safety and Health (OSH)**

### **1) Occupational Safety and Health (OSH) Analysis at Lab**

The objectives of OSH analysis are to identify danger sources at work (lab/workshop), understand principles of occupational hazard control, and take precautionary measures based on hazard control principles (Hargiyanto<sup>3)</sup>, 2006:1). In general, the following OSH analysis needs to be performed at laboratory: (1) facilities: floor should be non-slippery, even, and free of cracks all the time; trashes should be disposed at provided bins; (2) warning and danger signs: to be attached on walls non-permanently, for example in frames for easy moving/removal; (3) tool/equipment maintenance: to be performed on fortnight basis; broken tool/equipment should be repaired immediately; (4) work place safety: electric panels and cables should be wrapped and placed in places with less traffic for safety and aesthetical reasons; (5) portable fire extinguisher: to be placed in locations which are accessible, visible, and not blocked by other objects such as cabinets and bookshelves. Prepare red triangle, measuring 35 cm on its sides.

### **2) Equipment Safety**

To achieve durability and availability all the time, the followings are needed with regards to equipment: *toolmen*, grouping based on the functions, application based on the functions, recording of any incoming/outgoing events, recording of any breakdowns, proper placing/storing, maintenance, and repair.

### **3) Safety Visuals**

Safety visual measures include installing occupational safety illustrations/signs, working area boundaries, rules and orders, lab layout, SOP for every machine/equipment, and picketing schedule.

### **4) Environmental Safety**

Environmental safety is divided into three: (1) inside workshop area: brightly painted walls, clean and even floor, boundaries of working area, air circulation, sufficient lightning, fire extinguisher,

equipment and material locations, electricity, water, and fire shutdowns, and protecting equipment; (2) outside workshop area: reduced pollution, green area, water availability, and easy material traffic; (3) waste management: waste collection, grouping based on waste properties (recyclable and non-recyclable), waste recycling, and waste burial.

#### 4) Job Sheet Analysis (JSA) or Hazard Analysis (HA)

Job sheet analysis or hazard analysis is used to identify and analyze potential hazards or effects caused by equipment used in a fashion laboratory. JSA or HA can be presented as tables with columns for equipment, potential, hazard, exposure (organ vulnerable to risks), first aid, and personal protecting equipment (PPE). The example of JSA or HA is shown in Table 3.

**Table 3. Fashion Lab Job Sheet Analysis or Hazard Analysis**

No	Equipment	Potential	Hazard	Exposure		First Aid	PPE
				Target Organ	Effect		
1	Needle	Pricking	Minor injury	Hand/finger	Minor injury/external	Antiseptic	Thimble
2	Sewing shears	Cutting	Minor to severe injury	Hand/finger	From minor injury to ripped skin	Antiseptic, Bandage, Plaster	Glove
3	Paper scissors	Cutting	Minor injury	Hand/finger	Minor injury/external	Antiseptic	Glove
4	Seam ripper	Pricking	Minor injury	Hand/finger	Minor injury	Antiseptic	Glove
5	Sewing machine	Pricking, Electric shock	Minor to severe injury	Hand/finger, other body part	Hand injury of whole body sensation in case of electric shock	Antiseptic	Thimble, glove, rubber based footwear

## 11. Fashion Laboratory Functions

Laboratory is a learning site to achieve desired competences and also functions as business unit facility. Fashion laboratory is a facility for learning, competence transfer, and business unit. For it can function well, a good management must be in place.

### 1) As a Learning Facility

Laboratory fosters students' skills in fashion, from designing, setting price, selecting materials, to tailoring (basic, intermediate, and advance levels), so that students possess skills relevant with occupational/industrial needs.

### 2) As a Competence-Transfer Facility

As customers in instructional process, students have to enjoy a good service in such a way that they will be able to achieve desired competences in their respective fields. To meet that purpose, laboratory activities have to be optimized because the success in transferring competence is very much dependent on how the lab is managed. The ultimate goal of these efforts is to achieve competences which are a mix of knowledge, skills, and attitudes.

### 3) As a Business Unit Facility



Without leaving its main purpose as a learning facility and beyond its function as a competence-transfer facility, fashion laboratories can have added values as a business unit facility. School workshops can be turned into production workshops where students, under the supervision of their instructors, run production activities. Practical subjects derived from the curriculum can be applied into practical materials to equip students with marketable skills.

In the field of fashion service and production, practical materials such as management of dress making, confection/garment, tailoring, and boutique businesses can equip students with marketable skills.

### III. CONCLUSION

In instructional context, laboratory serves to provide students with particular skills and specific, hand-on experience. Learning conducted in a laboratory is a type of structured experiential learning in accordance with the applicable curriculum. Laboratory management covers the aspects of learning program management, laboratory governance, and occupational safety and health.

Fashion laboratory serves as a learning facility, competence transfer facility, and business unit facility. For the lab can run effectively and efficiently, learning program management and laboratory governance need to be taken into serious account so that it can function optimally in improving the graduate quality in the field of fashion.

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## A STUDY OF CERTIFIED VOCATIONAL TEACHER PERFORMANCE ON ENGINEERING MAJOR IN MALANG OBSERVED FROM PROFESSIONAL TEACHER STANDARD COMPETENCIES

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**ABSTRACT :** *Teacher has important and strategic roles in improving the quality of education; even good education resources are often meaningless unless they are equipped with highly qualified teachers. The Law of the Republic of Indonesia (UU No 14 2005 about Teacher and Lecturer on the fifth part section 5 paragraph 2, states that the training and upgrading of profession should include four competencies: (1)pedagogic, (2)personality, (3)social, and (4)professional. Therefore, a study needs to be conducted to examine whether the certified teachers really have the competencies as states in Permendiknas (Minister of National Education Regulation) No. 16 2007. It is expected that the certified teachers can do self-assessment to ensure whether they have qualified standard competencies or not, especially for the vocational teachers who are mainly distinguished by their skills. This study uses descriptive study that investigates and describes the condition in the field, concerning with the teaching performance of the certified teachers at SMK (vocational schools) especially in Industrial Engineering in Malang Municipality The formulated research problem is "How is the certified teacher's performance seen from the four competencies as states in the Law of Teachers and Lecturers, which are pedagogic, personality, social, and professional competencies?". The study found that the majority (77.7%) of teaching competencies of the certified teachers seen from pedagogic competency is categorized as good, personal competency (78.38%) can be categorized as good, the majority (77.42%) of the social competency can be categorized as good, the majority (78.36%) of the professional competency can be categorized as good.*

**Keywords:** Teaching performance, teacher certification, competency standards, professional teacher.

### I. INTRODUCTION

Vocational high school is one of educational institution which creates human resources with abilities, skills, and competences, so the graduates can develop their work performance when they get a job (Isjoni, 2004). This case goes along with the Government Law No. 20 Year 2003 which states that the purpose of vocational high school is to increase students' abilities for self-developing in line with science, technology and arts, also preparing students to enter employment and develop professional-skills. Vocational high schools have an aim for their grad such as abilities, skills, mastering some knowledges and be proficient to be applied in work. There are two strength of vocational education: (a) the graduates will be able to fulfill the oportunity in industry or business, due to a certification through competency test, (b) the graduates can continue for higher education, if they are qualified.

From those aims of vocational high school, a question has emerged about implementations, educators, teacher, system, and infrastructure. The main factor of teaching is the teachers, competency of teacher must be needed to develop students' ability. If the teachers do not have a good capability, the students will not have the same sense (Isjoni, 2004). Teacher competency in vocational high school always demanded to be in line with the course that they taught. However, some data show that we still experienced lack of teachers in vocational high school, some teachers do not teach based on their background course, even some of them still do not fulfill the minimum education qualification yet.

The data from Directorate for Education Resources, Departement of Elementary and Secondary Education, Departement of National Education in 2004 showed there were 991.243 (45,96%) teachers from elementary, junior, and senior high school were not qualified, it shown that the teachers quality in Indonesia are still low. This is because of the requirement for standart minimum of education that not

fulfilled. Based on the Law no. 20 Year 2003 Clause 42 and 61, the Law No. 14 year 2005 Clause 8, and the Rule of Law No. 19 Year 2005 Clause 29, teachers that are in preschool, elementary, and secondary education must have an academic requirement minimum undergraduates or IV diploma related with subject, physically and mentally healthy, also have awareness to bring the aims of education. The detailed quantitative representation of minimum education qualification of teachers as follows.

**Table 1.1** Minimum Education Qualification of Teachers Based on Education Level in Indonesia

Types of teacher	Minimum Qualification Total	Qualification Percentage	Education Level			
			Senior High School	D1	D2	D3
Kindergarten	119.470	78,1%	-	-	-	-
Elementary	391.507	34%	376.740	12.767	-	-
Junior	317.112	71,2%	-	130.753	82.788	-
Senior	87.113	46,6%	-	164	15.589	71.380

Source : Data Directorate for Education Resources, Departement of Elementary and Secondary Education, Departement of National Education Year 2004

**Table 1.2** Percentage of Teachers Qualification are not qualified for teaching based on Education Minimum qualification Requirement

Types of teacher	Percentage of unqualified teacher for teaching
Elementary	60%
Junior High School	40%
Senior High School	43%
Vocational High School	34%
Not based on the field	17,2%

Source : Human Statistics Development Index year 2006

According to Baedowi (2008), the role of teacher highly determine to increase the quality of education. Teachers as agent of learning must be capable to address the best learning process. It is similiar with the point of view expressed by Sylvia (2006:223) that “*Professional standards in teaching are developed in any education systems, with professional learning and quality assurance being the central purposes of these standards*”, it shows that professional standards on teaching will increase the quality in several education systems. Teachers have important contribution in education field, even education resources will be nothing without compatible teacher quality. In other words, teachers are the leader of education product and service improvement. Some cases, the quality of whole education system are also related with teachers. Therefore, education enhancement must be followed with teacher quality enhancement.

In the Republic of Indonesia Government Law No. 14 Year 2005 about teachers and lecturers in part five clause 32 article 2, states that there are four competencies of profession upgrading and development: (a) pedagogic, (b) personality, (c) professional, and (d) social. Therefore, if someone wants to be a teacher, are required to fulfill the minimum education qualification and having minimum





competency of agent of learning. The fulfillment of minimum education qualification are proved with diploma certification and the fulfillment of minimum competency requirement as an agent of learning with competency certification. The competency certificates are given to people who passed the portofolio or passed the certification through training.

In line with Education Government Rules No. 16 Year 2007 that explained about four standard competencies of professional teachers, namely personality competency, pedagogic competency, social competency, and professional competency. If teachers do not require these competence, it will make teachers not compatible for students, society, and generally for government. This is mainly for teachers who have been certified as educator or passed the training. When the educator-certified teachers do not have these four standard competencies yet, it will cause some problems such as, envious of teaching management among colleague, spending more government tax, and less maximum education learning. The teacher's pedagogic competency in doing teaching process is in the scale of mastered course and frequently performed course. This finding is different with the reality in learning activity where some teachers are subject matter oriented and teacher centred (Baedowi, 2008).

The problem found in vocational field is the lack of skills from the teachers to teach some productive subject that they taught. From the data that was taken from training centre of P4TK/ VEDC Malang in 2006, about competency training on 12 teachers, only 5 (five) that made to pass it. In 2007, from 12 teachers, only 6 could pass it. In 2009, from 12 teachers only 6 teachers passed the test. This shows that the competencies of vocational teacher are still low. Also, there are some vocational teachers that do not know yet about technology development which can help them in teaching. Year by year teachers competencies are stagnant or not developed.

Furthermore, it is need to be investigated about the teachers who have been certified (educators certified), whether they are truely having competencies that compatible with Educational Government Law no 16 year 2007. Therefore, the teachers who have been pass certification can measure themselves whether they are appropriate to become a teacher who has four standard competencies or not, especially for those who have main characteristic on expertise feature. This investigation are important to be conducted, because it will give positive contribution to government about teacher certification and teacher competencies nowadays. In the end, it can create a better education quality along with the role of teacher as agent of learning.

The aims of this research are: (1) to find out and describe teachers' certified performance observed from teachers' standard competencies on pedagogic competency, (2) to find out and describe teachers' certified observed from teachers' standard competencies on personality competency (3) to find out and describe teachers' certified observed from teachers' standard competencies on social competency, (4) to find out and describe teachers' certified observed from teachers' standard competencies on professional competency.

## **II. METHODOLOGY**

This study is a descriptive research, that aims to find out and describe the condition of teachers performance who has been certify in Vocational High School majoring industrial engineering in Malang Municipality. It will be described about how teachers performance is observed from Teachers and Lecturers Law that also explained in the Ministry of Educational Government Rules No 16 Year 2007 about "Academic and Competency Qualification Standard of teachers". From this rules, the instruments is



made in the form of statement, which can measure teachers ability from four components: personality competency, pedagogic competency, social competency, and professional competency.

Instrument that used to take the data from educator-certified teachers is an observation. The group of respondents that perform the observation are from colleagues, leaders component, such as headmaster and vice of curriculum, students and the researcher itself. This investigation can get valid data through given four competence towards four respondent groups, and therefore this research obtained the obvious competencies from educator-certified teachers. This investigation is measured from the respondents who always have interactions with the subject of the research. In line with Aleamoni in Akhmad Sudrajat (2008) who states, the argumentation of using teachers' performance assessment by students, due to a reason that students are the main source about learning environment, including motivation and teaching capability of teachers, students also can assess logically about the quality, effectiveness, and the satisfaction about material also methods of learning that are being enhanced by teachers.

Population and sample used in this research are vocational high school teachers who have been certified as educators in 2007 and 2008 in Malang, namely 25 teachers which work at three Vocational High School (SMK) majoring industrial engineering, such as SMKN4, SMKN 5, and SMKN 6. Procedures used to measure the variable are the *Likert* scale. Descriptive analysis technique used in this research is table frequencies, the percentage of average value are using formula:

$$P = \frac{F}{N} \times 100\%$$

Information: P = percentage that is being searched, F = the amount of respondent answer, N = sample amount (Arikunto, S., 1988). The result of percentage is consulted to interpretation criteria data like in table 1.3. The data description are stated into the form score numbers with five levels of interpretation such as in table 1.4.

**Table 1.3** Data Interpretation Guideline Criteria

No	Percentage (%)	Criteria
1.	0 – 20	Poor
2.	20,01 – 40	Low
3.	40,01 – 60	Partially
4.	60,01 – 80	Mostly
5.	80,01 – 100	Commonly

**Table 1.4** Signs of Score Interpretation in Descriptive Analysis

Score/Score Average	Interpretation
4,21 – 5,00	Higher
3,41 – 4,2	High
2,61 – 3,4	Medium
1,81 – 2,60	Low
1,00 – 1,80	Lower

### III. RESULTS

Variable description of investigation result are presented in table 4.1. In the table it can be seen the tendency categories of each sub variables of the study, the mean, standard deviation, minimum-maximum scores, according to the interpretation of the data and signs of scores that have been presented.

**Tabel 4.1** The Summary of Sub Variable Tendency Category

Sub Variable	Min-max	Deviation Standard	Mean	Category
Pedagogy	43-80	5,66	3,94	Good
Personality	37-70	5,01	3,92	Good
Social	23-45	3,74	3,92	Good
Professional	65-100	5,65	3,84	Good

Result of analysis that summarized on Table 4.2 is about pedagogic competency.

**Tabel 4.2** Observation Result on Pedagogic Competency in Planning and Implementation

N o	Statement	Percentage (%)	Criteria	Mean	Category
1.	Teachers in making lesson plan are based on the basic competency of subjects.	79,56	Mostly	3,98	Good
2.	Teachers in selecting and organizing the subject are in accordance with the characteristics of the subjects.	80,28	Commonly	4,01	Good
3.	Teachers adjust with the characteristics of the subjects in selecting learning resources / media.	79,67	Mostly	3,98	Good
4.	Teachers adjust the characteristics of the subjects in making strategies and methods of learning.	78,94	Mostly	3,95	Good
5.	Teachers make the draft assessment of student learning that are compatible with learning purposes.	78,5	Mostly	3,94	Good
6.	Teachers in making draft assessment to equip students with the instrument (question, answer key / scoring guidelines).	78,98	Mostly	3,95	Good
7.	Teachers prepare and check the condition before implementing learning space, learning tools, and students eagerness.	79,45	Mostly	3,97	Good
8.	Teachers in opening the learning process are using expressions that can motivated students and deliver the purpose that will be achieved.	78,41	Mostly	3,92	Good
9.	Teachers in implementing the learning show ability in mastering the material and can associate the material with other relevant sciences.	78,49	Mostly	3,92	Good

10.	Teachers in implementing the learning are compatible with competencies to be achieved by students.	61,40	Mostly	3,91	Good
11.	Teachers can control the class in the learning process by associating the material with other relevant knowledge to grow the nurturant effect on students.	77,75	Mostly	3,89	Good
12.	Teachers in implementing the learning can use instructional media therefore can interest the students.	78,42	Mostly	3,92	Good
13.	Teachers in implementing the learning can grow participation of students through the interaction of teachers, students and learning resources.	78,52	Mostly	3,93	Good
14.	Teachers are monitoring the progress and final assessment compatible with the competency in the process of assessing and learning	78,64	Mostly	3,93	Good
15.	Teachers in implementing the learning are using proper writings, well-spoken along with appropriate style.	77,86	Mostly	3,89	Good
16.	Teachers in the end of the learning give reflection (summary), provide direction, assignment as a part of the materials enrichment.	78,33	Mostly	3,92	Good

Result of analysis that summarized on Table 4.3 is about personality competency.

**Tabel 4.3** Observation Result of Teacher's Performance Assessment on Personality Competency.

No	Statement	Percentage (%)	Criteria	Mean	Category
17.	Teachers show fidelity in carrying out their religion.	77,61	Mostly	3,88	Good
18.	Teachers respect the students regardless of their professed beliefs, ethnicity, customs, place of origin, and gender.	77,79	Mostly	3,89	Good
19.	Teachers show the discipline and exemplary attitude and behavior.	77,66	Mostly	3,88	Good
20.	Teachers show courtesy and politeness in the society.	78,21	Mostly	3,91	Good

21.	Teachers present themselves as a person that is mature, wise, stable and authoritative.	78,59	Mostly	3,93	Good
22.	Teachers show a sense of pride and confidence in work.	78,55	Mostly	3,93	Good
23.	Teachers show professional independence in the work.	78,35	Mostly	3,92	Good
24.	Teachers are open-minded in accepting criticism and suggestions.	78,34	Mostly	3,92	Good
25.	Teachers show the work ethic and high responsibility.	78,75	Mostly	3,94	Good
26.	Teachers can apply the code of ethics.	79,16	Mostly	3,96	Good
27.	Teachers are doing self-development (e.g. seminars, training, create innovative works, CAR).	79,15	Mostly	3,96	Good
28.	Teachers guide students in academic activities and nonacademic actively.	78,39	Mostly	3,92	Good
29.	Teachers are able to communicate oral and written.	78,7	Mostly	3,93	Good
30.	Teachers are able to work together with teachers and leaders in school activities	78,03	Mostly	3,9	Good

Result of analysis that summarized on Table 4.4 is about social competency.

**Tabel 4.4** Observation Result of Teacher's Performance Assessment on Social Competency.

<b>No</b>	<b>Statement</b>	<b>Percentage (%)</b>	<b>Criteria</b>	<b>Mean</b>	<b>Category</b>
31.	Teachers can be objective to the students, friends, and environment for implementing the learning.	68,49	Mostly	3,93	Good
32.	Teachers do not look the students, friends, parents and the school environment from the background of differences in religion, race, gender, family background, and socio-economic status.	78,35	Mostly	3,92	Good
33.	Teachers can communicate with another teacher politely and emphatically.	78,61	Mostly	3,93	Good
34.	Teachers can communicate with parents and community politely, sympathically and effectively about the students' development and progress.	78,55	Mostly	3,93	Good

35.	Teachers can involve parents and the community in solving students' learning difficulties.	78,7	Mostly	3,9 3	Good
36.	Teachers can adapt with the working environment in order to improve the effectiveness as educators.	78,25	Mostly	3,9 1	Good
37.	Teachers can develop and improve the quality of education based on the related regions.	78,31	Mostly	3,9 2	Good
38.	Teachers can socialize with fellow teachers, and other scientific community in order to improve the quality of learning. Example; Forum of Subject Teacher.	78,33	Mostly	3,9 2	Good
39.	Teachers can socialize (present) the results of learning innovation to another teachers in oral and written or other forms. Example: after training, deliver to other teachers.	79,16	Mostly	3,9 1	Good

Result of analysis that summarized on Table 4.5 is about professional competency

**Table 4.5** Observation Result of Teacher's Performance Assesment on Professional Competency

No	Statement	Percentage (%)	Criteria	Mean	Category
40.	Teachers can comprehend student's characteristics related to phsysical, intellectual, social-emotional, moral, spiritual, and social culture background aspects	78,83	Mostly	3,94	Good
41.	Teachers can identify student's beginning skill on the lesson taught.	78,64	Mostly	3,93	Good
42.	Teachers can identify student's learning difficulty on the lesson taught.	78,62	Mostly	3,93	Good
43.	Teachers can apply various learning approaches, strategies, methods, and techniques which creatively educate on the lesson taught.	78,78	Mostly	3,94	Good
44.	Teachers can use information and communication technology on the lesson taught (computer use, TV media, LCD, etc)	78,49	Mostly	3,92	Good
45.	Teachers can comprehend various	78,41	Mostly	3,92	Good

	communication strategies which are effective, simpatic, and politeness in oral, written, and/or another types.				
46.	Teachers can use information from evaluation result to design tests and enrichments.	78,3	Mostly	3,92	Good
47.	Teachers can behave according to religion norms embraced, law and social norms applied on society, and diversity of Indonesia's national cultures.	78,96	Mostly	3,95	Good
48.	Teachers can act jujur, tegas, and humanist (giving assigments according to student's skill)	78,99	Mostly	3,95	Good
49.	Teachers are well-behaved and polite, which can lead an example to students and society around him/her.	78,65	Mostly	3,93	Good
50.	Teachers can innovate in order to raise their perfomance quality continuously.	78,44	Mostly	3,92	Good
51.	Teachers can bring parents and society in order to develop learning facilities.	77,45	Mostly	3,87	Good
52.	Teachers can comprehend lesson competencies that will be taught.	78,2	Mostly	3,91	Good
53.	Teachers show encouragement in developing student's achievement during learning activities or extracurricular.	78,18	Mostly	3,91	Good
54.	Teachers can utilize information and communication technology for self-development (internet mastering, handphone facility, etc).	78,35	Mostly	3,92	Good
55.	Teachers can teach well for the theories or practical works to students.	78,02	Mostly	3,9	Good
56.	Teacher sshows ability in evaluating student's study results.	78,65	Mostly	3,93	Good
57.	Teachers show the ability of utilizing learning facilities and infrastructures.	78,22	Mostly	3,91	Good
58.	Teachers show capability to perform improvement and enriching test program.	78,37	Mostly	3,92	Good
59.	Teachers show self-development as a teacher (e.g. attending seminar, training, making innovative products, performing PTK- Classroom Action Research	77,85	Mostly	3,89	Good

60.	Teachers can get along with globalisation by learning from various sources.	78,18	Mostly	3,91	Good
61.	Teachers can work together with other teacher/partners during learning process (team teaching).	77,56	Mostly	3,88	Good
62.	Teachers can give fair assesement towards student.	78,06	Mostly	3,9	Good

#### IV. DISCUSSION

The percentage that obtained in this research is relatively high because the research subjects are the educator-certified teachers on Vocational High School, majoring Industrial Engineering, which considered are having better competencies than Elementary and Junior High School teacher, e.g. from teaching media science, disciplines, and scientific writing skill. Another reason is, the most common respondents are from students themselves, because most of the students interact with their teacher everyday, therefore they will be selective on judging the teacher's performance.

Commonly, respondents assess the highest percentage on certified teacher's pedagogic competency is on lessons material selecting and organising suitable with the course's characteristics namely 80,28% with the good interpretation (mean 4,01). The observation result found many teachers are indeed very well in planning, parallel with the curriculum and applied on ideal Lesson Plan. The existed plans are supported with high capability or competency on vocational course. There are teachers which already attended more than three training programs about their lesson course, therefore their plans are highly compatible with the lesson characteristics. But in reality, learning process have a lot of challenges that cause many plans cannot obey the schedule.

These obstacles are; electrical shutdown during practical work, making the practical work using machine cannot be held. On the practical work, there are some challenges along with the lack of material preparation, therefore it makes them cannot follow in accordance toward the schedule. Because of the subject observed is in the vocational field, then planning is the important element in every occupation. Another finding is that some of the educator-certified teachers on adaptive courses can plan their schedules and perform it on time. Indeed there are many disruptive factors which influenced on adaptive courses learning. The lowest percentage is on the learning performance compatible with the competency that will be achieved by students, namely 61,40% with the good interpretation (mean 3,91). This is because the school equipments still cannot support the competency requested by curriculum, therefore many students assess this competency item lower. There are some teachers who are not capable in their competencies, especially on productive courses field. For example, a teacher perform machinery practical work. He is still not able to show how to put in screws when operating a lathe. Whereas that is the important competency that must be mastered by the students on machinery expertise program. Other is during gear wheel practical, a teacher is still not capable to perform well. There is an educator-certified teacher on adaptive courses learning which is still performing a material that is difficult to be understood by the students. The respondents assessed some lacks on this item. On an item about class controlling that have been done by the educator-certified teacher, teaching that can relate into other relevant material therefore it can raise positive habits on students, assessed mostly by the respondent with the percentage





of 77,75%, and good interpretation (3,89). This is not considered as too high, because some of the educator-certified teachers still do not have much knowledges related to the industry as the consumer of Vocational High School graduates, therefore they cannot relate the lessons with the existing phenomena. The example from observation on one Vocational High School, there are teachers that only teach the material context and cannot relate it with the existing condition and development.

On personality competency, most of the respondents value percentages (77,61%) as the lowest on loyalty item towards obeying the religion embraced (3,88). This is caused by some of the vocational high school teachers that sometimes during the practical activity, cannot leave the class on time for praying/worship activity, this is in connection with the control aspect on their work safety. There are some teachers that indeed too busy with their management activities, therefore they are forget to worship timely. Most of the respondents assess that the highest 79,16% percentage on certified teacher's personality competency is on applying teacher profession code of ethics and doing self development item (e.g. attending seminar, training, making innovative products, performing PTK- Class Action Observation) with the percentage of 79,15% which all of the interpretation are good. The result from the observation that already done is, indeed many teachers have written scientific papers, for example PTK (Penelitian Tindakan Kelas - Class Action Observation), because the average educator-certified teachers are members of IV a (Administrator) Group. This is the early requirement for getting higher position, and one of the profession development, namely scientific papers writing. For code of ethics are indeed less understood by the respondents, especially about the code of ethics' content. Therefore the respondent assessed if only the certified teachers did the good job, then the respondents concluded the teachers have ran under the code of ethics.

On social competency, most of the respondents assess the lowest percentage (68,49%) on the item of certified teachers' objective attitude towards students, partners, and the surroundings in order to perform learning with the good interpretation (mean 3,93). Although still included into the good category, this item percentage is considered as low if it is compared with other items. Because several certified teachers choose students that are likely to be diligent, wealthy, and obedient, in the relation of assessment. In partnership and friendship, some of these teachers also choose some friends that are likely to be compatible with them, without socialize or connecting with other partners. Even in some cases, the teachers formed groups based on their partnership. The respondents are mostly assess the highest percentage (79,16%) on an item about socialization (presentation) of learning innovation results to the fellow teachers in oral and written or in other forms with the good interpretation (mean 3,91). Example : after getting a training, a teacher can share to other teachers. These teachers in vocational school indeed have requirement after get trained, they should present material in school, at least in front of the same fellow partners on Expertise Program. Therefore the result of getting trained can be shared fairly to many teachers. On the MGMP (Teacher's forum for school subjects) activity, the teachers subsequently are presenting programs to each others about lessons and problems on learning.

On the professional competency, most of the respondents assess educator-certified teachers with the lowest percentage (77,45%) on an item about teachers who can bring parents and society in developing learning facilities with a good interpretation (mean 3,87). Many respondents state that society participations are rarely happen. There are several parents which are participating, but mostly on financial matters. Parents are rarely handling facilities development in school, even less on learning process quality, therefore the respondents assess this item less. Most of the respondents rate the highest for the



educator-certified teachers on an item about being honest, firm, and humane (e.g. giving assignment that fit with student's ability) with a good interpretation (3,95). From the observation data previously, the certified teachers' behaviour in school are indeed showing those characteristics. Many teachers are firm and highly discipline, e.g. when a student comes late on this teacher's class, then this student should fill explanation letter, and when it happens for more than three times, the student will be warned or faced with the counselor teacher. Based on the analysis results on professional competency, it can be interpreted that teacher performance judged from this competency have shown a good professional attitude.

## **V. CONCLUSIONS AND SUGGESTIONS**

### **A. Conclusions**

The performance of educator-certified teachers judged from the standard competencies for teacher on pedagogic competency is in good category. It means that most of the respondents said the educator-certified vocational high school teachers in Malang Municipality observed from teacher standard competencies on pedagogic is in good category. Observed from the existing pedagogic competency indicators, there is a small part of this educator-certified teachers on learning performance that is less compatible with the competencies that will be achieved by students. This is in matter with the teacher competencies himself that indeed still in low competencies. There are also teachers who find difficulties while giving explanation on several materials.

The educator-certified teachers when observed from personality competency is included into a good category. It means, most of the respondents concluded that educator-certified vocational high school teachers in Malang Municipality, observed from teacher's competencies standard on personality competency is in a good category. Observed from the existing personality competency indicators, there are some small part of this certified teachers that are less obedient in obeying their religion's obligation. It happened because some of the vocational school teachers cannot pray timely during the practical class ongoing. This is connected to the control aspect on the students' work safety.

The educator-certified teachers when observed from social competency is included into a good category. It means, most of the respondents concluded that educator-certified vocational high school teachers in Malang Municipality, observed from teacher's competencies standard on social competency is in a good category. Observed from the existing social competency indicators, there are several educator-certified teachers that act less objective towards their students, friends, and the surroundings. Indeed some of these teachers are choosing the students that are likely to be diligent, wealthy, and obedient, in relation of assessment. Some of them also choose some friends that are likely to be compatible with them, without socialize or connecting with other partners. Even in some cases, the teachers formed groups based on their partnership.

The educator-certified teachers when observed from professional competency is included into a good category. Most of the respondents concluded that educator-certified vocational high school teachers in Malang Municipality, observed from teacher's competencies standard on professional competency is in a good category. Observed from the existing personality competency indicators, some small part of these teachers cannot lead parents and society to participate on developing the learning facilities. This is because the parents are only participating on financial matters. Another things that happened, parents are rarely handling facilities development in school, moreover into learning process quality.



## **B. Suggestions**

Based on the previous conclusions, it can be suggested to the teachers on pedagogic competency about the aspect of learning implementation that is less compatible by attending some trainings in training organization that compatible with the expected vocational competency achievement, e.g. in PPPPTK (Education and Teacher Resourc Development and Empowerment Center). Learning difficulties can be discussed on MGMP meeting to find the solutions, therefore it will be knowledges sharing activity among the teachers; on personality competency, about the attitude towards religion, it would be better if the teachers create schedules in team teaching, then they can change their shift in order to obey their religion well; on the social competency about being less objective towards the students, friends, and surroundings, it would be better if the teachers assess only based from the assesment criteria on existed material, then there will be no more subjectivity from teachers. The teacher could be more active on socialization, e.g. in sports, arts, or scientific groups, therefore the relationships among the teacher and students will be closer; on professional competency about parents an society participation aspect in learning facilities development, it would be better if the school committee are formed from parents that have consistencies and competencies in school development. For example, there are parents who work on contractor filed are included into facilities development, while the teachers are participated in curriculum development, and the authorities are dealing with public relations. Along with the active school committee, then it is the teachers' assignment that is to handle those things can be changed to focus on learning towards students; always watch every aspect on pedagogic, personality, social and professional competency along with Permendiknas Nomor 16 Tahun 2007 (The Rules of National Education Department Number 16 Year 2007) therefore can always improve their performances as a professional teacher. This can be done by paying close attention to the aspects on these four competencies and always implement in a good way; on choosing and organizing material, the steps are very good, always maintain continuously, by searching material sources which are relevant with the lessons that will be taught.



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## ANALYSIS OF STUDENTS INDIVIDUAL VARIABLES TOWARD GRADUATES COMPETENCE ACHIEVEMENT AT VOCATIONAL HIGH SCHOOL

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**ABSTRACT:** Characteristics of learning at any educational institution, as well as the Vocational High School (VHS) closely related to Graduates Competency Standards. Graduates Competency Standard VHS provides the conceptual framework of learning objectives to be achieved. Factors believed to be related to the competence of the students are: motivation to learn, Industry practices (prakerin) experiences and student perceptions of teacher about performance teaching. This study aims to: (1) determine the correlation of learning motivation (X1), prakerin experience (X2) and students perception of teachers performance (X3) jointly and individually towards the attainment of graduate students (Y). This study is a quantitative correlational study. The population was 114 students grade XII of SMKN 1 Kepanjen and SMKN 2 Singosari. 89 students was chosen by purposive random sampling. Data collection technique for this study was questionnaire and documentation. Descriptive and inferential statistic was used to analyzed data by using SPSS for Windows version 18. The result showed that: (1) there was a positive and significant correlation (0,789) of learning motivation, prakerin experience and students perception of teachers performance simultaneously to students competencies; (2) there was a positive and significant correlation (0,615) between learning motivation and students competencies; (3) there was a positive and significant correlation (0,440) between prakerin experience and students competencies; (4) there was a positive and significant correlation (0,473) between students perception of teachers performance and students competencies.

**Keywords:** learning motivation, prakerin experience, student's perception of teachers performance, competencies.

### I. INTRODUCTION

The results of a survey of Industrial Electronics Engineering Department of SMK in Malang that the competence of students in the academic year 2013/2014 is still not classified as expected. It is seen also in the competency test results obtained by students on average are still many who are in a lower category, ie students who graduated with the results match the standard set is still below 75%. Despite this fact can not be fully used as a basis to draw conclusions, but this result is enough to show that the quality of graduates of Industrial Electronics Engineering in Malang not fully in accordance with what is expected.

Many factors affect the attainment of vocational students, which is broadly divided into two external and internal factors. The external factor is the factor that comes from outside the student such as: schools, teachers, teaching facilities and family. Meanwhile, internal factors are factors originating from within the students such as: intelligence, aptitude, interest, motivation, learning strategies and other factors that also affect the outcomes of student competence (Narwoto & Soeharto: 2013).

Growing age is generally accompanied by rapid technological advances. Advances in technology such as the Internet is no longer a strange thing for the community now includes vocational students. This is supposed to be used by students as a learning resource sufficient to support given the amount of information that can be accessed from the Internet. But in fact, many teens today use the internet media is not to learn but to use it to open social networks such as line, facebook, twitter and online games. Advances in technology have made the reduction of interest in student because at this period adolescents are still easily influenced by friends or "me-too" thus indirectly reduce their motivation to learn. Though ideally more students the spirit of learning and motivated for their adequate facilities to support teaching materials.



Students motivation is one of the internal factors that have considerable influence in the achievement of student competency. Learning will be successful when the students are motivated to learn. Lee (2010) suggested that the most influential factor on the learning achievement is motivation.

Application of industrial work practices (prakerin) at SMK as the implementation of the policy link and match in order to get closer to the quality of graduates with the skills required by the industry. Prakerin is a form of education provision of vocational skills, which combine vocational education competencies systematically with competence mastery of skills acquired through working directly on the real work at partner institutions, targeted to reach a certain level of professional expertise (Dikmenjur, 2008).

The results of interviews with the Chairman of the Department of Electronics Industry, both at SMK 2 and SMK 1 Singosari Kepanjen that prakerin activities is still not fully meet expectations. Prakerin experience gained after implementing prakerin students are very diverse. It is influenced by several factors, among others: (1) preparation prakerin performed each school are not the same; (2) the density prakerin activities in each industry is different and (3) model of coaching / learning in diverse industries. The voting system where prakerin often encountered a discrepancy between the background of student competence to work in the industrial field. Students who carry out prakerin in place in accordance with the background expertise possible to gain a broader experience than students who carry prakerin in industries that are less in accordance with the background expertise (Tella, A.: 2007).

Improving student learning outcomes are also influenced by the quality of the learning process in the classroom, therefore, to improve student learning, the learning process in the classroom should be going well, efficient and effective manner (Bakar, R.: 2014). According Feriady, et al (2012) that the state of teachers as one of the factors in school environments that influence interest in learning to be very important when the student's interest may arise on the basis of interest. The ability of teachers to improve student interest in learning is very important and a big influence.

Based on the above background is deemed necessary to hold the variable-veriabel correlational studies of individual students such as student motivation, prakerin experiences and perceptions of students about teachers teaching performance with the achievement of the competence of vocational students expertise Electronics Engineering Industry in Malang. The results obtained, is expected to make a basic or consideration in policies to improve the quality of vocational school graduates, especially membership of Industrial Electronics Engineering.

## **II. METHOD**

The design of the study is a quantitative study with correlational approach. By using statistical analysis descriptive and inferential statistical analysis. The tools used to collect data that questionnaire and documentation. The population in this study were all students of class XII expertise SMK Electronics Engineering Industry in Malang Regency in the school year 2014/2015, namely: 1) SMKN 1 Kepanjen and 2) SMKN 2 Singosari totaling 114 students. The number of samples in this study were 89 students with the sampling technique purposive random sampling. Mechanical descriptive statistical analysis using a percentage formula used to calculate the variable of motivation to learn, experience prakerin, students 'perceptions about the performance of teachers' teaching and competency of students, whereas in analyzing inferential statistics used multiple regression analysis techniques to determine the relationship between the variables of motivation to learn, experience prakerin, perception teachers to teach students

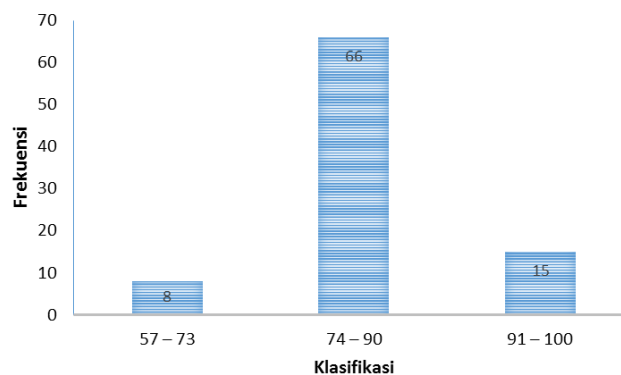
about the performance together with the competence of the students, while to know the pure relationship between each independent variable and the competence of students used partial correlation analysis.

Before conducting the test, first conducted trials instruments. Objective testing instrument is to investigate the validity and reliability of the instrument in the form of instrument that will be used, so the instrument is expected to be used in a valid and reliable research. Further analysis prerequisite test was done to determine whether the data have been obtained compliant then analyzed using simple linear regression analysis. To facilitate the calculation of the prerequisite test used SPSS.

### III. RESULTS

#### A. Motivation to learn

Data student motivation in this study was obtained through filling a questionnaire/ question-naire by the respondents, namely 89 students were selected as sample. Learning motivation questionnaire consists of 23 items with five alternative answers and using Likert scale for assessment. The frequency distribution of learning motivation can be seen in Figure 1.

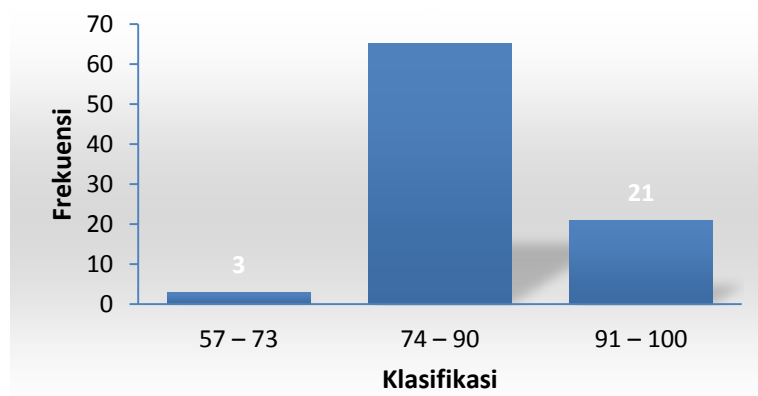


**Figure 1.** Frequency Distribution of Motivation

Based on Figure 1 in mind that students are motivated to learn in a category quite as many as eight students, or 9%, higher category as many as 66 students or 74% and as many as 15 students or 17% who have a very high motivation to learn. So we can conclude the majority of student motivation SMK Electronics Engineering Industry Expertise included in the high category, as much as 74%.

#### B. Experience industry practices (Prakerin)

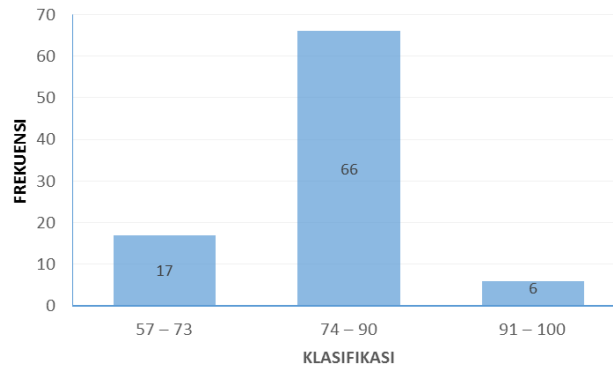
The frequency distribution prakerin experience can be seen in Figure 2. Based on Figure 2 that students who experience quite as much prakerin in category 3 students or 3%, higher category as many as 65 students or 73% and as many as 21 students or 24% who have a very high prakerin experience. So we can conclude the majority of students experience prakerin SMKN Industrial Electronics Engineering Expertise in the high category that is as much as 73%.



**Figure 2.** Frequency Distribution Prakerin Experience

### C. Student Perceptions of Teaching and Teacher Performance

The frequency distribution of students' perceptions of teachers' performance can be seen in Figure 3.

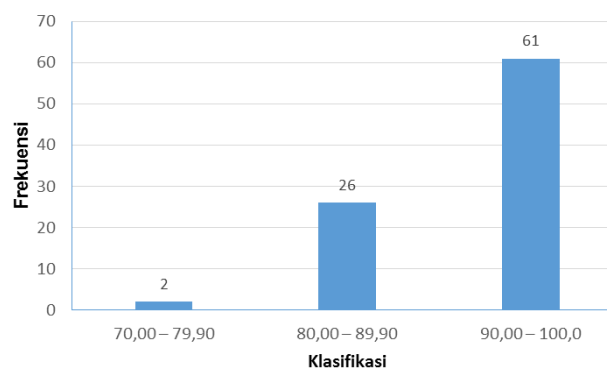


**Figure 3.** Frequency Distribution of Student Perceptions of Teaching and Teacher Performance

Based on Figure 3 is known that students who have a perception about the performance of teachers to teach in a category quite as many as 17 students or 19%, higher category as many as 66 students or 74% and as much as 6 or 7% of students who have a very high prakerin experience. So we can conclude the majority of students' perceptions about the performance of teachers to teach SMK Electronics Engineering Industry Expertise included in both categories is as much as 74%.

### D. Competence of Students

Data competence of students as the dependent variable is obtained by engineering documentation, namely by looking at the value of Vocational Competency Test (UKK) students were selected as sample. To obtain the data, researchers are working with the relevant authorities of each school, such as Kaprog EI and teachers who deal with the implementation of the UKK productive. Obtained from the processing of data with descriptive analysis, frequency distribution acquired competencies of students can be seen in Figure 4.



**Figure 4.** Frequency Distribution of Competencies Students

Based on Figure 4 can be seen that the competence of the students belonging to the category enough (C) for 2 students or 2%, good category (B) as many as 26 students or 29% and very good category (A) as many as 61 students or 69% of the number of students who researched.

### E. First Hypothesis Testing

The first hypothesis of this study reads: "There is a positive and significant relationship between motivation to learn, experience and perception prakerin teachers to teach students about the performance together with the competence of vocational students in Malang". The following Table 1 is the result of multiple correlation analysis:

**Table 1.** Statistics Multiple Correlation Test Results (X1, X2 and X3 with Y)



Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789 <sup>a</sup>	.622	.608	3.032
a. Predictors: (Constant), Student Perceptions of Teaching and Teacher Performance, Motivation, experience Prakerin				
b. Dependent Variable: Competence Students				

Based on Table 1 it can be seen that the multiple correlation coefficient (R) of 0.789. Based on the correlation coefficient can be said that, the variables of motivation to learn, prakerin experiences and perceptions of students about teachers' teaching performance is positively correlated with the variables of student competence. That is, the increase in motivation to learn, prakerin experiences and perceptions of students about teachers' teaching performance will be followed by the rise of student competence. Double correlation hypothesis test is done by comparing the probability value (Sig. Fchange) with 0.05 as shown in Table 2.

**Table 2.** Test Results F

ANOVA <sup>b</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1284.852	3	428.284	46.581	.000 <sup>a</sup>
	Residual	781.530	85	9.194		
	Total	2066.382	88			
a. Predictors: (Constant), Student Perceptions of Teaching and Teacher Performance, Motivation, experience Prakerin						
b. Dependent Variable: Competence Students						

Based on Table 2 it can be seen that the probability value (Sig.) = 0.000, smaller than the significance value of 0.05 or  $0.000 < 0.05$ , so the hypothesis is accepted. It can be concluded that, "There is a positive and significant relationship between motivation to learn, experience and perception prakerin teachers to teach students about the performance together with the competence of vocational students of Electronics Industry Expertise in Malang".

## F. Second Hypothesis Testing

The second hypothesis of this study reads: "There is a positive and significant relationship between learning motivation and competence of vocational students in Malang".

**Table 3.** Statistics Partial Correlation Test Results (X1 Y)

Correlations				
Control Variables			Motivasi Belajar	Kompetensi Siswa
Pengalaman Prakerin & Persepsi Siswa tentang Kinerja Mengajar Guru	Motivasi Belajar	Correlation	1.000	.615
		Significance (2-tailed)	.	.000
		df	0	85

	Kompetensi	Correlation	.615	1.000
	Siswa	Significance (2-tailed)	.000	.
		df	85	0

To measure the level of pure relationship of independent variables of learning motivation (X1) with the dependent variable of student competence (Y) used partial correlation test where other independent variables namely prakerin experience (X2) and perceptions of students about teachers' teaching performance (X3) is a control variable. Table 3 below is the result of the analysis of the correlation between the two variables.

Based on Table 3 it can be seen that the relationship between students' learning motivation and competence shown by the correlation coefficient of 0.615. Based on the correlation coefficient can be said that, the variables of learning motivation positively correlated with the variables of student competence. That is, the increase in motivation to learn will be followed by the rise of student competence.

Hypothesis test to determine whether there is a relationship between learning motivation and competence of the students, it can be seen by the Sig. (2-tailed) in Table 3 Based on the table it can be seen that the Sig. (2-tailed) 0,000 less than the significance value ( $\alpha$ ) = 0.05 or  $0.000 < 0.05$ , so the hypothesis is accepted. It can be concluded that "There is a positive and significant relationship between motivation Learning Competency Skills EI vocational students in Malang".

### G. Third Hypothesis Testing

The third hypothesis of this study reads: "There is a positive and significant relationship between experience prakerin the competence of vocational students in Malang". To measure the level of pure relationship prakerin experience of independent variables (X2) with the dependent variable of student competence (Y) used partial correlation test where other variables such as motivation to learn (X1) and perceptions of students about teachers' teaching performance (X3) is a control variable. Table 4 below are the results of the analysis of correlation between the two variables.

Based on Table 4 it can be seen that the relationship between prakerin experience with student competence shown by the correlation coefficient of 0.440. Based on the correlation coefficient can be said that, variable prakerin experience is positively correlated with the variables of student competence. That is, the increase in prakerin experience will be followed by the rise of student competence.

**Table 4.** Partial Correlation Test Results Statistics (X2 with Y)

Correlations				
Control Variables			Pengalaman Prakerin	Kompetensi Siswa
Motivasi Belajar & Persepsi Siswa tentang Kinerja Mengajar Guru	Pengalaman Prakerin	Correlation	1.000	.440
		Significance (2-tailed)	.	.000
		df	0	85
	Kompetensi Siswa	Correlation	.440	1.000
		Significance (2-tailed)	.000	.
		df	85	0

Correlations				
Control Variables			Pengalaman Prakerin	Kompetensi Siswa
Motivasi Belajar & Persepsi Siswa tentang Kinerja Mengajar Guru	Pengalaman Prakerin	Correlation	1.000	.440
		Significance (2-tailed)	.	.000
		df	0	85
	Kompetensi Siswa	Correlation	.440	1.000
		Significance (2-tailed)	.000	.
		df	85	0

Hypothesis test to determine whether there is a relationship between experience prakerin with student competence, can be seen by the Sig. (2-tailed) in Table 4 Based on Table can be seen that the Sig. (2-tailed) 0,000 less than the significance value ( $\alpha$ ) = 0.05 or  $0.000 < 0.05$ , so the hypothesis is accepted. It can be concluded that "There is a positive and significant relationship between Prakerin experience with EI Skills Competency vocational students in Malang".

#### H. Fourth Hypothesis Testing

The fourth hypothesis of this study reads: "There is a positive and significant relationship between students 'perceptions about the performance of teachers' teaching competence of vocational students in Malang".

To measure the level of pure relationship independent variable students' perceptions about the performance of teachers to teach (X3) with the dependent variable of student competence (Y) used partial correlation test where other variables such as motivation to learn (X1) and experience prakerin (X2) is the control variable. Table 5 below is the result of the analysis of the correlation between the two variables.

Based on Table 5 it can be seen that the relationship between students 'perceptions about the performance of student teachers' teaching competence shown by the correlation coefficient of 0.473. Based on the correlation coefficient can be said that, the variable student perception about teachers' teaching performance is positively correlated with the variables of student competence. That is, the increase in students 'perceptions of teachers' teaching performance will be followed by the rise of student competence. Hypothesis test to determine whether there is a relationship between students' perceptions about the performance of teachers to teach the student competence, can be seen by the Sig. (2-tailed) in Table 5 Based on Table can be seen that the Sig. (2-tailed) 0,000 less than the significance value ( $\alpha$ ) = 0.05 or  $0.000 < 0.05$ , so the hypothesis is accepted. It can be concluded that "There is a positive and significant relationship between Student Perceptions of Teaching Performance Master Industrial Electronic Skills Competency vocational students in Malang".

**Table 5.** Statistics Partial Correlation Test Results (X3 with Y)

Correlations					
Control Variables			Kompetensi Siswa	Persepsi Siswa tentang Kinerja Mengajar Guru	
Motivasi Belajar & Pengalaman Prakerin	Kompetensi Siswa	Correlation	1.000	.473	
		Significance (2-tailed)	.	.000	
		df	0	85	
	Persepsi Siswa tentang Kinerja Mengajar Guru	Correlation	.473	1.000	
		Significance (2-tailed)	.000	.	
		df	85	0	

#### IV. DISCUSSION

##### A. Relationships Motivation, Prakerin Experience and Student Perceptions of Teaching and Teacher Performance together with Competencies Students

Based on the results of data analysis and hypothesis testing multiple correlation that has been done, it is known that there is a relationship between learning motivation, prakerin experience and perceptions about the performance of teachers to teach students together with the students' competency SMKN EI Technical Expertise in Malang. Multiple correlation coefficient (R) of 0.789. Judging from the value of its significance, the relationship between these variables is significant that is worth 0,000. So it can be said that the motivation to learn, prakerin experiences and perceptions of students about teachers' performance and significant deal simultaneously with the competence of students. This means that the higher the motivation to learn, experience prakerin and student perceptions about the performance of teachers to teach together, the higher the students' competence SMKN EI Technical Expertise in Malang.

Based on the analysis of data is also known that the independent variables have the highest correlation with the value of student competence is variable students 'motivation, followed by the variable students' perceptions about the performance of teachers to teach, and most had the weakest correlation is variable prakerin experience. This means that the students' motivation to contribute the highest rate of increase in student competence.

The results of this analysis demonstrate the suitability of the place they need to increase prakerin students with competency skills of students. Research Jatmika & Tita (2014) which states that the factors inhibiting the implementation of the industrial partner prakerin among others, not all industries are used as a job prakerin accordance with the competencies of school handed. The higher the level of conformity prakerin where the students will be the higher the conformity with the program of activities prakerin student skills. Places and activities prakerin appropriate, will certainly have an impact on increasing students' experiences in conducting the practice in the industry. This certainly will affect the ability of students increased and certainly will be able to complete the UKK well as high prakerin experience is what will facilitate students in carrying out the practice exams.

From the analysis of the students' motivation variable has the highest correlation with achievement of student competency. This means that students' motivation on the subjects of productive both in theory



and practice contributed to a high level of skills competency test. As disclosed hamdu, G. & Lisa Agustina (2011) if the student has a motivation in learning, then learning performance would be good (high). Conversely, if the student has a bad habit of learning, the learning performance will be poor (low) (Inayah, et all: 2013). So the higher learning motivation of the students it is expected to further enhance the competence of vocational students technical expertise of Electronics Industry in Malang.

The findings in this study indicate that in order to achieve maximum competence, shown with a good value at the time of test execution competence, the necessary motivation to learn, experience and performance prakerin also a good teaching of a teacher to help the students to achieve the expected competencies. These three factors are related positively and significantly together with the competence of the students, or in other words, these factors can help smooth students in participating and solving problems which are given during the implementation of the competency test. Based on these findings expected that all parties concerned by learning to pay attention to these variables so that the attainment of the students can be maximized.

## **V. CONCLUSION**

Based on the results and discussion of this research, we conclude some of the following: learning motivation, experience prakerin and student perceptions about the performance of teachers to teach positively related and significantly together with the competence of vocational students in Malang, motivation to learn has a positive and significant student competence, experience prakerin has a positive and significant relationship with student competency, students' perceptions about the performance of teachers teaching has a positive and significant relationship with student competency.

## **VI. SUGGESTION**

Based on the results of the study suggested that to improve the competence of vocational students Expertise Electronics Engineering Industry in Malang Regency have also to consider several factors relating to the competence of the students, which increased student motivation, prakerin experiences and perceptions of students about teachers' teaching performance.



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EI-02-061

## IMPROVING LEARNING OUTCOMES HYDROLOGY COURSE IN CIVIL ENGINEERING STUDENTS STATE UNIVERSITY SURABAYA

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**ABSTRACT :** *Application Lecturers should have to obtain a solution as a motivator for learning and seek to improve understanding of the students as the main goal in this hydrological study. During the learning process so that students are expected to be active so that the learning objectives successfully and to increase the motivation, activeness, independence, responsibility, and self-understanding of learning in students with learning resources support the integrated multimedia technology and image. Some of the intended use of this model to develop and cultivate high-level thinking, including learning how to learn (learning how to learn) in the circumstances of a problem-oriented. Serving a wide variety of video on Hydrology and practical props as a component of the tools used in everyday life with models and methods are expected to be able to encourage the emergence of self-reliance and stimulate student motivation in getting optimal understanding. Supported provision of learning tools, lessons plans semester (RPS), the unit of the lecture event (SAP), student worksheets and systematic evaluation sheets*

**Keywords:** Hydrology, motivation, evaluation, Lesson Plan (LP).

### I. INTRODUCTION

Hydrology courses at the Faculty of Engineering Department of Civil inundated the basic subjects that must be understood and mastered by the student of a purely civilian and students PTB. Basically the science of hydrology is not an entirely exact science, but it is a science that requires interpretation. Jobs - jobs in hydrology experiments are very limited by the size of natural events and by research into things - certain things. Terms - a fundamental requirement that the need is data - the data observed in all aspects of precipitation, runoff (run off), stream-flow, infiltration, percolation, evaporation, and others. With these data and supported by experiences in many science related to hydrology, and then a hydrologist will be able to provide a solution in relation to the technical planning of the building - the building of water.

While teaching in the observations and experiences during this time, the learning process is generally centered on the lecturer (teacher-oriented). Students only heard faithfully and passive in the learning process that is in line with lectures alone. As a result, an understanding of the science of hydrology as an introduction to the basic science and civil engineering fields inundated more specific the basis for understanding. In this case study was undertaken by means of two directions by using the video and power point.

From the various opinions of students about the delivery of content is boring and less able to understand and be understood, since learning hours 13:00 at noon implemented a sleepy hour, exhausting because at the beginning of the course is theory. And lecturer in others less friendly towards students lecturer only judging on presentation display group without any explanation to be understood as well as the tone of delivery flatly that it is difficult to understand these are some of the factors as the failure of the learning is the lack of human resources lecturer of the course. mastery of the material, availability and preparation of learning tools such as models of learning, teaching and learning interactions, field experience in taking the example application. Lecturers should have to obtain a solution as a motivator for learning and seek to improve understanding of the students as the main goal in this hydrological study.



With the implementation of PBM models, will provide high motivation and more opportunities for students to learn independently or in groups in understanding the material. One way the above problems, it is necessary to study a class action in the course of Hydrology. Through this research will endeavor to increase the motivation to learn in studying and absorbing material Hydrology, so understanding obtained is used as the provision of courses and learning more readily, especially irrigation engineering courses.

From the results, can be identified some problems in the course of Hydrology in the Department of Civil Engineering, State University of Surabaya as follows:

1. The low yield Hydrology study subjects that affect the understanding.
2. If only emphasizes to the teacher-oriented, hence the need for touch and a fresh initiative for learning more interesting, not boring and more meaningful,
3. Students Hydrology difficulty in understanding the material presented
4. The response of students to learning is low,
5. Low monitoring and evaluation of lecturers during the learning process

The purpose of this paper is to improving learning outcomes hydrology course in civil engineering students state University Surabaya.

The purpose of this research is:

1. To determine whether the application of the model of Problem Based Learning (PBL) can improve learning outcomes in study subjects Hydrology for civil engineering students Unesa Technic Faculty
2. Want to know the advantages and disadvantages of the application Problem Based Learning (PBL)

## **II. LITERATURE REVIEW**

### **A. Assessment Theory**

#### 1. Learning and Teaching

Learning is the most basic activity in human learning process. Especially in achieving the institutional objectives of an educational institution or school, this suggests that the success or failure of an education goals depends on how the learning process experienced by individuals.

According Oemar Hamalik (1992:56) states learning is a process of change in behavior due to their training and experience. Moh. Uzer Usman (1996:4) argues that learning can be interpreted as a change in behavior of the individual self, thanks to the interaction between individuals, individuals with their surroundings so that they are better able to interact with their environment.

Based on some of the opinions expressed, if considered in the editorial of course different from one another, but essentially all of the opinion refers to the goals, objectives, and the same concept and has the same elements as well, namely:

- a. The existence of individual learning,
- b. The existence of learning as a process,
- c. Learning outcomes as a result of changes in behavior,
- d. The learning process occurs in the interaction with the environment.

#### 2. Hydrology

The Civil Building Engineers are very interested in Building Planning and exploitation of water resources, namely water for review control the use of water, especially that regulate the flow of the river,



dam - reservoirs and irrigation channels. Therefore, they need to know about the science of hydrology widespread use.

### 3. Problem Based Learning (PBL)

PBL engage students in the inquiry choices which enable them to interpret and explain real-world phenomena and to build understanding of the phenomenon. Learning is not designed to help teachers convey large amounts of information to students who are more likely to direct learning and lectures. PBL is designed to help students:

- a. Develop thinking skills, problem solving, and intellectual;
- b. Studying the roles of adults with live up to these roles through situations of real or simulated;
- c. Being independent, autonomous and students. Here are described and discussed three such purposes

PBL ultimately strives to provide and help students become independent, and students who are able to govern themselves (self-regulated learner). Teachers/lecturers continuously guide the pupil/student by pushing ask questions and provide rewards for weighty questions they ask. With the encouragement of the pupil/student find solutions to real problems are formulated themselves, then they learn to handle the tasks of finding these solutions independently.

PBL characteristics are as follows:

- a. Problems be a starting point in learning
- b. Issues raised are problems that exist in the real world of unstructured
- c. Problems requiring multiple perspectives (multiple perspectives)
- d. Problems, challenging the knowledge possessed by students, attitudes and competencies that then require the identification of learning needs and a new area of study
- e. Learning self-direction becomes the main thing
- f. Utilization of diverse sources of knowledge, use, and evaluation of resources is an essential process in the PBL
- g. Learning is collaborative, communications, and cooperative
- h. Development of inquiry and problem solving skills are as important as mastering content knowledge to find solutions to a problem
- i. Transparency in PBL processes include the synthesis and integration of a learning process
- j. PBL involves the evaluation and review the student experience and learning

**Table 1.** Indicator Behavior Problem Based Learning Teacher on

Phase	Indicator	Teacher Behavior
1	Student Orientation at issue	Explaining the purpose of learning, explains the necessary logistics, and motivate students engage in problem solving activities
2	Organize students to learn	Helping students learn to define and organize tasks related to the issue

3	Guiding experience of individual / group	Encourage students to gather the appropriate information, carry out experiments to get an explanation and problem solving
4	Develop and present work	Assist students in planning and preparing the appropriate work such as reports and help them to share tasks with friends
5	Analyze and evaluate the problem solving process	Helping students to reflection or evaluation of their investigations and the process they use

#### 4. Motivation

Motivation comes from the word "motive" is defined as "the driving force that has become an active" (Sardiman, 2001: 71). Another opinion also says that motivation is "the state in the one who encouraged him to undertake activities to achieve the goal" (Suharto et al, 2003: 110).

According to Mc. Donald, who cited Oemar Hamalik (2003: 158) motivation is the energy change in a person characterized by the emergence of feelings and reactions to achieve the goal. In this sense, it can be said that motivation is complex. Motivation will lead to a change in the energy present in humans, so it will cling to the issue of psychiatric symptoms, feelings and emotions, to then act or do something.

According to Siti Sumarni (2005), Thomas L. Good and Jere B. Braphy (1986) define motivation as a driving force and steering, which can strengthen and encourage someone to behave. It means the act of a person depends on the underlying motivations.

While the overall motivation to learn is the driving force both from within and from outside the student (by creating a series of businesses to provide certain conditions) which ensures continuity and provide direction on learning activities, so that the desired destination by a subject of study that can be achieved. In A.M. Sardiman (2005: 75) motivation to learn can also be interpreted as a series of businesses to provide certain conditions, so someone willing and wanting to do something, and if he does not like, it will seek to eliminate or circumvent the feeling did not like it.

#### 5. Multimedia

Multimedia is a means of (media) in which there are a mix (combination of) various forms of information elements, such as text, graphics, animation, video, interactive and sound as a support to achieve its goal of conveying information or just provide entertainment for its target audience. Multimedia is often used in entertainment such as games. Multimedia word itself is derived from the multi (Latin) which means a lot and says media (Latin) which means something that is used to convey something. Multimedia can be categorized into two kinds, namely multimedia linear and interactive multimedia. Linear Multimedia is a multimedia that is not equipped with any control device that can be operated by the user. Multimedia is running sequential (sequential / straight), for example: TV and movies. While a multimedia interactive multimedia is equipped with a controller (or aids, computer, mouse, keyboard, etc.) that can be operated by the user, so the user can choose what they want to proceed. Interactive multimedia combines and synergizes all media consisting of text, graphics, audio, and interactivity (draft).

6. Frameworks

One model of learning which typically where the role of teachers/lecturers thrusting authentic problems, facilitating the investigation of learners/students, and fully supports learning in achieving the goal of learning is the Problem Based Learning (PBL). With the implementation of PBL models that can provide more opportunities for students to learn independently and collectively pose a problem and question, do authentic research, and collaborate to find a solution in addressing the problems that exist with the best creative and full of initiative

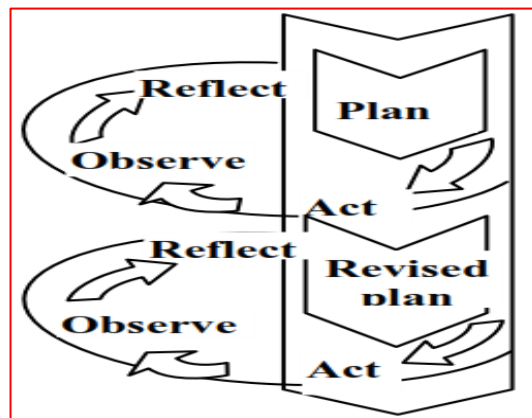
**B. Hypothesis Action**

Based on the above framework of thinking, the research hypothesis of this class action is the adoption of a model with the use of multimedia integrated PBL and practical props can increase the motivation and the understanding of the course of Hydrology at the Department of Civil Engineering student Unesa Technic Faculty

**III. RESEARCH METHODOLOGY**

**A. Study Design**

According Kemmis and Mc Taggart (in Rafi'uddin, 1996) action research can be seen as a spiral cycle of preparation of planning, action, observation (observation), and further reflections may be followed by the next spiral cycle (figure 3.1). PTK easily developed by Kemmis and Taggart can be described with a flowchart (figure 3.2).



**Figure 3.1** Spiral Model of Kemmis and Taggart

In practice it is likely investigators already have a set plan of action ( based on experience ) so that it can directly start the stage action. There are also researchers who already have a set of data, so that they start the first activity with the activities of reflection. But in general, the researchers started from the initial phase of reflection to conduct a preliminary study as a basis for formulating research problems. Furthermore, the necessary planning, action, observation, and reflection that can be described as follows

1. Reflection early

Reflection initial assessments that were intended to be used to collect information on situations that is relevant to the research theme. The researcher and his team do a preliminary observation to recognize and know the true situation. Based on the results of the early reflections to do the focusing problem then formulated into a research problem. Therefore, after the formulation of the problem is completed, further research is necessary to formulate a conceptual framework and can be set research purposes. In the early

reflections, the most prospective researchers examined the theories that are relevant to the issues to be studied.

## 2. Preparation of planning

All planning is based on the results of assessments of the early reflections. The detailed plan includes actions to be carried out to improve, enhance or change the behavior and attitudes of learners to be desired as the solution of problems. Be aware that this plan is flexible in the sense that can change according to the real conditions that exist. Early preparation is done in connection with a class action research, include:

- a. Determination team of researcher/lecturer dig preliminary data on student characteristics formulates indicators for measuring the success of learning in accordance with the basic competencies that have been set.
- b. Making learning quality assessment instruments faculty, student activities, student motivation, and skills of the students.
- c. Preparation of media teaching materials in the form of handouts, video, active speakers, practical props (components engineering), handouts, books diktat.
- d. Validation and revision of the instrument. Validation is done by learning experts competent. Based on expert input, then a team of researchers to revise the instrument.

## 3. Job action

Implementation of stating what actions conducted by researchers in an attempt repair, improvement or change that was implemented based on the action plan. The type of action taken in the PTK should always be based on theoretical and empirical consideration for the results obtained in the form of improved performance and results of the program are optimal. In this study, the actions to be carried out are the use of multimedia and practical subjects props Hydrology. At the time of this action research team there that act as lecturers and anyone acting as an observer.

## 4. Observation (observation)

PTK observation activities in line with other data collection activities in the formal research and the act of observing the course of implementation of the action. In this activity, the researchers examined the results or the impact of actions taken or imposed on learners/students. The observation was done by measuring the level of student learning motivation with the observation sheet filled out by the observer.



**Figure 3.2** Observation PTK with data collection activities



**Figure 3.3:** Event examined the results of the action against learners



**Figure3.4:** Observation measure student learning motivation level with the observation sheet filled out by the observer.

#### 5. Reflection

Reflection activity is an activity analysis, synthesis, interpretation of the information obtained during the action activities. In this activity, researchers examined, view, and considering the results or impact of the action. Any information collected needs to be studied link with one another and their relation to the theory or research results that already exist and are relevant. Through a deep reflection can be concluded that the steady and sharp. Reflection is a very important part of PTK is to understand the processes and outcomes that occur, namely in the form of change as a result of the action taken.

In essence the model Kemmis and Taggart in the form of devices or strands with each device consists of four components, namely planning, action, observation, and reflection is seen as a cycle. The number of cycles in the PTK depends on the problems that need to be solved, which is generally more than one cycle. Where in each cycle expected that the achievement of success at a certain level to really achieve the expected goals.

#### B. Research Subjects

The subjects of this study are students of Civil Engineering Education 2012 class S1 PTB-B as many as 36 students, the odd semester 2015/2016 at the Department of Civil Engineering, FT UNESA Hydrology course program.

#### C. Location of research and study time

This study will be conducted in classroom lectures Civil engineering FT Unesa A10308 building during the months of October and November 2015.

#### D. Data Collection Techniques and Research Instruments

Data collection techniques in this study using interviews, observation (observation), and questionnaires. The research instrument in the form of guidelines for observation, questionnaire, student worksheets and texts about/test.

### E. Data Analysis Techniques

To get the application of learning PBM models, need to analyze the data. According to Masri Singarimbun and Sofian Efendi (2006: 263), data analysis is the process of simplification of data into a form that is more easily understood and interpreted. Data analysis in this research is the Qualitative Data Analysis Techniques which can be described as follows:

- 1) Each item is scored according to the answers grading scale that is in the observation sheets and questionnaires student motivation.
- 2) Total score then presented descriptively percentage using a predetermined formula.

#### a. Analysis of Teaching and Learning Activities

Observation/observations were made every meeting by two (2) observers to fill in the observation sheet that is in accordance with procedures. Observations were made during the preparation, introduction, core activities, closing, time management and control of the classroom atmosphere. Grating in the observation sheet has a score that is converted in the form of a rubric (Table 3.3). Then the average score of observation of each stage are already observed is described by a category which has also been determined (table 3.4).

**Table 3.3** Value score conversion

Score	Description	Criteria
1.	Done, but not finished	(not good)
2	Do, is less appropriate, unsystematic	(not good)
3	Done, appropriate and less systematic	(pretty good)
4	Done, appropriate and systematic	(good)

**Table 3.4:** The average value of observation

Average	Description
1,00 – 1,99	not good
2,00 – 2,99	not good
3,00 – 3,49	pretty good
3,50 – 4,00	good

*Source: (Arikunto, 2001: 88)*

While data on learning activities continued with a simple statistical analysis descriptive in terms of percentage (%). The number of values taken from each activity divided by the number of observer and multiplied by 100 % while using the same instrument. Observations were made every 10 minutes once for each SAP / cycle. So that would be obtained percentage (P) with the formula:

$$P = \frac{\text{Total score item of observer}}{\text{number of observer}} \times 100\%$$

#### b. Analysis of Student Learning Motivation.

To find out the result of increased student motivation to learn, use calculation of the percentage of questionnaires. Each item response corresponding statement lattice questionnaire (Table 3.1) described quantitatively into scoring (Table 3.5). The results of the questionnaire are summed stuffing, starting the cycle all cycles 1 to i, then in percentage to obtain a picture of student learning motivation with Problem Based Learning model (PBL) and the prescribed method using the integrated multimedia as one of the supporting infrastructure.

**Table 3.5:** Scoring item questionnaire statement

Scoring point statement	Description
1	Strongly disagree
2	Disagree
3	Doubtful
4	Agree
5	Strongly agree

Data obtained from each cycle, then dipersentase analyzed using the following formula:

$$PA = \frac{\text{Total Score Item of Questionnaire}}{\text{Number of Students}} \times 100\%$$

Information:

PA = Percentage Questionnaire

#### IV. CONCLUSION

Observations were made during the preparation, introduction, core activities, closing, time management and control of the classroom atmosphere.

Then the average score of observation of each stage are already observed is described by a category which has also been determined.

The number of values taken from each activity divided by the number of observer and multiplied by 100 % while using the same instrument. Observations were made every 10 minutes once for each SAP/cycle.

To find out the result of increased student motivation to learn, use calculation of the percentage of questionnaires. Each item response corresponding statement lattice questionnaire described quantitatively into scoring.

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EI- 02 -062

## DEVELOPMENT LEARNING MEDIA BASED ON INTERNET USING MOODLE ON DATA COMMUNICATION'S COURSE AT THE STATE UNIVERSITY OF SURABAYA

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**ABSTRACT** : This research aimed to determine impact the development of learning media on data communication's course based on internet to student's learning outcome. Research objective were students of department of electrical engineering the state university of Surabaya. The research study design used pre-experiment design. Methods of data collection were obtained through, the questionnaire responses of students and student's learning outcomes were descriptively analyzed quantitatively expressed as a percentage. The first treatment that was introduced learning media prior to learning then deliver the learning process by using MOODLE based on internet, and last held post-test to determine student's learning outcome. The research results can be obtained: (1) the learning media have been validated by experts is obtained average value for content, animation and evaluation are 83.33%, 79.68% and 78.12%, respectively (2) the student's learning outcome that using learning media based on internet is obtained average value percentage of 87%. Finally, the learning media that using MOODLE based on internet is clearly valid and good achievement to student's learning outcome on data communication's course.

**Keywords:** learning media, learning based on internet, learning outcomes.

### I. INTRODUCTION

In the future application of technology in various fields, especially the Internet in the field of education will be needed in order to improve and equalize the quality of education, especially in Indonesia that territory spread across very far. So, it needs the right solution and quickly to address various issues related to the quality of education.

Learning is a complex process that happens to everyone and lasts a lifetime, since he was a baby up to the grave later (Arif S. Sadiman, 1984)

Media are all forms of intermediaries that is used by humans to communicate or spread ideas or opinions that is expressed until to the intended recipient (Hamidjojo, 1993).

According to opinion of Hamalik (1982), media is one of factor that determines the success of teaching because it has been helping teachers and students in delivering course material that have been formulated in the planning of learning.

Jaya Kumar C. Koran defines e-learning as any teaching and learning using a computer network (LAN, WAN, or the Internet) to deliver learning content, interaction, or guidance. There are also interpret e-learning as a form of distance learning is done via the Internet.

The Internet can be defined as following: "a large collection of computers in networks that are tied together so that many users can share their vast resources". (Williams, 1999).

It would be seem that understanding the internet can be defined as a set of computers that are interconnected with one another and have the ability to transmit data, form of text, messages, graphics, and sound. Then, it can be said that the Internet is a computer network that is interconnected each other computer networks all over the world (Sudirman, 2007)

Moodle was first introduced around the 90 years by Martin Dougiamas, he was webmaster at Curtin University of Technology. In addition, he became administrator of the system in the installation of WebCT (e-learning software from commercial vendors at the university).



According to opinion of Kukuh Setyo Prakoso (2005:13), moodle is a software package that benefit for creating and conducting courses/training/internet-based education. Moodle is a continuous project and endlessly. Development project is designed to support the construction of a framework of social (social construct) in education.

Moodle stands for Modular Object-Oriented Dynamic Learning Environment. Moodle is an application of Course Management System (CMS) which can be downloaded free or modified by anyone with the license GNU (General Public License).

Whoever can download the application at the address <http://www.moodle.org> and initial view website can be viewed as figure 1 at the next page, so that anyone can download and install it.

Based on some explanation of learning media, it can be concluded that the learning media is a tool, material or various components that used in teaching and learning activities to deliver a message from source to the receiver and make more easily the message recipient receives a concept.

Data communication's course is a compulsory subject that should be taken by students of the Department of Electrical Engineering State University of Surabaya (Unesa) as the principle of Science and Technology due to the rapid development of the science in education and industry. Therefore, it is necessary to develop a media that can help students in understanding the Data Communication's course. It is expected the delivery of course materials in the learning process more leverage and can be understood by students more easily.

According to the previous description, the purpose of this study can be formulated as following: (1) make learning media using moodle based on internet at data communication's course (2) know the results of learning outcome students using moodle based on internet at data communication's course (3) determine response students against learning media based on internet at data communication's course

Subjects Data Communications is a course that is given to each student majoring in electronic communications education discusses the understanding kind of data communication systems, format, and speed covering a wide range of data communication systems that exist include serial, parallel, synchronous, asynchronous, half duplex, full duplex, modem, protocol, and the others. (Ariyus, 2008)



**Figure 1.** Display Web *MOODLE*  
 Sumber: <http://www.moodle.org>

## II. METHOD

This research uses a design types One-Shot Case Study that included in the pre-experimental design (Sugiono, 2008). In this design, there is one group that is used for research and given treatment and then observed the results. Research paradigm can be described as follows:



Explanation:

X: given treatment (learning media)

O: Observation (students)

Basically this research to produce the E-learning as a complement or substitute in a study that could bridge the limited time in class learning process

For this media learning use research tools (research instrumentation) in the form of questionnaires and evaluation sheets, which contains answers questionnaire from media expert validator.

Sheet questionnaire is aimed at media expert such as lecturers and subject content experts as well as students. While the evaluation is done by work on the problems given to students online, so that researchers know student learning outcome.

### III. RESULTS AND DISCUSSION

The development of this research use the Research and Development (R & D) method, which consists of seven steps: (1) Research and data collection, (2) Planning, (3) the development of the product, (4) preparation trial products, (5) Revision products, (6) The test product, (7) Analysis and reporting.

The entire contents of the website can be seen in this figure 2 and 3, respectively:



Figure 2. Display of E-learning

Figure 3. Display of content

Media learning courses that designed for Data Communication's course is expressed by rating of 75.96%, so that media learning tools e-learning course on data communication can be used as a medium of learning in department of electrical engineering State University of Surabaya.

The details of aspects of media formats are excellent with a rating of 83.33%, aspect of media material with rating of 79.68%, while aspects of animation media with results of 65.62% . Finally, aspects of media evaluation rating results is expressed by 78.12%.

The response of students to the learning on Data Communication is good with the result of 75.20%. Based on the results of data analysis can be made the description that "Learning Tools E-Learning course on Data Communication" have gotten a positive response from the majority of students.

Results learning outcomes using learning tools E-Learning on Data Communication can be seen as follows: Students who have passed are 27 students who have not completed is 4.

Percentage of learning outcomes in department of electrical engineering the State University of Surabaya using learning tools E-Learning on Data Communications has been achieved with score of 87%.



## IV. CONCLUSIONS AND SUGGESTION

### A. Conclusions

Based on the results of research and discussion can be taken several conclusions as follows: (1) the development of Internet-based on media learning (E-Learning) on Data Communications in the Department of Electrical Engineering UNESA is qualified (valid) with a 76% rating result. So that the learning tools E-Learning on Data Communications has been qualified and can be used as a learning tool in the Department of Electrical Engineering the Surabaya State University; (2) the response of students to the learning tools of 75.20% with a good category, which means learning tools E-Learning on Data Communications have received a positive response from the majority of the students; (3) while the calculation results of classical learning completeness reached a score of 87%. Thus we can conclude the result of learning outcomes using learning tools E-Learning on Data Communications at the State University of Surabaya was good category.

### B. Suggestions

In future, It is expected for the development of similar research can be made more attractive and adding animation in the presentation of the material so that the students do not get bored and make evaluation subject more variation in order to spur the students for using the media learning based on internet.

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EI-02-007

## CUTVIEWER USE SOFTWARE TO IMPROVE SKILLS AND LEARNING OUTCOMES CNC COURSE IN MECHANICAL ENGINEERING EDUCATION STUDY PROGRAM FKIP UNS SURAKARTA 2015/2016

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**ABSTRACT :** *The aim of this research is to improve the skill and learning result in the Basic CNC Turning and CNC Milling of the students the class of Mechanical Engineering Education, the Faculty of Teacher Training and Education, Sebelas Maret University, Surakarta in Academic Year 2015/2016. The target of change are improving students' skill and learning result, with action variable is the uses CutViewer software. This research is has of four phases, namely: planning, implementation, observation, and reflection. The subjects of this research were all of students as many as 31 from the class of Mechanical Engineering Education, the Faculty of Teacher Training and Education, Sebelas Maret University Surakarta in Academic Year 2015/2016. The data's of the research were collected through observation, documentation, test, and in-depth interview. The instrument validated with content validity of the observation sheet and expert judgment of the test. The data's analyzed by descriptive comparative method and critical analysis. The result shows that the uses CutViewer software can improve the skill and learning result. In Cycle I, the average of student's skill attainment is 65.42% and the average score is 80.91 with the percentage of the students who fulfill the minimum learning completeness criterion is 74.19%. In Cycle II, the student's skill becomes 88.45% and the average score is 85.69, with the percentage of the students who fulfill the minimum learning completeness criterion is 100%.*

**Keywords:** CutViewer Software, CNC Turn and Mill, Skills, Learning Outcomes

### I. INTRODUCED

Software CutViewer is one of learning media package that can be used to facilitate the learning process that will make the program operated on a machine Computer Numerically Control (CNC) . This software is easy to operate, can be operated via a personal computer and can be accessed from anywhere ( not just in the lab) so it is very beneficial for the users .

During in Mechanical Engineering Education Study Program, Faculty of Teacher Training and Education, UNS Surakarta teach how to make programs directly on the CNC machine so that the result is less than the maximum because learners not practicing. With the use of this software can be a medium of learning in order to improve the skills of students in the practice of CNC .

Limitations on the number of machines of CNC in Mechanical Engineering Education Study Program, UNS Surakarta lead to low skills and learning outcomes of students in the subject of CNC . The problem can be overcome by using instructional media CutViewer this software .

Gagne and Briggs (1997), quoted by Sumiati and Asra (2009 : 160) emphasizes the importance of learning media as a tool to stimulate the learning process . This was defined as anything that can be used to deliver the message, stimulate the mind, feelings, concerns and willingness of students so as to encourage the teaching and learning process .

Skills means the ability to complete the task (Ministry of Education and Culture cit Sukiarto, 2007). Skill is the ability of individuals to carry out actions that begins with receiving specific learning experience.

Purwanto (2011 : 44-45) explained that the study results can be explained by understanding the two words that make it up, namely the "results" and "learning". It self the result (product ) refers to an acquisition as a result of doing an activity or process that result in changes in the functional input. Learning is done to commercialize their behavioral changes in individuals who learn .



The purpose of this study to enhance the skills and practices of CNC student learning outcomes Mechanical Engineering Education Study Program, Faculty of Teacher Training and Education, UNS Surakarta in the academic year 2015/2016 via the user of CutViewer.

## II. RESEARCH METHODS

This research is a classroom action research conducted on students Mechanical Engineering Education Study Program, Faculty of Teacher Training and Education, UNS Surakarta year 2015/2016 amounted to 31 students . The data source of this research was the respondents , events , and documents or records . Collecting data in this study conducted in four ways , namely observation , documentation , assignments / tests and interviews . Test the validity of the instrument using the construct validity . Variables learning outcomes researchers used a technique content validity. The test the validity of the content of the tests to be used, the researchers used a technique expert judgment .

Data were analyzed using descriptive quantitative analysis technique comparative percentages. This method is used to assess the skill with the variable:

$$P = \frac{f}{N} \times 100\%$$

Where:

P : percentage  
 f : Frequency  
 N : Number of respondents  
 100% : konstant

Descriptive percentage indicates the level of criteria to determine the highest percentage figure and determining the lowest percentage .

**Tabel 1.** Descriptive Analysis Criteria Percent

No	Percentage	Criteria
1	76% - 100%	Good
2	56% - 75%	Enough
3	40% - 55%	Not good
4	1% - 40%	Bad

## III. RESULTS

### A. Observation Actions

Here is the observation of teaching practices using instructional media software CutViewer:

#### 1 ) Skills of Students

In the first cycle , the skills of students in training of CNC Basics show results that are included in the category of "enough" , which is the average skills of learners by 65.42%. The results of these skills have not reached a good indicator of the skills (80%). The skill level is measured on seven indicators of learning skills . The explanation of each indicator skill in detail as follows :

**Table 2.** Skills Students Cycle I

No	Observed Objects	Achievement	Target
1.	Independence of learners in doing the job .	70,4%	80%
2.	The ability of resolving the problems in the job	65%	80%
3.	Has several options to resolve the problems in the manufacture of CNC program .	65,8%	80%
4.	Ability to analyze and resolve new problems correctly .	64,6%	80%
5.	Creative thinking in doing the	63,3%	80%

	job .		
6.	Working quickly and accurately .	62,5%	80%
7.	Learners concentration and meticulous .	66,3%	80%
The average overall skill		65,42%	

## 2 ) The results of learning CNC

Learning outcomes seen from the thoroughness of learners . The evaluation results indicate that the first cycle completeness of learners by 74.19 % ie as many as 23 students , with an average value of 80.91 , while the remaining 8 learners incomplete. Here the data in detail :

**Table 3.** Learning Outcomes of Students Cycle I

No.	Interval	Number of Students	Information
1.	0 – 60	0	Not Completed
2.	61 – 75	9	Not Completed
3.	76 – 85	9	Completed
4.	86 – 100	13	Completed
Number of students		31	

The range of values of students in initial conditions can be presented in the following table :

**Table 4.** Range of Values of Students In the cycle I

No.	Interval	Frequency
1.	65 – 70	5
2.	71 – 75	3
3.	76 – 80	4
4.	81 – 85	6
5.	86 – 90	10
6.	91 – 100	3

The highest value obtained learners is 95. At intervals the value of the first cycle looks a value above 85 has increased as many as 13 students but there are still eight students that scored below the KKM (76).

## 3) Actions reflection Cycle I

The results of the data analysis at this stage is used as a reference to plan the next cycle . Information gained from the first cycle shows that skills and learning outcomes of students do not meet the target .

Based on the observation and analysis above, the act of reflection to do is :

- 1 ) The role of teachers should be reinforced in control of teaching and learning.
- 2 ) Job to practice before the test is made easier and more attractive look.
- 3 ) Teachers are more closely manage the evaluation , in terms of both jobs and the evaluation process to prevent cooperation during the evaluation .
- 4) Improvements in the way of writing programs that can save time , ie without rewriting the same command at the top of the block.

## B. Cycle II

### 1. Observation Actions

Based on observations on the implementation of the learning process CNC training. Here is the observation of the use of instructional media software CutViewer :

### 1 ) Skills of Students

In this second cycle , the skills of students in CNC training shows the results included in the category of "good " , which is the average skills of learners by 88.45 % . The results of the second cycle skills in detail as follows :

**Tabel 6.** Keterampilan Peserta Didik Siklus II

No.	Objek Amatan	Ketercapaian
1.	Independence of learners in doing the job .	89,58%
2.	The ability of resolving the problems in the job	90,42%
3.	Has several options to resolve the problems in the manufacture of CNC program .	88,75%
4.	Ability to analyze and resolve new problems correctly .	87,5%
5.	Creative thinking in doing the job .	90,42%
6.	Working quickly and accurately .	84,58%
7.	Learners concentration and meticulous .	87,92%
The average overall skill		88,45%

Learning outcomes seen from the thoroughness of learners . The evaluation results indicate that the second cycle students learning completeness of 100% that as many as 31 students , with an average value of 85.69 . This shows siswa has achieved learning outcomes research performance indicators , with data in detail

**Tabel 7.** Learning Outcomes of Students Cycle II

No.	Interval	Number of Students	Information
1.	0 – 60	0	Not Completed
2.	61 – 75	0	Not Completed
3.	76 – 85	13	Completed
4.	86 – 100	18	Completed
Number of Students		31	

The range of values of students in the second cycle can be presented in the following table :

**Table 8.** Range of Values of Students In Cycle II

No.	Interval	Frequency
1.	76 – 80	5
2.	81 – 85	10
3.	86 – 90	10
4.	91 – 100	6

At intervals the value of the first cycle looks a value above 85 has increased .

### Actions reflection Cycle II

The results of the data analysis at this stage is used as a reference to plan the next cycle. Information obtained from the second cycle showed that the skills and learning outcomes of students already meet the targets.

Comparison of Outcome Measures the Cycle. The improvement of each indicator in the study can be presented as follows :

**Table 9.** Improved results for Research Cycle

No	Aspect	Target achievement	Prosentase		Cycle I to cycle II
			Cycle I	Cycle II	
1.	Skills	80%	65,42%	88,45%	23,03%
2.	Results of learners	80%	74,19%	100%	25,81%

According to the table 9 , seen data presented in the first cycle and the second cycle on the increase. The successful implementation of learning to use the software media CutViewer have an impact on increasing the skills of learners and the skills that increase ultimately improve learning outcomes . The results showed the use of media software CutViewer positive impact on CNC learning activities , so as to improve the skills and learning outcomes of students .

#### IV. DISCUSSION

The use of media software CutViewer on training of CNC Basics is a class action that aims to improve the skills and learning outcomes of training of CNC Basics . This research was conducted by applying two cycles of learning through the same medium at each cycle , ie using software media CutViewer. Each cycle further changes towards improving the learning process based on the reflection previous cycle.

Finally, at a certain cycle can reach the indicators of research performance . The study reached the indicators of research performance in the second cycle which showed improved results from Cycle I. cycle which consisted of the following two indicators of achievement that is the skill and learning outcomes of students at Basic training of CNC.

##### A. Skills

Skills of learners in the use of media software CutViewer is increased from the first cycle to the second cycle , which amounted to 23.03 % . Where the achievement of performance indicators have reached the target skills. In the second cycle of each indicator obtain equitable outcomes in which the achievements of each indicator skill at least 80 % in a range of categories. The following table skills upgrading learners :

**Table 10.** Increasing The Skills of Students

No	Aspects observed	Target achievement	Cycle I	Cycle II	Inter- Cycle I and II
1	Autonomy		70,4%	89,58%	19,18%
2	Reconstruct / organize results		65%	90,42%	24,58%
3	Flexible		65,84%	88,75%	22,71%
4	Adaptive		64,59%	87,5%	22,91%
5	Creative		63,33%	90,42%	27,09%
6	Dexterous		62,5%	84,58%	22,08%
7	Austerity		66,25%	87,92%	21,67%
<b>Average</b>		<b>80%</b>	<b>65,42%</b>	<b>88,45%</b>	<b>23,03%</b>





According to the table 10 shows that the skills of learners has increased from the first cycle to the second cycle with the average of 23.03%. The small increase observed objects independence and rigor caused, in the first cycle observed objects independence and accuracy scores the highest of 70.4% and 66.25%, when carrying out the second cycle the observed objects are not increased too large compared to the object other observations, because the second cycle there are still some students who get caught cooperate when taking the test and the precision of learners in work program.

In the observed objects nimble despite experiencing a larger increase than the independence and accuracy, observed objects deft has the largest percentage low both in the first cycle and in the second cycle, this is due to the students who work quickly but less precise, and there are right but less fast in doing, it can be seen from the results of measurements of working time and the results of the programming of the learner.

In the observed objects reconstructed, flexible, and adaptive increased similarly. Due to the three observed objects observed the same thing from the learners, namely how learners can solve problems encountered when working on the program. The greatest increase is observed objects creative of 27.09%. Major increases in the creative observed objects visible from all learners can apply the use of media software CutViewer well and were able to create a program with creative thinking abilities of each learner, so that the results are made have different programming of each learner. A significant increase in these indicators, showed that the use of media software CutViewer able to improve the skills of learners in making CNC program.

#### Learning Outcomes of Students

By using the software media CutViewer on CNC turns learning courses can improve learning outcomes of students Mechanical Engineering Education, Guidance and Counseling, UNS Surakarta. It can be seen from the test execution from the first cycle to the second cycle.

#### **B. Cycle I**

On the implementation of the first cycle of the values obtained by the students the class of Mechanical Engineering Education, the Faculty of Teacher Training and Education, Sebelas Maret University, Surakarta learning training of CNC Basics is low, here can be seen from the achievement tests that have not reached mastery learning criterion of 80%. Learners who scored below the KKM (76) by 8 students, average achieved new 80.91 and 74.19% of the new percentage completeness 80%. Here it can be seen that the implementation of the first cycle is not successful or otherwise do not meet the criteria of mastery learning. Learners who otherwise completed 74.19% and unresolved as much as 25.81%, while the mastery of learning outcomes should reach 80%.

#### **C. Cycle II**

In the second cycle the values obtained values were obtained by the students of class XI TPM B SMK Negeri 2 Surakarta increased and otherwise has been successful or have met the criteria, namely the achievement of learning completeness percentage of 80%. Can be seen from the results of the last test that students, all students get a score above 76 as many as 31 students, the average achieved at 85.69 and the percentage reached 100%. Students who otherwise completed in learning CNC Basics is 100%. With the holding of this second cycle learning outcomes of the course Basic CNC Mechanical Engineering Education Study Program, Faculty of Teacher Training and Education, UNS Surakarta otherwise completed.



**Table 11.** Comparison of Results of Learning of Students in Cycle I and Cycle II

No	Interval	Cycle I	Cycle II	Information
1	60 – 75	25,81%	0%	Not Completed
2	76 – 100	74,19%	100%	Copleted

Based on the results of actions taken , the teacher has been successfully implementing learning using software media CutViewer , resulting in an increase in the skills of students in CNC programming . Furthermore, with the high skill, making the students easily create CNC programs , so that the study of students also increased . It can be seen from the increasing student mastery learning and have reached the target of exceeding the 80 % indicator of learning outcomes in the form of a 100% mastery learners learners.

## V. CONCLUSIONS

Based on research data obtained a conclusion as follows : the implementation of learning using software media CutViewer can improve their skills and learning outcomes of students . It is proved from observations on the learner by the observer on the skills of students in cycle I and cycle II.

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## THE ROLE OF CRITICAL THINKING FOR ENGINEERING FIELD IN THE WORKING WORLD

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**ABSTRACT :** *Soft skills are different with hard skill. Hard skill can assess with values, but soft skills do not learn in class. So that it can be assess like hard skill. Soft skills consist of interaction ability to other (interpersonal skills) and self managing ability (intrapersonal skills). Soft skills are important because after we graduate from university, we join to society directly. We get interaction with society. Each person has different mindset, principle, point of view and culture. Critical thinking is a cognitive ability. The important ability for decision making and solving problems. Critical thinking is useful in engineering. For example engineering outcomes work in construction firm. When they studied in universitu, they studied the theory about how to build a good building, what is the material should to use to certain building, and theoretical and technical knowledge. But, fresh graduate have not experience to work in new project. First, in really work there are not only about count and draw, but they should making negotiation with accounting, marketing, law, etc. Each part has a different budget and principle. When they studied, they have to mastering how to draw a good designbit in really worked, they have to face many limitations. For example, they must consider limitation budget from accountant, they have to concern market trenda for marketing. It more diffucult when they faced a customer with strong idea, he always keeps his idea when applying the design. Here, we need critical thinking to think more about the problems. Soft skills have advantages in workplace; there are character building, a good personality, increasing the confident, and teamwork. There are the ways to face the critical thinking obstacles: not using emotion, focus on logic and values and lack of concept. The ways to increasing the critical thinking are critical reading, analysis improvement, developing of ability, observation ability, curiosity, asking performance and reflection.*

**Keywords:** soft skill, critical thinking, engineering

### A. INTRODUCTION

Soft skills are more abstract from the hard skills. Not as hard skills that can be measured from the value, soft skills are not taught as elective courses in the classroom. So that it is no assessment system. Soft skills consist of the ability of interact with the interpersonal skills and the ability to regulate ourselves (intrapersonal skills). Interpersonal skills include the ability to communicate with people working in groups, presentation, maintain a good relationship with the people and all the skills associate with how to interact with other people. Intrapersonal skills is the ability to regulate ourselves, as time management, deal with stress, motivate ourselves, responsibility, creative thinking, confident, proactive and ability to improve themselves to be a good personality. Soft skills are important for us because after graduation, we work directly to the working world, where we must interact with the people who have different thinking, the principles and different views, different cultures and still many other differences.

### B. THE STUDY OF THE THEORY

#### 1. Soft Skills

##### a. The Definition

The Request of the working world criteria of worker is perceived to be the higher. The working world is not only prioritize on the academic ability (hard skill), but also pay attention to the skills



in the values that attach to a person or often known with aspects of soft skill. This ability can also call with non-technical capabilities that would have not less important role with the academic ability.

According to Elfindri (2010: 67), soft skills are defined as follows: life skills for both the own group or society values as well as with the God. Soft skills make the existence of a person in the middle of the community will increase. The skills in communicate, emotional, language in groups, ethics and moral, polite and spiritual skills. According to Elfindri soft skill is all the qualities that cause the functioning of the hard skill is owned. Soft skill can determine the direction of the utilization of the hard skills. If someone has a good soft skill, the knowledge and skills that he mastered can bring prosperity and comfort for the owner and the environment. On the contrary, if a person does not have good soft skills, it makes hard skills can be harmful to themselves and their jobs.

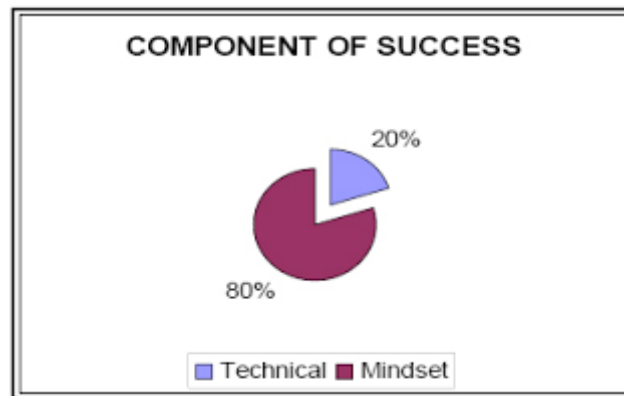
Soft skills are behaviors that build a human character to be able to use (EQ Emotional Intelligence Quotient). In the working world, soft skills are very important in taking the initiative, work with other, and persistent. On this era many competition in the working world, the competition does not include the ability or hard skills but there is need soft skills too. Usually companies need employees who are exceedingly wise in work, always have initiative, good teamwork and develop themselves in an organization. Soft skills include the ability to adaptation, communication, leadership, decision-making, troubleshooting, conflict resolution and critical thinking.

Soft skills have some benefits when it has been in the working world. The following are some benefits of soft skills:

- 1) Soft skills can build character,
- 2) Build a quality personality,
- 3) Confidence,
- 4) Good sociality

Softskills and hard skills are important in our study and the working world. On the study, we need soft skills and hard skills to get science and high mark. Hard skills use to do tasks and test that usually given by lecturer for students to get maximum value. While Soft skills is required to understand and conform the ethics, soft skills is also important for students to socialize with the community both peers, elders, leader in their environment. Soft skills needed for students who are trying to become entrepreneurs and have marginal work. In the working world any softskill and all is needed, even clearly softskill and all written as a requirement for applicants jobs.

It is the percentage of component to get success. Hard skills are 20% and soft skills are 80%. It shows that soft skills have a big role in our success.



There are kinds of Soft skills that working work needed: initiative, ethic and integrity, critical thinking, willingness to learn, commitment, motivation, communicative, creative, analytic, management of time, problem solving, cooperative, flexible, a good team work, independently, listener, logic reason and ability to dealing the stress.

## 2. CRITICAL THINKING

### a. The Definition

Critical thinking according to Mustaji (2012), critical thinking is thinking unreasonable and reflective with emphasized the decision-making about what must be held or done. The following are examples of the ability to think critically, for example (1) experiencing and distinguish, (2) create a category, (2) examine small parts and the whole, (3) describe for, (4) make minimally futuristic setting / sequence, (5) determine source that is held to be, and (6) divination.

According to Walker (2006), critical thinking is an intellectual process in the making of the concept, applying, analyzing, synthesize, and or evaluate various information obtained from the result of observation, experience, reflection, in which the result of this process is used as the basis when take action.

Thinking is a process that happens in man. Every day, human always do the activity of thinking, the ability to think someone comes from within us, but the ability can be trained and developed to become a different capabilities between a men. Sardiman (2006: 46), thinking is a mental activity to be able to formulate the sense, synthesize and draw conclusions.

Rugiro (1998) in (Johnson, 2007: 187) defines that thinking as "all mental activities that help formulate or troubleshooting, make decisions, or fulfill the desire to understand; thinking is a searching answers process to an achievement of meaning. Critical thinking has been defined by the experts. According Santrock (1998) in (Desmita, 2005: 160-161) about critical thinking is "critical thinking involves grasping the deeper meaning of problems, keeping on open mind about different approaches and perspectives, not accepting on faith what other people and books tell you, and thinking reflectively rather than accepting the first idea that comes to mind." (Critical thinking involves the understanding of the depth of the problem, open to thinking and approach different views, not received



so only the things that conveyed both people of the book, and think reflectively before receiving the idea that appears in mind).

From the formulation of above, we can conclude that critical thinking is the understanding or reflection of the problems in depth, synthesize, and draw conclusions to be able to solve a problem, reflective, and evaluative. Critical thinking is a process that focused and used mental activities such as problem solving and doing scientific research. Critical thinking is the ability to argue with how organized. Critical thinking is the ability to evaluate systematically the weight of personal opinion and others.

**b. Critical thinking indicators**

According to Ennis (in Rante 2008) there are twelve critical thinking indicators are grouped into 5 groups thinking skills such as in the following table:

Critical Thinking	Sub- Critical Thinking
1. Elementary clarification ( gives the simple explanation)	1. Focus questions.
	2. Analyze arguments.
	3. Ask and answer questions about an explanation and challenges.
2. Basic Support (Build basic skills)	4. Considering the credibility of a source.
	5. Observe and consider the result of observation.
3. Inference ( Conclusion)	6. Make wrong deductions and consider the results of wrong deductions.
	7. Make the induction and consider the results of induction.
	8. Create and consider the results of the Decision
4. Advance Clarification ( create further explanation)	9. Define the terms
	10. Identify the assumptions
5. Strategy and Tactic ( The strategy and tactic)	11. Decide an action
	12. Interact with others

**c. The importance of critical thinking**

Critical thinking is an important thing to be complete because:

- 1) Critical thinking allows students to take the advantage of the potential for a person in seeing the problem, problem solving, create and realize.



- 2) Critical thinking is the universal skills. The ability to think clearly and rationally is required for any work when studying the science of anything, to solve any problem.
- 3) Critical thinking is very important for information and technology. It must give respond to changes quickly and effectively so that requires flexible intellectual skills, the ability to analyze the information and integrate the various sources of knowledge to solve problems.
- 4) Critical thinking skills improve verbal and analytical writing skills. Think clearly and systematically can improve how to express their ideas useful in learn how to analyze the structure of the text with the logical, improve the ability to understand.
- 5) Critical thinking improves creativity. To produce a creative solution to a problem is not only need new ideas, but new ideas useful and relevant to the tasks, it must be completed. Critical thinking useful to evaluate new ideas, select the best and modify can be necessary.
- 6) Critical thinking is important for self-reflection. To give the structure of life so that life is more significant (meaningful life), then required the ability to search for the truth and reflects the value and the decision yourself. Critical thinking is a meta-thinking skills, skills to do reflection and self evaluation of the value and the decision, and then in the context of make life more meaningful to do a conscious effort to the untruthful result reflection in life.

### C. THE DISCUSSION

In the last years, Pearson (2013) his research that shows that people who have high value critical thinking is also have:

1. Ability to analysis and a good troubleshooting.
2. The assessment and decision making is good.
3. A good achievement in work
4. The ability to evaluate the quality of the information provided.
5. Creative
6. Working knowledges
7. A good potential in the organize

Critical thinking is one of the cognitive ability, one thing that is very important in decision making. It is very important engineering. As well as the graduates of civil engineering work in the construction company. During the lecture would have to learn how the theory of building a solid foundation, the material that needed to be used for certain building types and theoretical knowledge and technical. But perhaps the new graduates who have not yet experienced in work may be in the project. Due to the fact that the work is not only calculate and draw. They must discuss with the finance section, marketing, the lawyer and the other part is concerned, each of which has a budget and the principles of its own. If during in study, the lecture duties only drawing a good design, but they find many limitation in the working world for example they must consider the material used but limit budget from the finance section, must pay attention to the current trend of the market that can be marketed by the marketing and other things. They must get negotiations with the client that maintains their idea. Critical thinking is has important role here.

The obstacles in critical thinking are emotion and lack of knowledge. When we get emotion, it will break our logic. There are the ways to face this condition in critical thinking:

1. Not using emotion, focus on logic and values.



2. Increase the knowledge continuously. Thinking is using information in our mind. If we have many stock of knowledge in our mind, our logic will sharpness and we can think more critical.

There are some efforts to increase our critical thinking:

1. Reading critically

Applied the critical thinking skills in our job is like observing, connecting each concept with text, evaluate the text from logic and credibility point, reflection the content of text with self opinion, compare text to each other.

2. Increasing the analytic skills

On the discussion try to make a good problem solving, and then discussing the bad impact will be happen.

3. Increasing the curiosity, asking ability, and reflection

Ask good questions. It means that try to make question where's no true or false answer, in order to increase the critical thinking.

#### **D. CONCLUSION**

Critical thinking is the understanding or reflection of the problem deeply, synthesis, concluding to solve the problem. Critical thinking is a mental process to solve the problem and to do research. Critical thinking is giving opinion ability to evaluate systematically. Critical thinking produces the base of thinking skills. In the working world not only need hard skills but also need soft skills too. Soft skills have an important role in the working world. Without soft skills, our hard skills are not complete.

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EI-02-029

## THE IMPROVEMENT OF LEARNING ELECTRICAL CIRCUITS ANALYZE USING PREZI MEDIA IN VOCATIONAL HIGH SCHOOL

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**ABSTRACT** :The main problem in this research the results of student learning in subject matter Electric Circuits Analyzing was low (63.33%) at SMK Dhuafa Nusantara Padang and below minimum completeness criteria (MCC), this is due to the teachers use instructional media is traditional (blackboard). Therefore, the purpose of this research is to develop teaching and learning prezi media validity, practicality, and effectiveness way to improve the quality of teaching and learning. The method used is research and development model 4-D (define, design, develop, and disseminate) with research subjects are students of class X TITL SMK Dhuafa Nusantara Padang. The results showed that the developed teaching and learning prezi media validity, practicality (86.62%), and is very effectively to improve the quality of teaching and learning of Electric Circuits Analyzing. Minimum completeness criteria (MCC) capable of improving student learning outcomes amounted to 88.46%, so that the teacher needs to use and develop learning prezi media to support the quality of teaching and learning.

**Keywords:** prezi, media, teaching and learning.

### I. INTRODUCED

The education is an effective tool in supporting the development and enhancement of human resources towards a more positive direction. In line with the development of education is rapidly increasing, requires educational institutions to adapt to the development of science. One way to improve the quality of education is to reform the education system. The learning process is done today is still modest due to the learning process carried out in class focused only to teachers (teacher centered). This learning process would lead to a lack of interaction between students and teachers, the students were not to direct to think critically and creatively in the learning process. Then, the students tend to be passive in the learning process.

In addition, teachers could not conduct the class optimally. For example, when the teacher is busy explaining the subject matter, the students are also busy with other activities that do not pay attention to the explanation provided by the teacher. This can be seen in the observations that have been made previously. In the process of learning that takes students rarely ask and express opinions on the material presented by the teacher. So that, when they are given a test by the teacher, many students do not answer the questions well. This would be impact on learning outcomes. The learning outcomes can be shown on Table 1 below.



**Table 1.** The Percentage of Student's Learning Outcomes of Electric Circuits Analyzing of X TITL at SMK Dhuafa Padang FY 2014/2015

Complete Minimal Criteria (KKM)	TITL	Percentage (%)
$\geq 75$	11	36.67
$<75$	19	63.33
Total	30	100

Source: Learning Outcomes List of Electric Circuits Analyzing of SMK Duafa Padang.

Based on Table 1, it can be seen that there are still students who have not completed Electric Circuits Analyzing subject according to Complete Minimal Criteria (KKM), students have reached KKM if they have learning outcomes  $\geq 75$ . Of course, this problem does not comply with the KTSP's completion (75% complete). These data is still much to be desired, it might be caused by various factors, including, instructional media less varied, one-way the learning process (teacher centered) which not using another learning model, the lack of involvement of the student in the learning process. Those would be impact on student learning outcomes.

One of solving problem to overcome this problem is using the media in learning process, because it can generate motivation and stimulation of learning activities. Particularly, in Electric Circuits Analyzing (MRL) use appropriate media presentation which will make the abstract more concrete or tangible helping students to understand the subject matter. The variation of instructional media is one way that can be taken to induce a pleasant atmosphere in the classroom, increasing the activity, and student mastery of the material. Variations of instructional media would be more interesting to follow the students' learning. Therefore, a teacher is able to perform a variety of media learning and to improve student learning outcomes.

## **B. THEORY REVIEW**

According to Gerlach and Ely (Rayandra 2012: 7), "Instructional media has a very broad scope, which includes human, material or studies that establish a condition that makes the learner is able to acquire the knowledge, skills, and attitudes. Based on the above understanding, learning media can be understood as "everything that can deliver or distribute a message from a source in a planned, resulting in a conducive learning environment in which the receiver can make the learning process efficient and effective manner. Prezi's instructional media provide a stage that is not limited in extent for creative teachers produce interesting presentation slideshow. With a platform that is based on the flash, the functions are there to be very dynamic and interactive. Teachers can incorporate a variety of pictures, songs and even video into presentations with ease. Moreover, teachers are also given the complete freedom to be creative about the movement of one slide to the next slide. The transition can zoom in/out, rotation, and more. Prezi's instructional media is based on the stage. Then, the result's slide creations must have been very effective and interesting for students. Excellence Prezi's instructional media allows to make a presentation to the canvas using the system path, or so-called "Path" which is



used to regulate the flow between one object to another object in the canvas. Displacement does not only happen in a linear manner, but also can bring up the effect of zooming. It also provide facilities to include pictures, video, several shapes and illustrations like diagrams. It provide attractive templates, import facility to convert the content into the content inside Prezi's power point. Then, Prezi's learning media can explore parts of the canvas to the smallest detail that the main concept to be conveyed clearly visible. This indicates that the Prezi's learning media can be used to attract student interest. In addition, this media-based adobe water, so that video and flash animation can be run with a lighter. This indicates that the Prezi's learning media can be used to attract student interest.

Electric circuits Analyzing (MRL) is a subject that has the scope to describe the basic material of electricity. MRL is one of the subjects that provide basic knowledge to the students, to be ready to receive more lessons in the discussion, especially in electricity. Electric circuits Analyzing in the academic year 2015/2016 consists of one of Competency Standards (SK) is to analyze electric circuits, and it has four basic competencies (KD), i.e. (1) to describe the concept of RL (2) to analyze RL's direct current (3) to analyze RL's alternating current, and (4) to analyze the magnetic circuit. Electric circuits Analyzing (MRL) especially on basic competencies describing the concept of the electric circuit is suitable using Prezi's learning media. The media can create lessons that are abstract becomes more concrete. In accordance with cones of dale's experience, that with the demonstration like audio, and video; so, it can help the student to the understanding the subject matter because of the involvement of student's senses.

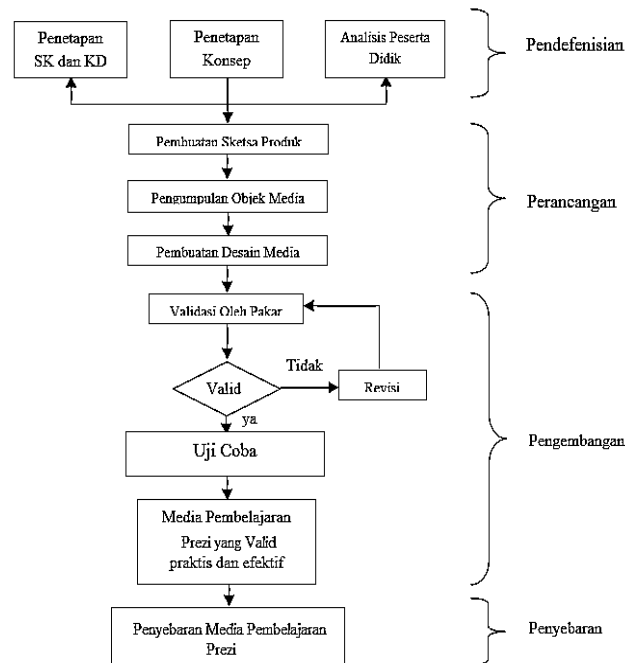
#### A. The Problem's Formulation

Based on the problems that have been outlined and identified in the background, the focus of the problem in this study is limited to the development of instructional media of Prezi. The media was developed in applied of basic competence to describe the concept of the electric circuit on the subjects MRL in SMK Dhuafa Padang. The problem's formulation is how to develop learning media Prezi become valid, practical, and effective on subjects MRL at SMK Dhuafa Padang?

## II. THE RESEARCH METHODOLOGY

The type of research that used is a research approach development (Research and Development). The method of research and development is to produce a particular product, and to be able to produce such products (Sugiyono, 2013: 407). The subject of research is Prezi's learning media on MRL. The respondents are students and teachers of TITL X SMK Padang Dhuafa.

The development model which used in this study is the 4-D model of development. The development model of the 4-D (Trianto, 2012: 93) has four stages in its development, namely phase I (define), phase II (design), stage III (develop), and stage IV (disseminate). The development model of 4-D was shown in Figure 1.



**Figure 1.** Chart of 4-D's Development Model

According to Suharsimi Arikunto (2009: 29), means of data collection or data collection instruments are selected tools and used by researchers in their activities in order to collect these activities into a systematic and easy by it. The instrument used in this study is to collect data relating to the validity of which is used to measure the level of validity multimedia interactive learning, the practicalities are used to measure how practical media that have been made in the learning process, and the effectiveness was measured by conducting developed objective tests in the form of student learning outcomes. The instrument is a validation sheet, questionnaire's practicalities and objective tests. While, the data analysis is using descriptive data analysis techniques. The research methodology is to describe the validity, practicality and effectiveness of Prezi's instructional media on MRL.

### III. RESULTS AND DISCUSSION

#### A. Results

According to the research method, this research conducted the 4-D's development model which consists of four stages:

##### 1. Stage I (Definition)

The definition's stage aims to establish and to define the conditions of learning in accordance with the purpose of research of Prezi's media development. At this stage, the steps are:

- a. Determination of Competency Standards (SK) and Basic Competencies (KD)
- b. Determination of Concept
- c. Analysis of Students



## 2. Stage II (Design)

In the design's stage of Prezi's media is adjusted to the basic competencies, indicators and learning materials of Electric Circuits Analyzing. In this stage, there are several steps to be taken are:

- a. To make Sketch
- b. To collect object of media
- c. To make media's design

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The development stage is to produce the final form of Prezi's instructional media through revisions which based on input from experts and test result data. The development phase consists of:

- a. The validation's stage

The validation's stage of media was tested by three validators: two validator are electrical engineering's lecturer and a validator is teacher of MRL at SMK Dhuafa Padang. The results of validation is shown in Table 1:

**Table 1.** The Results of Validation

No	Validator	Score	Max Score	Percentage
1	1	67	80	83,7%
2	2	69	80	86,25%
3	3	69	80	86,25%
The Average Percentage				85,4%

- b. The trial's stage

This stage aims to determine the practicalities and effectiveness of developed instructional media.

### 1) The Practicality Test

The test's results of practicality was tested by the teacher obtaining a percentage of 85.4%, so that this results categorize as practical.. The percentage of assessment's data presented in Table 2:

**Table 2.** The Results of Practicality by Teacher

No	Criteria	Score	Max Scor	Percentage
1	Practicality of med	47	55	85, 4%

The practicality test of Prezi's learning media was performed by students of X TITL at SMK Dhuafa Nusantara Padang as 26 students obtained an average value of 87.84% with a practical category.

### 2) The Effectiveness Test

The effectiveness test was performed by seeing the student's learning outcome, as shown in Table 3.



**Table 3.** Frequency Distribution of Results of The Effectiveness Test

No	Interval	Frequency	Relative Frequency	Cumulative Frequency
1	60-64	1	3.84	1
2	65-69	0	0	1
3	70-74	2	7.68	3
4	75-79	7	26.88	10
5	80-84	9	34.57	19
6	85-89	5	19.2	24
7	90-94	2	7.68	26
Total	26	100		

### 3. Stage IV (Dissemination)

The packed of CD of Prezi's media distribute to teachers of MRL at SMK Dhuafa Nusantara. Prezi's learning media also distribute via internet.

## B. Discussion

Electric Circuits Analyzing is one of the subjects that must be studied by all students X TITL as the foundation for advanced subjects which will be studied at the next grade level. These subjects also apply the concepts of electrical circuit, which makes it very abstract, so it is difficult to be understood by students when using verbal information. With the development of these media make immateriality Prezi is reduced, and the learning materials can be understood better by students. So that, this would enhance the learning outcomes to the higher marked compared to previous.

The validity test of Prezi's media obtained from fill in the sheet of validations conducted by a team of validators with results of 85.4% or with a valid category. This shows that the developed multimedia is qualified didactic and technical construction. The practicality Prezi's media was tested by filling the questionnaire by the respondent consisting of teachers and students X TITL of MRL at SMK Dhuafa Nusantara Padang, total as 26 students. The results test of students are obtained the 87.84% with a practical category. The practicality results of teachers obtained the average practicality of 85.4% with a practical category.

The effectiveness test of Prezi's instructional media was done by looking at the classical mastery learning after the use of this media. Prezi's learning media can improve learning outcomes, as it's evident from the posttest result of students who have grades above KKM. From the views of student learning outcomes, that are the grades above KKM obtained after application of with Prezi's instructional media is 88.46%. To sum up, the usage of Prezi's media is very effective because it makes comprehension or understanding the material to be excellent marking.

The using of Prezi's instructional enhance student's learning outcomes, and it also giving better understanding for students in MRL lesson. This might create the interaction between teachers and



students, along their feedback during the learning. Submission of materials by teachers delivered by presentation, then there is training and evaluation. After Prezi's media categorize as valid, practical and effective media, then it would be in disseminated stages. The distribution of Prezi's media conducted on a small scale in SMK Dhuafa Padang. Prezi's media deploy to the subject teachers of MRL of SMK Dhuafa Nusantara Padang, and it also disseminate via the internet.

The Prezi's instructional media development are limited to two basic competencies on MRL subjects. There are many obstacles for development. The challenge remains, namely electricity blackouts problems. Finally, the first meeting of the learning activities carried out in the next week. These obstacles are finally resolved, and continue to the learning process for the next meeting.

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

##### **A. Conclusions**

Based on the research, it can be concluded that Prezi's media development research has produced a valid, practical, and effective instructional media for Electric Circuits Analyzing (MRL) of X grade at SMK Dhuafa Padang. The validation results of Prezi's media from three validators is 85.4% of the valid category, consist of 83.7% from 1<sup>st</sup> validator, 86.25% from 2<sup>nd</sup> validator, and 86.25% from 3<sup>rd</sup> validator.

Test practicalities results was obtained that Prezi is practical instructional media used in learning, with a level of practicality as 86.62% from 87.84% by the students (practical) and 85.4% (practical) by teachers. The effectiveness of the use of instructional media Prezi derived from classical completeness level students is 88.46%, so that developed Prezi's learning media is effective for use in the learning process.

##### **B. Recommendations**

Based on the discussion and conclusions as a follow-up to research and subsequent development, as for some suggestions as follows:

- a. Teachers need to make the best use of existing information technology facilities in the learning process, such as using Prezi's learning media and other learning media.
- b. The need for further research and development of instructional media Prezi, which covers all aspects of learning.
- c. The development of research is expected the other to support the development of research learning.



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EI-02-030

## IMPLEMENTATION OF COOPERATIVE TEACHING METHODS TO INCREASE OF TEACHING THE UNDERSTANDING OF BASIC ELECTRONICS SUBJECTS IN ELECTRICAL DEPARTMENT SMK NEGERI 1 PARIAMAN PADANG

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**ABSTRACT :** *This research is motivated from the learning outcomes of the students at SMK Negeri 1 Pariaman class X TITL on subjects Understanding the Basics Electronics (MDE) which is still not optimal. One of the factors that influence student learning outcomes is the low learning process centered on the teacher (teacher center), so it can not raise the activeness of students in learning. Therefore, it's really need a method of cooperative learning "Think Pair Share" that can encourage students to be more active and creative in the learning process. Students will discuss with friends his chairmate, and mastery the subject matter together. Moreover, using this method the student is able to solve the problems experienced during the learning process well. The goal of this study is to see significantly the differences of student learning outcomes in subjects MDE using the Think Pair Share and lecture in SMK Negeri 1 Pariaman. This research is a Quasi Experiment with design "Posttest Only Control Design". The subjects were students of class X SMK N 1 Pariaman enrolled in the academic year 2015/2016 which consists of two classes, namely X TITL-1 and TITL-2. From these two classes were randomly selected, class X TITL-1 As the experimental and class X TITL-2 as the control class. To see the beginning of the student's ability to analyze daily tests (UH) on the subjects of MDE. Collecting data in this study using achievement test (posstest) in the from of an objective matter as much as 25 items. Data were analyzed using two different test average (t-test). Based on the research results obtained average value 82.85 post test experimental class and control class 74.91. These results indicate that there are significant of student learning outcomes between experimental class using "Think Pair Share" cooperative methods compared with control classes using traditional method.*

**Keywords :** Method Think Pair Share, Methods of Teaching and Learning Outcomes.

### I. INTRODUCTION

Education is an attempt to create human resources that have the knowledge that is useful to make man more qualified and immoral. Vocational High School (SMK) is an educational institution not only provides knowledge but also provide students with skills. Schools are an effective tool in supporting the development and enhancement of the human family resources towards a more positive direction. One of the subjects that the productive part is very important that given to students in the field of Teknik Instalasi Tenaga Listrik (TITL) is Memahami Dasar-dasar Elektronika (MDE). This course covers the activities to educate, train and prepare students to be able to master the basic concepts of electronics in the field of electricity

Based on the results of preliminary observations that the author did in SMK Negeri 1 Pariaman in learning MDE. Seen many students are bored, sleepy, inattentive, and inaction on the material being taught teachers. By the time the teacher explains the subject matter and gives examples of questions, a lot of students who have not been creative and active and less dare to issue its opinion in the learning



process. Low interest and activity of students in the classroom lead to lower learning outcomes achieved by students.

Referring to the results of interviews with subject teachers MDE for observation, obtained information that student learning is less eager to follow the lessons, often out of the classroom and unplug. After the evaluation was still a lot of students who do not understand the subject matter. As a result of student learning outcomes have not reached the *Kriteria Ketuntasan Minimum (KKM)*.

Many factors affect student learning outcomes as internal factors and external factors. Among the external factors one of which is a method of learning which is one component that could affect the study results. How much influence teaching methods to student learning outcomes can be determined by which method is better to achieve the learning outcomes. Anticipating the low student learning, should the effort to develop creativity in the learning process management strategies. Management strategy in question is the student not just serve as the object alone but also as a subject of direct actors in the learning process.

One of the methods that can be used is a method to study groups (cooperative), because in group learning can foster students' awareness and sense of responsibility in students. One method of cooperative suspected suitable to be applied is the method of learning Think Pair Share. Cooperative learning methods TPS type is cooperative learning methods that have defined eksplisit procedure gives more time for students to think deeply about what is being described or experienced (thinking, respond to, and help each other). They help students in developing and associate facts and concepts that had been learned in problem solving.

This method could encourage students to be more active and creative in the learning process and will encourage learning in the classroom more leverage because of the methods they have to explain to his friend the material being studied. This method is suitable for subjects that form of understanding the material as subjects MDE containing about recognition, understanding and penerapaaan of electronic components for the methods of TPS students clarify each other, in this way it is expected that students will more quickly understand, because his direct explained.

According Fathurrohman (2015: 86), TPS is a type of cooperative learning that has procedures set out explicitly to give students plenty of time to think, to answer and help each other. Furthermore, according to Trianto (2011: 61), Method cooperative TPS is an effective way to diversify the atmosphere of a class discussion on the assumption that all is resistant or discussion needs settings for mengendaliakan class as a whole and the procedures used in the method of cooperative TPS can give students more time to think, to respond and help each other.

Advantages of TPS method, according Istarani (2012: 68) namely; (1) increase the power of reason, critical power and imagination of the students to the problems, (2) increased cooperation between the students as they work in groups, (3) improve the ability of students to understand and



respect the opinions of others, (4) enhance students' skills in presenting opinion as implementation science, and (5) the teacher is more likely to add a child's knowledge when it finished discussions.

Based on the problems described above, it can be formulated problems in this paper, namely, how the application of methods of cooperative learning TPS MDE in SMK N 1 Pariaman. Furthermore, this study aims to find a significant difference in student learning outcomes in learning MDE using the type cooperative TPS and traditional methods at SMK Negeri 1 Pariaman

## **II. RESEARCH METHODS**

This type of research that will be done is quasi (quasi-experimental), to determine differences in learning outcomes of students in learning MDE using cooperative learning TPS and traditional methods in vocational Negeri 1 Pariaman. The subjects were students of class X TITL electricity power engineering expertise SMK Negeri 1 Pariaman registered in the first semester of the 2015/2016 academic year with the number of 71 people consisting of TITL-1 amounted to as many as 35 students, and TITL-2 is about 36 students. according to the type of research conducted, it is necessary to sample two classes, namely the experimental class and the control class. Selection of experimental class and control class is done by analyzing the average value of daily tests of students. After the second class can be used as a research object, the determination of the experimental class and control class can be determined by simple random sampling technique.

The instrument used in this study is in the form of 30 questions about the objective. Before the test questions about the tests used to determine the validity, reliability, level of difficulty and different power about the matter. Tests performed on the class X SMK N Dhuafa Padang.

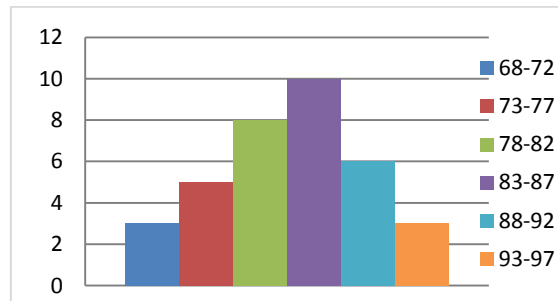
Validity is based on calculations where if  $r_{\text{count}} > r_{\text{table}}$  the test items are considered valid and if  $r_{\text{count}} < r_{\text{table}}$  the test items to be invalid and disqualified hence the amount of matter that is otherwise valid and can be used for After the validity of the question test instrument research consists of 30 questions, was obtained 5 questions which were not valid and another item 25 is valid. Based on the calculation of reliability, the reliability values obtained about the test of 0.83. Then the arithmetic result is 0.83 consulted with tables scale level of reliability problems, so it can be known about these tests are included in a very high level of reliability.

## **III. RESULTS AND DISCUSSION**

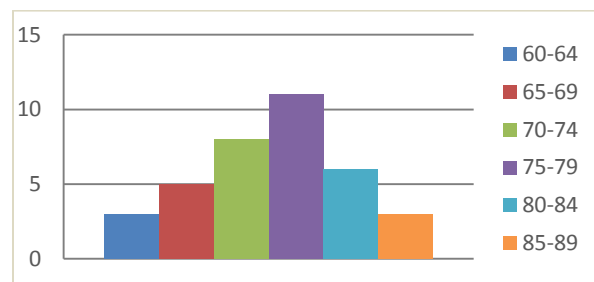
### **A. Description of Data**

Description of the data from this study is in the form of student learning outcomes data experimental class and control class. Learning outcomes data as a value for each of the students in the experimental class numbering 35 people and control classes totaling 36 people. Value of students in the experimental class ranges between 64-92, while in the control group ranged from 60-88.

For more details, a histogram of the frequency distribution illustrated in Figure 1 and 2:



**Figure 1.** Histogram of frequency distribution experimental class



**Figure 2.** Histogram of frequency distribution control class

## B. Test of Requirements Analysis

### 1. Normality Test

To ascertain whether the data of the subject class research normally distributed, then tested for normality using the Chi squared. Based on data analysis for experimental class  $\chi^2$  count = 1.40 and  $\chi^2$  count for the control class = 1,83. For the value of the subject class  $\chi^2$  table at significant level at  $\alpha = 0.05$  and degrees of freedom (df) = 6- 1 = 5, then the value obtained  $\chi^2$  table in the experimental class and control 11.07 thus the  $\chi^2$  count <  $\chi^2$  table, this means that the data obtained from the second class, or research subjects for an experimental class 1.40 < 11.07 and for control class 1.83 < 11.07 can be concluded that the learning outcomes in subjects MDE with normal distribution.

### 2. Test Homogeneity

The results of calculations for homogeneity test with the largest variance than the smallest variance obtained  $F_{\text{count}} = 1.01$  then from  $F_{\text{count}}$  compared with  $F_{\text{table}}$ , where  $F_{\text{table}}$  with  $\alpha = 0.05$  with the numerator df = n - 1 = 35-1 = 34 and dk denominator = n - 1 = 36-1 = 35, then searched in table F obtained  $F_{\text{table}} = 1.01$ . Conclusions used the test criteria if  $F_{\text{count}} \geq F_{\text{table}}$  means not homogeneous, and if  $F_{\text{count}} \leq F_{\text{table}}$  means homogeneous. So from the calculations, the  $F_{\text{count}} \leq F_{\text{table}}$  or 1.01 < 1.80. It can be concluded that the samples have a homogeneous variance. Having carried out tests of normality and homogeneity tests and obtained data result of learning MDE is normally distributed and both samples have a homogeneous variance.

### 3. Hypothesis Testing

The results of the hypothesis test calculations obtained  $t_{\text{count}}$  of 4.13. Then  $t_{\text{count}}$  compared with  $t_{\text{table}}$  with  $\alpha = 0.05$  degrees of freedom ( $df = n_1 + n_2 - 2 = 35 + 36 - 2 = 69$ ), searched in the table values obtained t distribution table = 1,996. Conclusions criteria for testing the hypothesis that if  $t_{\text{count}} > t_{\text{table}}$  ( $4.13 > 1.997$ ), then the null hypothesis is rejected or accepted working hypothesis  $H_a$ . and there are significant differences in student learning outcomes using TPS type of cooperative learning methods with traditional methods in the subjects Understanding the Basics of Electronics at SMK Negeri 1 Pariaman.

### 4. Discussion

Based on the test results of students' average grade obtained experimentally (X TITL 1) ie 82.85 which passed the 27 students who previously only 10 students and a higher than average number of control class (X TITL 2) ie 74.91 which graduated 20 students from the previous 12 students. This shows that the type cooperative learning methods TPS can improve student learning outcomes in subjects in class X MDE TITL 1 SMK Negeri 1 Pariaman.

The results of the data analysis has been done that  $t_{\text{count}}$  of 4.13 compared with  $t_{\text{table}}$ , amounted to 1.996 with a degree of freedom ( $df = n_1 + n_2$ ), thus  $t_{\text{count}}$  is greater than  $t_{\text{table}}$  which means that there are significant differences in the level of 0, 05 to the learning outcomes of students using cooperative learning methods SMT type with traditional methods. The results of the analysis to test the hypothesis  $t = 4.13$  and  $t_{\text{table}} = 1.996$ , it also indicates the use of learning methods TPS in improving student learning outcomes in subjects in class X MDE SMK Negeri 1 Pariaman, influential in improving student learning outcomes and can be accepted as methods of learning on the subjects of MDE.

Selection of the method according to the characteristics of a subject can enhance the creativity of the students in understanding the subject matter, so that student learning outcomes in the classroom learning meningkat. Proses experiments provide questions to the students and the students to think about questions, divided into two according to the seat or in pairs , then exchanging ideas in solving the matter and discuss it. If the discussion has been completed, the teacher randomly select a partner to look forward class and explain the extent of his understanding.

The learning method is considered suitable for the material that is understanding of subjects such as MDE, so students who are less intelligent will be helped by his friend in an attempt to understand the material. This is in accordance with the opinion of Trianto (2011: 61) states that the type cooperative learning TPS is designed to influence students' interaction patterns.

Furthermore Fathurrohman (2015: 86) states that the TPS method has procedures set out explicitly to give students plenty of time to think, to answer and help each other. This learning comes from the concept that students can easily find and understand the material which is difficult if they were in discussions with his friend. The average value of post test control class appears to be lower than the experimental class, for the use of methods that are less precise. The traditional method is



more suitable in the subjects of a procedural nature and this method is centered on the teacher, so the teacher must be smart in classroom management. If teachers are not able to manage a class, then the learning process will not work effectively. This was confirmed by the results of research Adrizal (2012) which concluded that the learning outcomes of students using cooperative learning TPS higher than traditional method.

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

Based on research that has been done, it can be concluded that there are significant differences between the results of student learning using cooperative methods SMT type with traditional methods in the subjects MDE at SMK Negeri 1 Pariaman as indicated by the average student learning outcomes experimental class is 82.85, while for the average student learning outcomes that control class 74.91. Referring to the results of research it is suggested, the teachers of the subjects MDE TITL class X SMK Negeri 1 Pariaman to be able to use methods of cooperative TPS so that students can be motivated and actively involved in the learning process. Furthermore, for learning using cooperative learning effective TPS type, to do training on the teaching methods of the school to the teachers of subjects. Using cooperative learning TPS can be used as an alternative for teachers of SMK Negeri 1 Priaman to increase the activity of individuals in the group and student learning outcomes in subjects MDE.



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**EI-02-031**

**PROJECT BASED LEARNING:  
Learning Competency Skills Machining Production Technology  
(Pembelajaran Kompetensi Keahlian Teknologi Produksi Pemesinan)**

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**ABSTRACT :** *Order of life in college formally is the most dominant civilizing process and the empowerment of learners that lasts a lifetime. Implementation of this process requires lecturers to provide exemplary, willingness to build, develop the potential and creativity of learners. The implication of this principle is to shift the paradigm of educational process, namely from the teaching paradigm to a learning paradigm. Learning is a process of interaction of learners with lecturers/teachers and learning resources. The learning process is planned, implemented, evaluated and monitored in order to run effectively and efficiently. Learning practices pursued education lecturers have not shown as a process of development of student creativity. Powered result of preliminary observations, namely the tendency of faculty in choosing and using methods of practice learning speculative, resulting in learning activities practice less attractive, boring, unchallenging, the products are not optimal and tendencies fails, it is not worth selling, it is difficult to achieve the target, not oriented production. In fact, most of the learning practices using intuition or based on the experience of their colleagues and lecturers tend to be concentrated on interests rather than the needs of students*

**Key Word :** *Project-based learning, Pembelajaran, Kompetensi keahlian*

## **I. INTRODUCTION**

The mission of education in Indonesia is the nation's intellectual life. This can be done development in the field of education shown to make changes and updates over time, Such as the development of curricula that do change and renewal to achieve a better level of education.

Education was organized as a civilizing process and the empowerment of learners that lasts a lifetime. Implementation of this process requires lecturers to provide exemplary, willingness to build, develop the potential and creativity of learners. The implication of this principle is to shift the paradigm of educational process, namely from the teaching paradigm to a learning paradigm. Learning is a process of interaction of learners with lecturers / teachers and learning resources in a learning environment. The learning process needs to be planned, implemented, evaluated and monitored in order to run effectively and efficiently.

Based on data from the Badan Statistik Nasional (BPS) in 2011, there were 82.1 million Indonesian workers filled unskill group of workers (workers who do not have the skill or competence in the field). Unskill group of workers, the majority are graduates of public schools. While the group on it filled skill workers (workers with a skill or competence in their field) amounted to 20.4 million people. And the composition of the top-working expert (expert) with 4.8 million people. Seeing this





condition Indonesia would be difficult to compete with other countries in the era of globalization and intense competition present today and in the future.

Based on these facts, it becomes the responsibility of education especially vocational education to produce graduates who are competent. Therefore competencies that will be developed through a learning process should refer to the competencies required by the industry. One of the subjects in college is very important and strategic for the establishment of production machining technology competency skills. Therefore it is considered very important to always improve the quality process of competence machining production technology expertise. Based on surveys that have been implemented in the manufacturing industry, information was obtained that the manufacturing process one unit of product requires collaboration (cooperation) of various skills (collaborative skills). Without the cooperation is good then the end result of the expected product cannot be achieved. One effort to inculcate the attitude and behavior of students associated with the competencies demanded by the industrial world is to develop a competency model skills-based machining technology production project based learning.

## **II. LITERATURE**

### **A. Project Based Learning**

According to the Buck Institute for Education (BIE) (in Khamdi 2007) "Project Based Learning is a learning model that involves students in problem-solving activities and provide opportunities students work autonomously construct their own learning, and ultimately produce the works of students valuable and realistic.

Thus, Project Based Learning is an innovative learning centered on the learner (student centered) and put the professor as a motivator and facilitator, where learners are given the opportunity to work autonomously construct learning. Project Based Learning is perfect paired with production machining technology subjects. Based learning activities in the syllabus, the course of production machining technology requires learners to be active (student centered) while lecturers act as facilitators and motivators, learner collaboration with various materials to be provided.

Learners use the inquiry, research, planning skills, critical thinking and problem-solving skills in the process of completing the project. Actually, working on a project does not guarantee the learning. To ensure the study, the project needs to be chosen carefully and designed covers the required content. To that end, the PPA: 1) engage learners in issues and complex problems in the real world, and if possible, educate participants who select and define the issues or problems that are meaningful to them; 2) students use inquiry, research, planning skills, critical thinking, and problem-solving skills while completing the project; 3) learners learn and apply skills / specific standards on content and knowledge in various contexts when working on the project; 4) students have the opportunity to practice some of the skills needed for life and career in the future (eg skills allocate time and resources, interpersonal skills, and others.); 5) The activity ended with the results in the form



of a product or presentation which demonstrates there has been a learning and assessment.

Theoretically and conceptually, project-based learning is also supported by the theory of activity. Activity theory states that the basic structure of an activity consists of: (a) the objectives to be achieved, (b) subject in context, (c) a society in which the work was done by the hand, (d) tools, and (e) work rules and division of tasks. In the application class relies on active learning activities in the form of doing something (doing) rather than passively receive knowledge transfer activities of teachers (Wena, 2010).

Project-based learning is also supported by constructivist learning theory, which rests on the idea that students build their own knowledge within the context of his own experiences. Project-based learning can be seen as one approach to creating a learning environment that can encourage students to construct knowledge and personal skills. When done in a project-based learning model of collaborative learning in small groups of students, project-based learning is also supported by theoretical sourced from social constructivism Vygotsky that provides the foundation of cognitive development through increased intensity of interpersonal interaction. An opportunity to convey ideas, listen to others' ideas, and reflect his own ideas on others, is a form of individual learning. Interactive process with fellow colleagues help knowledge construction process. From the perspective of this theory of project-based learning can help students improve their skills and collaborative problem solving (Wena, 2010).

## **B. The concept of Project Base Learning (PjBL)**

Based Learning Project (PjBL) is a learning method that uses a project / activity as a medium. Learners exploration, appraisal, interpretation, synthesis, and information to produce various forms of learning outcomes. Project Based Learning is a learning method that uses a problem as the first step in collecting and integrating new knowledge based on their experiences in the activity significantly. Project Based Learning is designed for use on complex issues that required learners in doing insvestigasi and understand it.

Through the Project Base Learning, the process begins with the inquiry raises questions guide (a guiding question) and guiding learners in a collaborative project that integrates a variety of subject (matter) in the curriculum. At the time a question is answered, directly learners can see the various major elements as various principles in a discipline that is being studies. The Project Base Learning is an in-depth investigation of a topic the real world, it would be valuable for the attention and effort of learners. Given that each of the students have different learning styles, then-Based Learning Project provides an opportunity for learners to explore the content (material) using a variety of ways that are meaningful to him, and conduct collaborative experiments. Project Based Learning is an in-depth investigation of a topic the real world, it would be valuable for the attention and effort of learners.

## **C. Why Use Project Base Learning (PjBL)**

The PjBL emphasizes contextual learning experiences that can encourage learners to acquire



knowledge through: questioning (inquiry), solve problems, explore interests and develop skills that can be applied to his future life as a responsible decision maker in society. The PjBL also effectively achieve multi standard of learning and competence, often across disciplines / fields of study. This method is derived from the results of research in cognitive psychology and learning based on the understanding that so that learners can: understand the concept; think critically; analyzing information; communicate ideas; to work cooperatively; and develop knowledge and skills in earnest; learners need to practice these skills constantly in a variety of contexts. The project, in harmony with the traditional teaching practices can be a tool for providing the above context for learning.

The PjBL is used in learning in order to: 1) learners motivated and experienced learning; 2) students have many opportunities of acquiring and using new knowledge and skills and achieve the learning competencies; 3) learners associate: the field of study disciplines / fields of study other important, namely between the academic and technical fields; learn to work; and learn with reform initiatives.

#### **D. Characteristics Project Base Learning (PjBL)**

There are four characteristics of project-based learning, among other content, conditions, activities and results. Description of Project Based Learning characteristics presented CONTENTS: Loading an original idea a) complex issues; b) the students to find relationships between ideas proposed; c) students faced the problem of ill-defined; d) QUESTIONS tend to question the real-world problems. CONDITIONS: prioritizing student autonomy a) conduct inquiry in the context of the community; b) the students are able to manage time effectively and efficiently; c) students learn to fully control himself; d) simulates the working professional. ACTIVITIES: investigation of a collaborative group) Students berinvestigasi during a certain period; b) students perform complex problem solving; c) Students formulate relationships between his original idea to construct new capabilities; d) students use technology in solving problems. RESULTS: tangible products a) The students showed a real product based on the results of their investagi; b) students undertake a self-evaluation; c) the student is responsive to all the implications of its competence; d) students demonstrate social competence, management, personal, subsequent regulation (Satyasa, 2006: 11)

Project Based Learning (PjBL), active learners become more motivated in learning, faculty only as a facilitator, lecturer evaluate learner performance products include the outcomes that can be displayed on the results of the project.

#### **E. Advantages and Disadvantages of Project Base Learning (PjBL)**

Advantages of project-based learning: 1) Increase the motivation of learners to learn, encourage their ability to do important work, and they need to be respected; 2) Improve the ability of solving problems; 3) Make learners become more active and managed to solve complex problems; 4) Improve collaboration; 5) To encourage students to develop and practice communication skills; 6) Improve the skills of learners in managing resources; 7) Provide to the students learning experience and practice in



organizing the project, and make the allocation of time and other resources such as equipment to complete the task; 8) Provide learning experiences that engage learners are complex and designed to develop according to the real world; 9) Involving the learners to learn to take the information and demonstrate knowledge, then implemented with the real world; 10) Create a learning atmosphere to be fun, so that students and teachers enjoy the learning process. Weaknesses in project-based learning 1) It requires a lot of time to solve the problem; 2) Requires considerable expenses; 3) Many instructors who are comfortable with traditional classroom, where the instructor plays a central role in the classroom; 4) The amount of equipment to be provided; 5) Students who have a weakness in the trial and will have difficulty gathering information; 6) There is a possibility of learners who are less active in the group work; 7) When the topic is given to each group is different, it is feared learners cannot understand the topic as a whole.

Overcome the weaknesses of project-based learning at the top of an educator must be overcome by facilitating learners in dealing with problems, limit the time students in completing the project, minimize and provide simple tools that are in the neighborhood, choosing research sites are within easy reach so that no requires a lot of time and costs, creating a fun learning atmosphere so that instructors and learners to feel comfortable in the learning process.

Project Based Learning also requires learners to develop skills such as collaboration and reflection. According to research studies, Project Based Learning helps learners to improve their social skills, often leads to reduced absenteeism and fewer discipline problems in the classroom. Students also become more confident talking to groups of people, including adults.

#### **F. Syntax and Application Project Base Learning (PjBL)**

Carrying out this project methods in teaching and learning activities carried out in six phases as follows: Phase I; Identify the real problem; Learning begins with the lecturer motivate or ask the learners with regard to authentic problems that exist in everyday life, so that in this description will arise a problem that will be answered or resolved by learners. Phase II; Formulation Strategy / Issues and Problems: Based on the existing problems, learners in the study group with the guidance of faculty makes the formulation of strategies or alternative solutions to those problems. Phase III: Product Design / Design Event learners work in groups looking for all the information or sources of support to make a product design and product manufacturing operations planning. Stage IV: The production process / activity Once the product design is complete, learners collect and collate material products according to design products to be made, then of the design and the results in the investigation to the person who masterfully. Phase V: Presentation of the results obtained from each group demonstrate their products to other groups, while teachers to pass judgment on the outcome of the respective product groups. Phase VI: Evaluation Provide individual evaluation exercises to determine the ability to accept the concept of self-developed material.

#### **G. Evaluation Project Base Learning (PBL)**



The evaluation phase is an important stage in the project-based learning. In order to know the extent to which faculty practice learning objectives can be achieved. Assessment through the tasks performed on tasks that learners individually or in groups for a certain period. The task is often associated with the collection of data / materials, data analysis, presentation of data or materials, and report generation. Assessment tasks can be performed on a task or process during the execution of the final test. Thus, professors can assign things that need to be assessed. Implementation of the assessment can use the check list (checklist) or the assessment scale (rating scale).

The successful implementation of project-based learning to the learners depends on the design of the learning phase. Phase lessons that are designed to be able to dig their own inventions. The role of the faculty in this study is as a mediator and facilitator, where the implementation of project-based learning, educators should be able to motivate learners to express their opinions in the presentation of the project democratically.

## **H. Learning on Vocational Education**

Implementation of learning for Production Machining Technology courses in the Department of Mechanical Engineering held in Production Technology Laboratory. Practical lesson in the laboratory is intended that keterlaksanaan learning according to the learning objectives in the mastery of competencies as written in the standard of competence which is the basis for curriculum development. Learning in the lab is a very important part of the learning process. Learners will learn and remember information longer after carrying out laboratory experiments. Baillie and Hazel (2003: 4-8) suggests forms of learning activities in the laboratory, namely: the exercise of control, investigation and project work. According Asirvatham (2002) in [http://www.colorado.edu/gtp/training/publications/responsibility\\_lab\\_instructor\\_is\\_helping\\_students\\_achieve\\_the\\_learning\\_objectives](http://www.colorado.edu/gtp/training/publications/responsibility_lab_instructor_is_helping_students_achieve_the_learning_objectives), namely:

*Give the student the opportunity to carry out experiments, (2) Make careful observations and record information accurately, (3) Become proficient in laboratory techniques and the use of instruments, (4) Collect data, and analyze it in a scientific manner, (5) Learn to interpret results and draw valid conclusions, (6) Provide applications of concepts and principles discussed in lecture, (7) Learn to work independently and make decisions, (8) Develop the ability to plan and carry out lab tests, (9) Cultivate a team spirit when experiments call for students to work in pairs or groups, (10) Gain respect for the difficulties involved in performing some types of experiments, (11) Acquire skills in using the scientific method, (12) Stimulate interest, enthusiasm and appreciation for science and its impact on everyday life and living.*

According to Dickman (2009) in <http://tep.uoregon.edu/resources/librarylinks/>, learning in the laboratory may have benefits in:

*(1) Get to know your students and create a safe and friendly atmosphere, (2) Get students to work in small groups with other students, (3) Motivate students with hand-on examples, (4) Allow students to be creative, (5) Help students to understand the significance of the activity, (6) Challenge students to construct their own models and to investigate them, (7) Familiarize students with techniques and laboratory tools.*



According Wena (2010: 135) laboratory training learning strategies include: the formation of groups, presentation of the material, training / practice, and training / practice real problems. According to Unesco recommendations (2001), technical and vocational education for the orientation and education of students should include learning theory and practice are balanced. In addition the study program managers must cooperate with the professional community in the field. The learning process in the study program should: (1) is based on problem-solving and experimental approach and involve experience in planning methods and decision-making; (2) introduce the learner to a broad spectrum of technology and productive work situations; (3) develop special procedures concerning valuable practical skills such as tool use, repair and maintenance and safety procedures, and appreciate the value of work; (4) develop an appreciation of the design, workmanship and good quality; (5) develop the ability to function as a team member and to communicate technical information; (6) close to the local environment without limiting yourself.

Vocational education is characterized by a very close relationship with the workplace. Theoretical and practical learning are combined such that compliance is assured. Students in vocational education learning real skills in the practical world, and learn about and reflect upon the theoretical world. In vocational education both theory and practice have the same value for learning in school and learning in the workplace. Thus, both theoretical and practical learning is not confined to student learning (DG Education and Culture, 2005: 6).

Based on the above, it is understood that the implementation of learning in vocational education include learning theory and practice. The study program in cooperation with the professional community in the field, so that the learning carried out in the laboratory and in the workplace in accordance with the courses studied. Thus, learning in vocational education leads to learning according to the working world.

## **I. Competency**

Competence in specific and technical sense described by Nordhaug (1998: 8-19), that competence consists of knowledge about methods, processes, and techniques designed to carry out specific tasks and the ability to use tools and equipment. This means in terms of specific competencies and technical knowledge covers the working principle and working procedures, as well as the ability to operate a tool to carry out a specific task or job. Bowden & Masters (1993: 39) expressly says that competence should be defined as one who truly do a person, not a has been obtained from the learning that may not be possible. This means that competence refers to a person's performance-ability. Preston & Walker (1993: 127) gives the definition of competencies with a holistic approach as a combination of knowledge, skills and attitudes that enable a person can do its job.

Competence by Bunk, Kaizer & Zedler (Prihadi, 2004: 15), identified in four groups, namely: (1) "Vocational competence"; carry out work on a specific activity, (2) "Methodical competence", is systemic reactions and systemic action on each challenge are shown as performance, in order to obtain



independent solutions and are able to use the experience in order to obtain a meaningful way to address the problems of employment; (3) "Social competence", is the ability to communicate with others and work together in a way cooperative, exhibit behavioral group orientation and empathy, (4) "participative competence", the finesse of work and adaptation to the work environment in the broad sense, the ability to organize and make a decision, and readiness to take responsibility.

The learning model by Joyce & Weil (1996: 20) is a planning or patterns that can be used for curriculum (long learning materials), design of learning materials, and to deliver learning inside and outside the classroom. Joyce & Weil (1996: 46) describes the learning model is a plan that is used as a guide in the classroom learning or learning in tutorials and to determine learning tools and direct us in designing learning to help learners so that the learning objectives achieved.

Therefore, the development of good learning model must be adapted to specific conditions. This condition is a little big or complex case of an educational institution, the scope of the duty of educational institutions, as well as the ability of a manager. Joyce & Weil (1996: 87) describes the learning model is a plan that is used as a guide in the classroom learning or learning in tutorials and learning tools to determine and direct us in designing learning to help learners so that the learning objectives achieved.

Teaching models according to taxonomy Gustafson (2003: 112) is divided into four categories, namely, model-oriented; (1) class, (2) product, (3) system, and (4) organization. According to the model the manufacture of products has three main characteristics; (1) the assumption that the required learning products, (2) the necessary testing and revision of the air and over again until steady and (3) the assumption that the product must be used by a variety of learning manager. In connection with the manufacture of the product models, such as modules and / or instructional materials teaching, learning model that is premised development is the Model Dick & Carey (2005) and other models that are considered relevant. It can be seen that at this time we need a learning model that is able to empower students to achieve their competencies.

The main components of learning theory according Reigeluth & Merrill (1983: 22), namely: methods, conditions, and results. What is meant by learning methods are various ways to achieve various results, in various macarn conditions. Learning conditions is a factor that affects the impact of the method, and it is therefore important to determine the method. Learning outcomes are the consequences of which can be used to measure the usefulness of various methods in various conditions. Learning strategies (instructional strategy) is a plan to help the learner through a variety of efforts to achieve each goal.

Furthermore, Seels and Richey (1994: 31) says that learning strategies are the specifications for selecting and sorting processes and activities in a lesson. Meanwhile, Dick & Carey (2005) says that the learning strategy usually describes a common component of a set of learning materials and procedures that will be used with other ingredients to produce the specific learning outcomes of the



students. Furthermore, Dick & Carey (2005: 190-198) also details the five components of learning strategies, namely: (1) pre-instructional activities, (2) the presentation of information, (3) the participation of students, (4) tests, and (5) follow-up.

The learning activities according to Gagne and Briggs (Dick & Carey, 2005: 189), namely; (1) providing motivation or draw attention; (2) explains the purpose of learning to students; (3) remind competency prerequisites; (4) provide a stimulus (issues, topics, concepts); (5) give instructions to learn (how to learn); (6) creates the appearance of a student; (7) provide feedback; (8) assessing performance; and (9) Summing up. These aspects are all used in the implementation of the strategy developed in the practical lesson learning model development. The same is stated by Arends (2004: 97-100) in lesson planning is good to be able to involve the use of time allocation, selecting appropriate learning methods, create student interest, and build a productive learning environment. In fact, careful planning is needed for many aspects of modern life. However, the learning plan can also have the unintended consequence of rendering the lecturer is not sensitive to the needs and ideas of students.

### **III. ANALYSIS AND DISCUSSION**

Project Based Learning is a learning model that involves students in problem-solving activities and provide opportunities students work autonomously construct their own learning, and ultimately produce valuable and realistic work of students. Satyasa (2006) also explained that in the PBL project was done in collaboration and innovative focus on solving problems associated with student life or community. Based on these opinions indicate that PBL implementation emphasis on collaborative learning.

In the passage of time, the students carry out all activities ranging from the preparation of their project implementation to monitor and report the temporary lecturers monitor the progress of projects student groups and provide the necessary guidance. In the next phase, after the student reported the results of projects they do, lecturers assess student achievement gain in terms of both knowledge (knowledge of related concepts that are relevant to the topic), to skills and attitudes that go with it. Finally, the lecturer then give students the opportunity to reflect on all the activities (activities) in project-based learning that they have done so in other learning opportunities and project completion activities to be better again.

This model has several advantages and disadvantages. The surplus is to be able to remodel the mindset of learners from a narrow becoming more extensive and thorough in looking at and solving problems encountered in life, the knowledge gained is functional, a student studying seriously in working together, and children are fully responsible for the work, while weakness is applicable curriculum in our country today, either vertically or horizontally, yet supporting the implementation of these methods, organization of material, planning and implementation of this method is difficult and requires special expertise of the lecturers, while the lecturers are not ready for this and study materials





often be wide, so it can obscure the basic unit are discussed.

#### **IV. CONCLUSIONS**

Based on the results of the analysis concludes that LPTK-PTK in the implementation of the demands of relevance to business and industry (DUDI), is a characteristic of the most important characteristics for vocational education. Embodiments of reciprocity in the form of the willingness of businesses and industries (DUDI), to accommodate the students to have the opportunity of learning experience in employment / industry is translated into material for the planning and implementation of educational programs, and other forms of cooperation more mutually beneficial. Education Vocational Technology has broad implications to the learning process. Appropriate learning in the Vocational Technology Education is learning to use a competency-based approach that is based on two basic philosophies. The first is the idea of "human competence" is an ability that is really visible. Knowledge, attitudes, and skills is worthless if it is not in-show with their results. The second philosophy of "mastery learning" to mention that almost everyone can learn all things well, when getting a quality learning and adequate time.

Based on the conclusion, here are some suggestions put forward in the learning process of vocational education / vocational as part of the national education system plays a very strategic role for the realization of a highly skilled workforce. From various studies that the opportunity to have high economic growth and sustainable of the country would be even greater if supported by human resources that have: (1) basic knowledge and skills to meet the demands and dynamics of ongoing developments; (2) the higher the level of education; (3) skill backgrounds in science and technology (science and technology); and (4) the ability to produce products both of quality and price, able to compete with other products in the global market.



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## **THE DEVELOPMENT OF MIKROPROCESSOR LEARNING MODLE USING LMS APPLICATION BASE ON MOBILE AT UNIVERSITY**

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**ABSTRACT :** *Utilization of information and communication technology-based mobile learning is developing very widely and quickly in various aspects of one of them in the field of higher education. STMIK Nurdin Hamzah Jambi are college computer science education Strata 1 (S1) Information Systems Studies Program and Strata 1 (S1) Informatics Engineering Program. The education system in STMIK Nurdin Hamzah Jambi running at the moment that is face to face between students and lecturers is already well underway. But sometimes there are some problems that often arise, such as the students and professors feel the meeting time courses are not enough to accommodate all of the discussion subjects, for example, need to copy the material subjects of laptop faculty, or replicate, it must be made more efficient and organized , This research has focused on mobile learning by using LMS applications one of which is Edmodo on learning microprocessors, applications have been selected for Edmodo makes it easy to track student progress. All values and plan study commissioned or provided through Edmodo stored and easily accessible. Lecturers can get input from the classroom through student reaction to quizzes, assignments, and discussion postings that captures the understanding, confusion, or the frustration of students*

**Keyword :** LMS,Mobile,Edmodo

### **I. INTRODUCTION**

Learning is described in the Law on National Education System number 20 of 2003 Article 1 stated that the process of learning in the educational unit organized in an interactive, inspiring, fun, motivating the students to actively participate and provide enough space for the initiative, creativity and independence in accordance with the talent, interest in physical development of learners. Learning is also described in the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 109 of 2013 Article 1 of penyelenggaraan distance education explained that the electronic learning (e-learning) is learning that utilizes the information packet-based information and communication technology for the sake of learning that can be accessed by the participants students anytime and anywhere. Information and Communication Technology seemed to have become a necessity in every human being in this era of information and communication technologies that have global as well able to cover all aspects of the life. Along with technological advances globalized been affected in every aspect of life in the fields of economics, politics, culture, art and even in the world of education. In the field of education, ICT has many roles. Information technology has become pengalihfungsian as books, professors and teaching systems that previously were conventional.

The learning method is performed in most colleges educational system of "traditional", ie between educators and learners meet at a place and at a certain time (face to face in the classroom directly). Actually there is nothing wrong with the education system, but along with the development of increasingly sophisticated technology, the system is less and unable to move dynamically.



Dynamism is needed is the creation of communication that goes well, namely the easy communication between educators and learners. Such dynamics can not be limited by space and time (scheduled classes), so the opportunity to meet face to face will be greatly reduced. This can be exemplified by the various activities of the educators who have activities outside of learning nor is there the same subjects and conflicting with another course with the other half of the courses so that educators can not do a good job. This is actually not the fault of educators, because of the absence of someone in traditional learning is also due to preoccupation of learners.

There are students who can not attend classroom because they have to attend seminars, workshops, and employment needs of the organization. The problem of the solution is to elektronik learning. As elektronik learning system at least consist of: content, software, hardware and human. According to Darin E. Hartley e-learning is a type of learning activities that allow tersampaiannya teaching materials to students by using the internet, intranet or other computer network media. There are two main parts to the e-learning is the e-learning (or teaching materials) and learning management system (LMS). Learning management system is a model and a system that is running the administration that serves as a platform for e-learning. According pandey (2009) written in Szabo, LMS is an infrastructure that delivers and manages content, identify, assess, track progress, gather and present the data to monitor the overall learning process. The idea of LMS is the achievement of e-learning system that can be set and managed in an integrated system. All learning activities and materials in a learning (course) organized and managed by and within the system. The Internet is the use of technology that is widely used in the learning process, development of the Internet are quite widely supported by computer prices are quite cheap, therefore the more open the opportunity to change the structure of technical education by expanding the learning experience and lecture halls to a combination of lecture halls and computer students ,

Educators can take advantage of computer ownership existing in students optimally for teaching, to student's desktop, the process of becoming a student as learning centers will be able to run well, lecturers no longer be the only speaker in learning (Teacher Center Learning), but will become an active part in the study (student Center learning), computer ownership on the students enough, not fully utilized by the teachers in the learning process, each stand alone, without being connected to one another to increase student learning.

Exploiting this potential, we need a plan and develop a strategy that is useful to clarify the purpose of education is to be achieved, determine the resources needed, to make all parties involved to adhere to the same goal, knowing the measurement of success. The magnitude of the potential use of information technology and the computer is in learning as well as the magnitude of competences of the students, some universities have designed based learning computer and information technology in the form of e-learning by utilizing social media applications that exist such as blogs, portals integrated



into the campus website, facebook, twitter, or build applications with a commercially available application program. But not maximized in terms of its use.

Seeing an application on the market, to build a web-based learning and the benefits are considerable arising from its use in learning, which encourages researchers to develop learning with application of a learning management system (LMS) with the concept of e-learning model utilizing the internet facility, this concept is known also with Mobile Learning.

STMIK Nurdin Hamzah Jambi are college computer science education Strata 1 (S1) Information Systems Studies Program and Strata 1 (S1) Informatics Engineering Program. The education system in STMIK Nurdin Hamzah Jambi running at the moment that is face to face between students and lecturers is already well underway. But sometimes there are some problems that often arise, such as the students and professors feel the meeting time courses are not enough to accommodate all of the discussion subjects, for example, need to copy the material subjects of laptop faculty, or replicate, it must be made more efficient and organized ,

Consultation between students and lecturers to discuss a subject material is also sometimes not met as a result of the difficulty of finding the right time to to do so. In another case, a problem that often arises is the desire of some students to develop their knowledge, but the difficulty in getting the source.

To solve the problems mentioned above, we need a support system to support existing educational system. The support system is e-learning. The E-learning is an educational system using an internet as a medium. Lecturers can upload course materials and material about courses on e-learning. Students can learn the lecture material from the lecturer concerned with opening the e-learning site. However, based on reports from the Academic of not maximal use of e-learning in the two existing courses in STMIK Nurdin Hamzah Jambi that only 21% of lecturers STMIK Nurdin Hamzah Jambi are using e-learning or use of information technology and communication, this is because the absence an integrated system in the management of learning that can be used by all lecturers STMIK Nurdin Hamzah Jambi called learning management system.

As in Microprocessors Course in Informatics Engineering study program can be found some of the fact that during this learning process, 1). Learning tends to look dull, interactive and communicative because the learning process is performed using a diktat or modules, whereas subjects in existing courses in STMIK Nurdin Hamzah Jambi especially Microprocessor developed along with the development of technology. 2) Power of Student interest in the subject is less, 3) student learning outcomes are less satisfactory when viewed from the ability to understand the subjects and academic values To overcome the disadvantages of the use of mobile-based lms as a learning tool in universities, especially in the course of microprocessors regarded as an appropriate solution. The success in developing and implementing learning microprocessor with mobile learning course should be formulated both by researchers and universities supported by management to be drawn up long-



term plans gradual and well integrated system and its content. There are several factors that must be considered as a success in building the mobile learning, namely, 1) The institutional factors, 2) Factor lecturers, 3) Factors student, 4) consideration of Pedagogic (Stacey & Gerbic 2008). Another factor to be considered in building a successful Mobile Learning depends on the syllabus which is structured and planned. Teachers should also consider the following aspects: equal distribution of online activities, educational objectives and solutions related to the ability of the individual student, the choice of appropriate teaching methods, control and assessment tools. When designing mobile learning required to broaden the horizon of the student learning experience for what he did (Throne, 2003). Mobile learning as ICT media quite an impact on the learning process, has prompted researchers to build on microprocessor course ,, maybe later can be a forerunner to build the institutional governance in the form of campus learning management systems, learning management systems in general in Jambi still STMIK Nurdin Hamzah conducted individual teaching with a variety of applications used. With this study, researchers expect this to be a breakthrough in the future in building a learning system based integrated mobile LMS.

Issues to be studied can be encapsulated in the formulation of the problem as follows:

1. How to develop a learning model with a microprocessor-based mobile LMS application in college
2. How to design instructional materials in the form of mobile learning used by educators?

Research conducted on microprocessor course aims to:

1. Develop learning model microprocessors with applications Learning Management System (LMS) at the College-based mobile learning.
2. Make it easy for students to understand the material being taught, especially on a microprocessor
3. Provide feedback to teachers in colleges as pengampu course that the importance of the development of mobile based learning
4. To determine whether the LMS-based mobile learning can enhance the effectiveness of the learning process of microprocessor

## **II. MATERIALS AND METHODE**

### **A. Materials**

1. Learning Management System (LMS)

According to Ryan K.Ellis in the book *A Field Guide to Learning Management System* (2009: 1), "Learning Management System, the basic description is a software application that automates the administration, tracking, and reporting of training events". K.Ellis Ryan explains that the LMS is a software or software for administrative purposes, documentation, search material, reports an activity, provision of training materials online teaching and learning activities that are connected to the internet. According to Ann Gordon LMS is the environment used by teachers / lecturers / instructors to create, store, reuse, manage and deliver learning materials to students. Meanwhile, according to wikipedia: LMS is defined as a software for delivering, tracking and managing learning. LMS is a software



application for documentation, administration, tracking, reporting, training programs, classes and activities " online ", " e-learning ", and the content of the training. One platform lms used is Edmodo. According to ([www.Edmodo.com](http://www.Edmodo.com)) Edmodo is a private microblogging platform developed for lecturers and students, with emphasis on student privacy. Lecturers and students can share notes, links and documents.

## 2. The Definition of Edmodo

Edmodo is a social learning platform for teachers / lecturers, students / students or for parents / guardians that developed in late 2008 by Nic Borg and Jeff O'Hara who feel the need to grow in the school / college to reflect that the world is increasingly global and connected, then they create a tool / application that can close the gap between how students / Students live their lives and how they learn at school / college, for that reason, there Edmodo. Edmodo created as a learning platform social network for teachers / lecturers, Student / Students and parents / guardians. Edmodo is designed to make students / Students eager to learn in an environment that is more intimate. Within Edmodo, teachers / lecturers can continue the discussion online classes, giving polling to check for understanding Student / Students and merit badges to the Student / Student individually based on performance or behavior. On Edmodo, teachers / lecturers are in the midst of a powerful network that connects the teacher / lecturer to student / students, administrators, parents / guardians, and publishers / book. This network is a surface the best resources in the world and tools, which provide the building blocks of a high quality education. Edmodo makes it easy to track the progress of student / student. All values and plan study commissioned or provided through Edmodo stored and easily accessible. Teachers / lecturers can get input from the classroom by reaction Student / mahasiswa for quizzes, assignments, and discussion postings that captures the understanding, confusion, or frustration Student / Student

## 3. Definition of Mobile Learning

Mobile learning is defined by Clark Quinn [Quinn 2000] as: The intersection of mobile computing and e-learning: resources accessible wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-learning independent of location in time or space. Based on these definitions, the mobile learning is a learning model that utilizes information and communication technology.

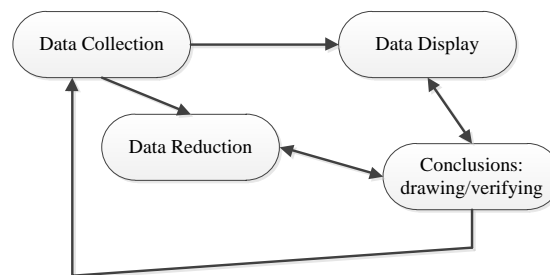
## **B. RESEARCH METHODOLOGY**

In each study, the technical term data collection methods and instruments. Between these two terms there is a very close relationship, especially the link between the instrument selection method. In fact, sometimes there is overlap between differentiate methods with the instrument. According Trianto (2010: 262) is essentially a method of data collection "The ways that can be used by researchers to collect data". Thus we can conclude, that the instrument is one determinant of the success of the study. Instrument serves as a tool in gather the necessary data. Form of instrument relating to data collection

methods, such as interview guides the instrument interview method. The questionnaire method, instrument in the form of a questionnaire or questionnaires. The test method, the instrument is a test question. Methods of observation instrument observation sheet. In this study the research methods used in data collection are interviews, observations, and questionnaires. Interview instrument used in this study is the interview guidelines, in the form of free guided interviewernya. Interview conducted by faculty and students in particular majors in information systems STMIK Nurdin Hamzah to know opinions about this product and to deepen the data obtained through the observation and study of the document. Then the interview was also done to the elements of leadership to college to find out how they feel Learning management system is built. Instruments of observation in this study is the observation sheet form of systematic observation, and questionnaires. Observation is used to examine the implementation of mobile learning system based on Management of the department of information systems. Researchers looked at more deeply whether the system can enhance the learning process in college.

#### A. Data Analysis Method

Data analysis techniques used in this research is the analysis of qualitative data that follows the concept given by Miles and Huberman and also quantitative analysis statistically processed. According to the analysis of Miles and Huberman, the selection of design analysis for the study was based on three main components. According to Miles and Huberman (1989), the third principal component includes "data reduction (data reduction), presentation of data (data display), and conclusion (verification)". Here is an explanation of these three components.



**Figure 1.** Model Interactive Analysis (Miles & Huberman, 1992: 20)

The research process begins with data collection. The collection of data is the data search process conducted by observation and interviews. Furthermore, after the data are collected, do advanced process of data reduction. Merupakan data reduction selection process, focusing, simplification and abstraction of data (roughly) that exist in the note fields. The process of data reduction persisted throughout the study. Once the data is sorted out, then the data is presented in narrative form sentences arranged in a logical and systematic reference to the formulation of the problem



## B. Analysis And Result

Mobile learning as a supplement in the process of learning and online learning should still be there face to face it in the application development learning model mobile learning is done in-person learning and online learning, better known as blended learning, development of learning models of microprocessors using the application lms in mobile learning can be several lecturers expected behavior in mobile learning models are as follows:

Phase -1 (student orientation at issue)

At the first step educator or lecturer may explain learning objectives ,, motivate students to engage in problem solving activities chosen.

Phase- 2 (Organizing students to learn)

At this stage By helping students define and organize learning tasks related to the issue both in class and outside of class by making use of learning resources that already exist in the LMS applications that can be accessed via mobile devices by students.

Phase - 3 (Lecturer properly guide students individually or in groups)

At this stage Lecturer can mmbimbing students to collect or obtain information using modules, teaching materials, which already exists on the application lms.

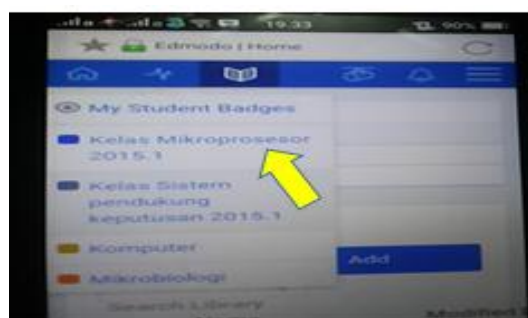
Stage - 4 (Developing and presenting the results of the work)

At this stage Lecturers can assist students in planning appropriate work such as reports, videos and models as well as help them to share the duties with his friend.

Stage - 5 (Analyze and evaluate the process of solving the problem)

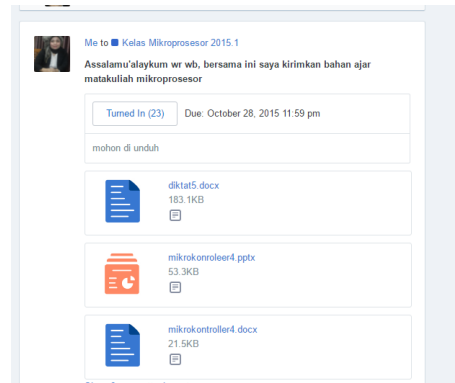
At this stage Lecturer helping students to conduct their investigation and evaluation of the processes they are involved

As a result of the microprocessor development process learning model using LMS applications (Edmodo) based mobile taken from android can dilihat in Figure 2 below:



**Figure 2.** Class microprocessors on Edmodo

In figure 3 below can be seen how the teacher assign tasks to students



**Figure 3.** Set tasks Lecturer

### III. CONCLUSION

1. Learning to use Edmodo LMS applications are alternative solutions for faculty and students in the learning of the microprocessor.
2. With the development of models that do can give to the students knowledge of college students looking for extra lessons microprocessor
3. Microprocessors are the subjects that develop in accordance with developments in technology so that more appropriate use of LMS-based mobile applications.

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- [www.edmodo.com](http://www.edmodo.com)



EI-02-043

## PEMBANGUNAN WEBSITE SUMBER DAYA ALAM SEBAGAI WUJUD KONTRIBUSI DALAM PERCEPATAN PERKEMBANGAN DAN PEMERATAAN AKSES INFORMASI BAGI MASYARAKAT PEDESAAN

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**ABSTRACT :** *Designing websites Pinang Merah (B1) village are motivated by concerns about the lack of exploration undertaken by the village government of all forms of potential and that information should be made in general public. Unfavorable geographical location makes the Pinang Merah (B1) village left behind will be the development of all aspects and one of them is the knowledge of the IT world. With the implementation of the system has been designed, Pinang Merah (B1) village will have a forum to convey any information village to the public.*

**Key word :** Website, exploration, knowledge, implementation

### I. INTRODUCTION

The technology continues to grow rapidly assessed able to provide convenience in all aspects of human life. no exception even ordinary people are now beginning to use the technology for simply interacting with others in the virtual world. Both in terms of hardware and software, the development of technology can also help to overcome all human limitations in doing any form of work to be done simultaneously or just to shorten the time in the process. As proof, until now has many technology created many innovations and advanced with the help of computer technology in terms of making an intelligent system to the world of networking.

Lack of optimization of the technology has become a common sight, especially for rural communities, especially in the field of internet technology. Societies generally make the Internet from their smartphone just to access facebook alone. Yet behind such availability there are myriads of information they can get from the internet, something that is not too common place in public life, especially villagers Pinang Merah (B1) who want to learn from the internet. Lack of container that is provision of a website that has not been realized in the provision of education will make society monotonous world of the Internet.

Moving on from the reviews mentioned, with all the insight you have about the use of the internet as a medium of learning. So the author had the idea to design a village government official website Pinang Merah (B1) that will be used by the community to share knowledge and experience, which will be set forth in the discussion forum provided. Not only that, the public is also given the freedom to give each opinion and most actual news are certainly going through the screening of the admin to minimize the actions that can be detrimental. In realizing and as a first step, the authors



summarize these descriptions into the title :“ WEBSITE DESIGN AND IMPLEMENTATION OF NATURAL RESOURCES IN THE VILLAGE PINANG MERAH (B1) INFRASTRUCTURES AS A CONTRIBUTION IN ACCELERATING GROWTH AND ADVANCEMENT OF ACCESS TO INFORMATION WITH PHP AND SUPPORTED DATABASE MYSQL ”.

From the description of the background issues that have been pointed out above, and based on the reviews and the information obtained from the community and village government Pinang Merah (B1), it can be formulated some of the problems posed as follows:

1. How does the concept of education to be provided from Pinang Merah village website (B1)?
2. What types of websites to be designed to meet the expectations of the public and especially to the village government Pinang Merah (B1) ?.
3. What types of information will be loaded into the website ?.

The writing of this research is more focused and the issues discussed are not too broad that correspond with the purpose of the research is expected that with these authors set limits. The limit referred to in this study will only discuss the design and implementation of the website as a means to provide information and education to the general public and especially residents of the village of Merah Pinang (B1).

Based on the formulation of the above problems, the writer can put forward a hypothesis as follows:

1. The concept of education given in the form of guidance in making and post news and discussions that eventually is expected that residents will exchange information and their insights.
2. Website designed shape of multi-user system with the expectation that residents would have the id in the form of username and password to be able to post news to meet the expectations of the public in obtaining information from the village of Merah Pinang (B1).
3. The information to be loaded into the website in the form of data or real news about the real of the situation and the conditions in the village of Merah Pinang (B1) and is not a fictitious data. Which is expected to lead to accurate information both in the news and educate.

## **II. THEORETICAL**

### **A. Basic Concepts of Information Systems**

#### 1. Definition System

The system is basically a group of elements that are very closely related to one another, which function together to achieve a goal (Tata Sutabri, 2012: 6).

#### 2. Definition System

The system is essentially a group of elements that are very closely related to one another, which function together to achieve a common goal (Tata Sutabri, 2012: 6).

### **B. Design Tools Model Information System**

#### 1. Unified Modeling Language (UML)



Unified Modeling Language is a visual language for modeling and communication about a system using diagrams and text-templates support (Rosa A.S.-M. Saladin, 2011: 118).

## 2. Diagram Unified Modelling Language (UML)

Diagram shape of graph showing the symbol element models arranged to illustrate certain parts or aspects of the system. A diagram is part of a particular view, and when plotted normally allocated to a particular view. The type of diagram, among others.

### C. Basic Concepts Database

#### 1. Database

Database system is a computerized system that its main purpose is to maintain the data that are processed or the information and makes the information available when needed. At its core is a media database for storing data to be accessed easily and quickly (Rosa U.S.-M. Shalahuddin, 2011).

### D. Concepts MySQL and PHP

#### 1. Overview of MySQL

MySQL is a Relational Database Management System (RDBMS) that distributed for free under GPL licenses (General Public License). Where everyone is free to use MySQL, but must not be derived products that are close source or commercial. MySQL actually a derivative of one of the main concepts in the database since long namely, SQL (Structured Query Language).

#### 2. Overview of PHP

PHP is a programming language that runs in a web server and serves as a data processor on a server (Madcoms, 2012: 206).

## III. ANALYSIS AND RESULTS

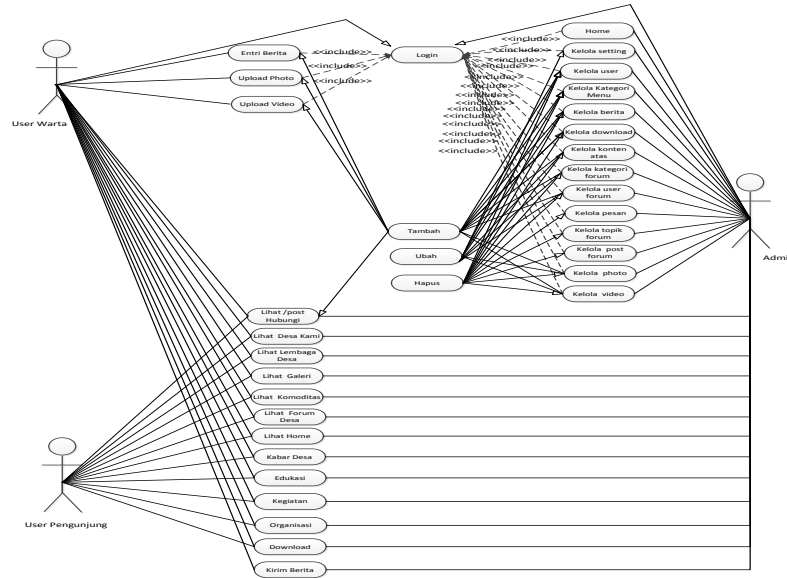
### A. Analysis System

Analysis system is a critical stage and very important in the design and development of information systems, because at this stage will be evaluated how far the performance of the running system, the identification of the problems that exist, the design of the system and the steps for design demands of the expected and will eventually come to the conclusion the analysis that determines

### B. Design of New System

#### 1. Design Using Use Case Diagram

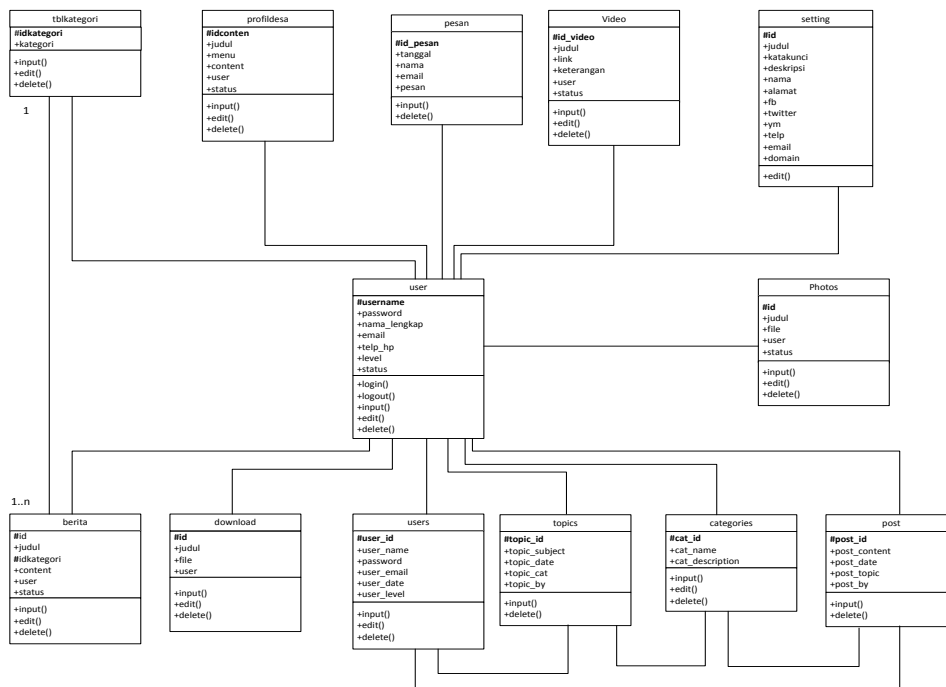
Use case used in the construction Pinang Merah village website (B1), is as follows that is a picture of the actor, use case, use case scenarios and their interactions in the system.



**Figure 3.1** Use Case Diagram

## 2. Design Using a Class Diagram

Class diagram illustrates how the structure of the system design.



**Figure 3.2** Class Diagram

## IV. IMPLEMENTATION AND TESTING SYSTEM

### A. Implementation System

#### 1. Order hosting and domain

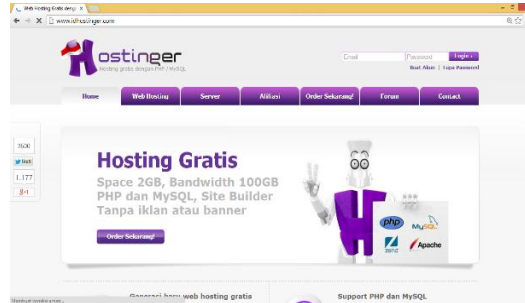


Figure 4.1 Site Domain and Hosting Service Providers

#### 2. Creating a Domain Name and Hosting

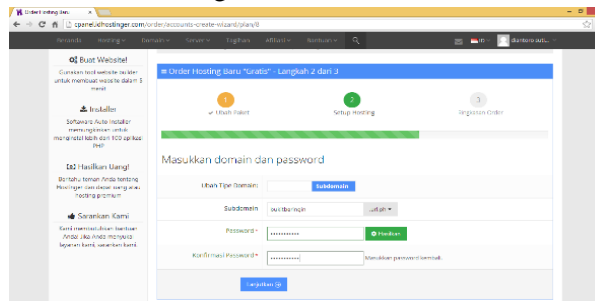


Figure 4.2 Pages manufacture of Domain Names

#### 3. Upload Files Through FileZilla

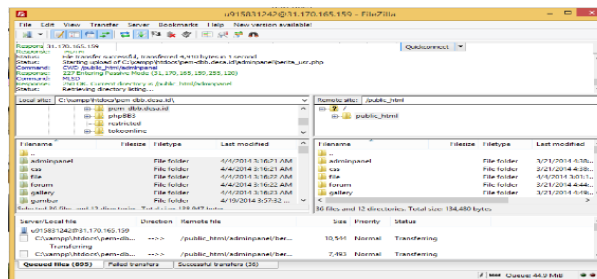


Figure 4.3 Upload Files Using FileZilla

### B. Testing Systems

#### 1. Home Website (Homepage)



Figure 4.7 Display Main Page Website

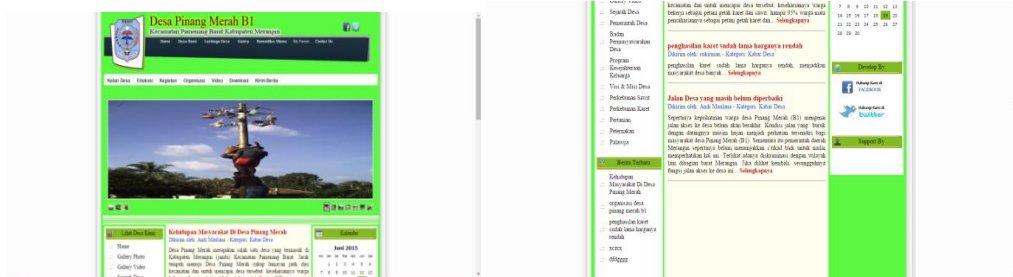


Figure 4.8 Display Options Pages News

3. Pages Viewing Options News



Figure 4.9 Display Pages New

4. Halaman View On Village



Figure 4.10 Display Viewing Pages Content

4. Pages Gallery

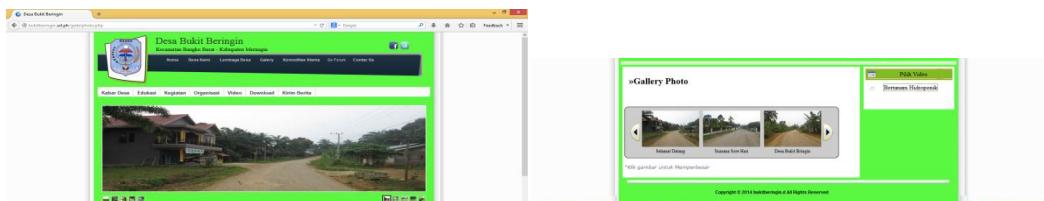
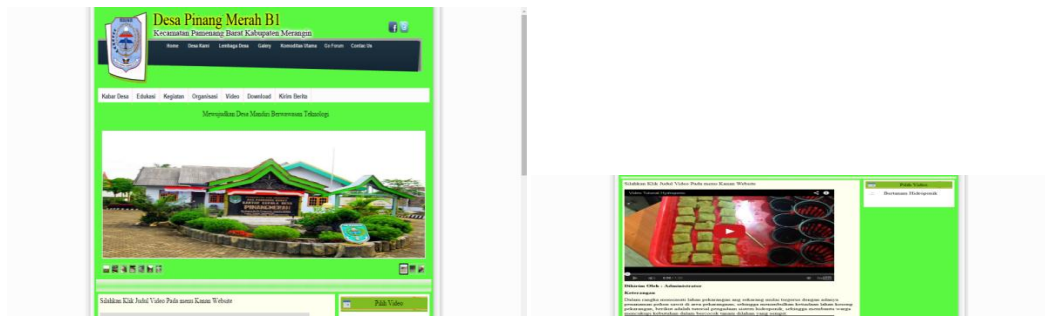


Figure 4.11 Pageviews View Photo Gallery

5. Pages Displays the Videos





**Figure 4.12** Pageviews Viewed the Video Content

## V. CONCLUSION AND SUGGESTION

### A. Conclusion

From this thesis starting from stages of analysis of the problem until the application testing of the new system, it can take several conclusions, namely:

1. The website is not only used as a container in providing information of villages, but also provide good information such as news events or activities held by governments and their constituents.
2. Every citizen is given the opportunity to contribute in providing information to the website to provide ID in the form of a username and password.
3. Any news bulletin posted by the user will be sorted by the admin before being posted to the website.
4. The forum may be freely used to issue all the ideas in the form of criticism and constructive suggestions for Desa Pinang Merah (B1) better.

### B. Suggestions

In order for the proposed system can be used more optimally and can run as expected, then there are some suggestions that can be considered in this application. As for her advice as follows:

1. Internet Network villages that need to be optimized. In this case can contact the internet service provider for bias helps provide Internet connections.
2. Unlike in urban communities, rural communities are often reluctant to switch to using existing technology, but unconsciously already started using it. That is, there is need for dissemination to the public in maximizing existing technology.
3. There should be experts who are truly skilled in the use and implementation of this system through the training provided, so that the people concerned can benefit



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EI-02-045

## COMPLAINT SYSTEM IMPLEMENTATION OF PATIENTS HOSPITAL TREATMENT OF SERVICE USING SMS GATEWAY GAMMU

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**ABSTRACT:** SMS Gateway is a platform that provides a mechanism to send and receive SMS from mobile devices (mobile phones, PDA, etc.) via short code SMS Gateway, as well as a mix between a mobile phone service with a computer, where the computer will respond automatically every request obtained via SMS, and the computer will send an answer to the request via SMS. Associated with these technologies, many agencies, institutions and organizations that use them. In this study, the SMS Gateway technology is used to accommodate complaints from patients to medical care and services faced by patients. Data were collected through observation and interviews with patients relating to complaints and their expectations of the service they receive at the time of treatment in hospital. The object of research is the Government General Hospital M.Djamil Padang. The development of systems using prototype models. The system was developed using the programming language PHP with a MySQL database, engine Gammu as sms gateway and modem as a medium to send and receive text messages. This study is expected to report complaints on target and can be responded to quickly by policy makers in order to improve the quality of medical services for patients.

**Keywords:** SMS Gateway, Pengaduan Pelayanan Rumah Sakit

### I. INTRODUCED

The development of information and communication technology it will never "die". A wide assortment of technologies present to enliven the world of information technology and communications today, one of which is the technology of SMS (Short Message Service) or short message service, SMS technology allows people to send each other or exchanging information (such as text) via mobile devices, for example mobile phones.

Along with the rapid flow of information and communication and the increasing demand for these two things, the more the media or means of information providers that have sprung up. Starting from SMS technology, there is an interesting idea that is currently being adopted and developed, namely SMS Gateway. SMS Gateway comes as media or means of SMS-based information providers. To see progress, SMS Gateway is now increasingly being used by many agencies as one of the information management tool.

One form is the use of SMS technology to improve services to the public, which in this case is the medical services at the hospital. There are times when some patients abandoned for reasons that are not clear when the treatment let alone an emergency nature should be addressed first. This causes them to complain without having to know where to place the complaint and if there is a complaint only at lower levels without any meaningful follow-up. There are also some practices appropriate drug treatment procedures are fatal for the patient. Something like the above often experienced by patients,

so they expect a more practical solution than the state

## II. Research Methodology

### A. Research Methods

The research method is basically a scientific way to obtain information for the purpose and usefulness. In this study, the method used is the method development research (Research Development). According to Tarin et al, 2012, research and development is research used to produce a specific product and test the effectiveness of these products is already in line with the expected.

### B. Research Sites

The research was conducted at the Hospital M.Djamil Padang. Election due Hospital Government Hospital M.Djamil is Type A as the reference treatment for the entire community.

### C. Data collection

Data collected through interviews and observation in a hospital medical service that is part of outpatient and inpatient

### D. Data analysis method

#### 1. Needs analysis

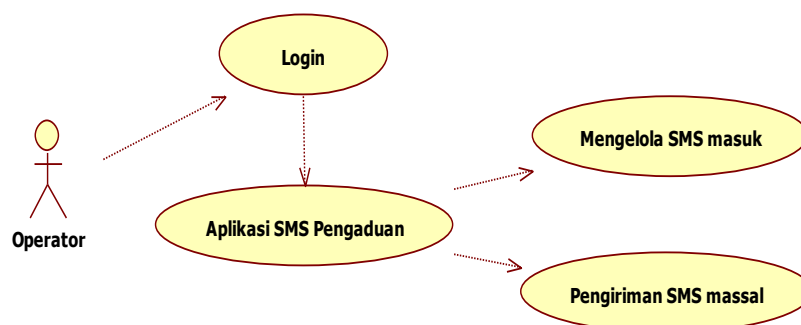
System requirements analysis aims to identify the problems-problems that exist on the system where the applications built include hardware (hardware), software (software) and users. This analysis is needed as the basis for the system design stage and to observe how the system will be run in accordance with the requirements of the system follows the basic concept of the needs of the information therein

#### 2. Design Analysis

For easy to understand the flow of the system, the authors use UML in the design application. Here is the Use Case Diagram to see how the user interacts with the system.

##### a) Use Case System Operator

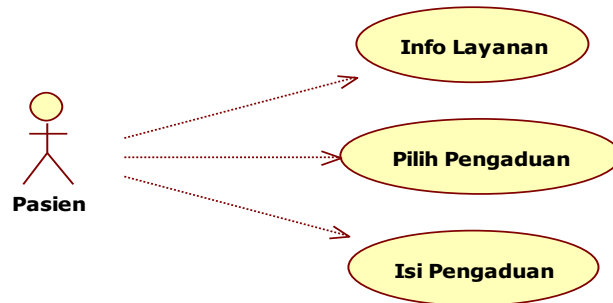
Here could have been admin or special officer in charge to manage the system from managing incoming sms to sending bulk sms. Here is a picture of the interaction between the actors and the system;



**Gambar 1.** Use Case Diagram System Operator

b) Use Case Patients

Pasien bisa siapa saja yang melakukan interaksi dengan sistem, interaksi yang dilakukan dalam bentuk meminta info layanan, memilih pengaduan dan mengirimkan pengaduan. Berikut adalah gambar interaksi pasien(aktor) dengan sistem ;



**Gambar 2.** Patients Use Case Diagram

## V. RESULTS AND DISCUSSION

### A. Testing and Implementation

#### 1. Implementing of Application

Once the design is done, then the application is built will do the testing and implementation. Layout of the application is built as follows;

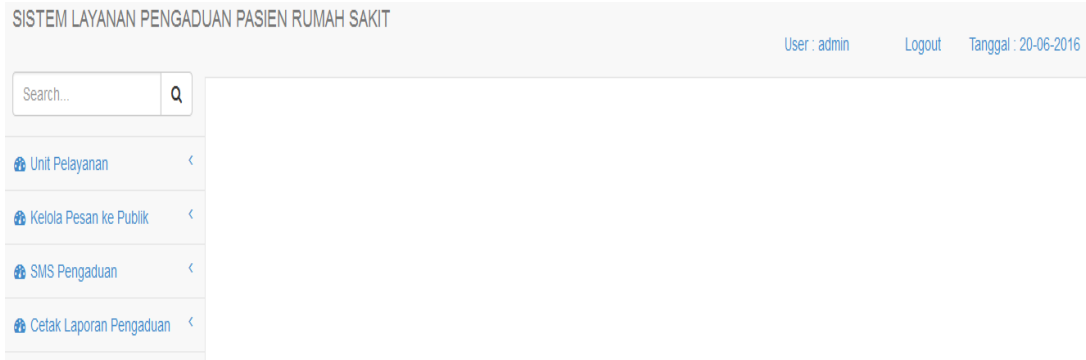
#### 1. Login Menu

Login menu is a menu that will appear when the hospital management will access the application, with the following picture ;

**Gambar 3.** Login Menu

#### 2. Main Menu

The main menu will appear after the user (admin / manager application) has successfully logged into the application system, as shown in the following figure;



**Gambar 4.** Main Menu

### 3. View Menu of patient complaints

View menu of complaints function to display sms complaints of patients to treatment, as shown in the following figure;

#### SMS Pengaduan

Tanggal	Pengirim	Unit Pengaduan	Keterangan
2016-06-21 23:03:55	+6285274741981	Poli Penyakit Dalam	Tolong perbaiki fasilitas, terlalu minim fasilitas.
2016-06-21 23:03:55	+6285274741981	Poli Mata	Manajemen antrian tidak efektif, masih dijumpai antrian yang lama.
2016-06-21 23:03:55	+6285274741981	Poli Anak	Dokter tidak informatif
2016-06-21 23:10:16	+6285274741981	Poli Mata	Petugas terlalu sedikit, tolong ditambah agar pelayanan cepat.
2016-06-21 23:24:35	+6285274741981	Poli Mata	Pelayanan lambat
2016-06-21 23:39:21	+6285274741981	Poli Penyakit Dalam	Pelayanan sdh baik, tp minim fasilitas.

**Gambar 5.** View Menu of Patients Complaints

Of the application system developed as in the view menu above, then the user (admin / manager applications) can perform on the incoming sms governance of the patient so that the system worked well.

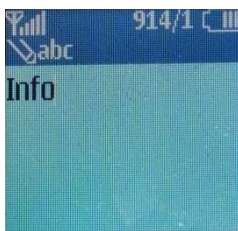
#### SMS implementation

Testing is done by sending an sms to the number of service complaints after it was responded to by the server system. Then patients choose a service unit that will be done and the last complaint charging the complaint is to be conveyed to the hospital. Testing is done with the message format as seen from the image below;

**Tabel. SMS Delivery Format**

Kode	Format Pesan	Contoh
Info	<b>Step 1 :</b> Info	Info
1-10	<b>Step 2 :</b> Pilih 1-10	1 --- > For this type of service Poli Children
	<b>Step 3 :</b> Message content	Concierge services uninformative, please evaluated.

Here is the implementation of the use of SMS to the SMS gateway application systems are built;

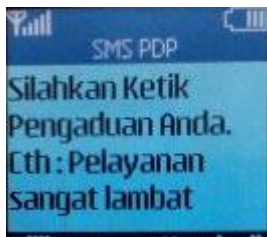


a. SMS from patients



b. Replies from the system

**Picture 6. Step 1 to see what kind of service**



b. SMS from patients

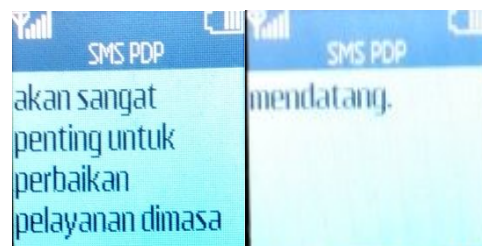


b. Replies from the system

**Picture 7. Step2 to choose complaints**



c. SMS from patients



b. Replies from the system

**Picture 8. Step 3 charging complaint**



## **E. Conclusion**

Based on the results of the testing and implementation of the system, then a number of conclusions that :

1. Users can submit a complaint without being limited by time and place as well as low cost.
2. Implementation of SMS Gateway as a service complaint can be used effectively and appropriately targeted.
3. PHP programming language and MySQL database can be used in building the system SMS Gateway

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EI-02-048

## INFLUENCED FACTORS OF ENTREPRENEURSHIPS INTEREST OF ALUMNI OF FASHION STUDY PROGRAM AT DEPARTMENT OF FAMILY WELFARE OF FACULTY OF ENGINEERING OF THE STATE UNIVERSITY OF PADANG

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**ABSTRACT :** This research operationally is aimed to describe factors which influence entrepreneurship interest of alumni of Fashion Study Program at Department of Family Welfare of Faculty of Engineering of the State University of Padang (FT UNP). It is reviewed from three indicators; (1) Good feelings on entrepreneurship, (2) Take attention at entrepreneurship, and (3) Courage on entrepreneurship. The type of the research is qualitative descriptive where the research which is identifying, reviewing and describing researched subject as it is and resulting answers on the observed formulation of the problem. Population of this research is alumni of Fashion Study Program at Department of Family Welfare of FT UNP who graduates in the period of 2009 to 2014. Meanwhile the sampling is total sampling which consists of 47 persons. Data of the research is primary data which is obtained from questionnaire. The data analysis used percentage descriptive analysis technique through SPSS version 15. The result of the research firstly was reviewed in term of feeling of happiness is 38, 3% respondent, it means that good feelings on entrepreneurship in low. Secondly, It was reviewed from the alumni attention on entrepreneurship is 55, 3% respondent, it means that the alumni attention on entrepreneurship is low. The last, it was reviewed from alumni courage on entrepreneurship is 36, 4% respondent, it means that the bravery of alumni on entrepreneurship is also low (afraid of taking a risk in entrepreneurship).

**Keywords:** interest, entrepreneurship

### I. INTRODUCTION

The world development has been growth rapidly which forces the people to think forward. There have some effort which has been done to improve the quality of human resources. One of them are through education which is aimed to give them knowledge and skills. The learners can develop their knowledge and skills in line with interest which is hoped to help themselves in career development.

The state university of Padang (UNP) is one of institutions of formal educational in higher education which has a role preparing human resources in the producing scholars in various disciplines. UNP has Fashion study program which is intended to generate capable and skilled associate expert performing duties as instructor, supervisor in the field of dressmaking or as well as being able to provide employment (entrepreneurships). For entrepreneurships, the learners need to have an interest, because it is a situation in which a person who has the attention to a field of work is driven by interested feelings, high motivation which brings out desire to pursue certain the field.

Hurlock (1990: 149) argues that "The interest is a source of motivation to encourage people to do what they want and they are free to choose". Interest is also a person of interest in something as proposed by Muhibbin (2007: 136) that "interest is the tendency with high excitement or great desire for something"



The interest is also influenced by various factors, both internal, external and objects. As stated by Ambiyar (1993: 14) that: "Generally, there are three (3) factors that underlie the emergence of interest in a person, they are:

1) The internal factors, is a factor of self are closely related to age, intelligence, talent, gender, motivation, and so on. 2) External factors are outside factors that are related to things, circumstances and people who are nearby, such as: information, attention and the role of parents, peers, neighborhood, community, and others. 3) Factor where its object is one observation to the object being desires and interests. If the state of the object situation that gave a positive stimulus for someone it will arouse interest of the object.

Based on the facts, just little alumni of fashion study program who are interested in entrepreneurship even though they already have enough skills for entrepreneurship. In accordance to interviews conducted by the author with the alumni fashion study program of FT UNP (JKK FT UNP) who graduates on 2009 to 2014 in March 2014. There are several factors that influence them in term of entrepreneurships such as environmental factors as well as families. Lack of encouragement for entrepreneurship of the family and the environment gives less motivation. Yet entrepreneurship in the family also plays an important role as a provider of cooperative networks, financial support, as well as courage and constructive feedback. Therefore, factors that affect the interest of entrepreneurship firstly are support from family. Further growth of an entrepreneurial spirit which is needed in entrepreneurial activity has been growth up. The entrepreneurial spirit that encourages individuals establish and manage the business in a professional manner, including confidence, initiative, achievement motivation, leadership, and bravery to take risks.

Robert Hisrich in Alma (2004: 12) explains that Entrepreneurship is the process of creating something different by devoting all his time and energy accompanied by bear risk, financial, psychological, social, and receive remuneration in the form of money and personal satisfaction. While Scarborough and Zimmerer in Suryana (2011: 15) argues:

Entrepreneur is someone who creates a new business in facing risk and uncertainty in order to obtain profit and growth by identifying opportunities and combine the necessary resources to take advantage of these opportunities.

Syahril (1999: 139) also argued that: "Entrepreneurship is the courage to make an effort and meet the needs of life that a person on the basis of its capability by exploiting all kinds of potential to produce something useful, both for themselves and others. Thus, entrepreneurship is one manifestation of human consciousness that life is a struggle with the effort that should be done with the powers that be, by opening new businesses and their own risk to achieve benefits in accordance with the expertise and skills possessed.

Achieving a successful entrepreneur, there are many factors that influence it. Skinner in Ambiyar (1993: 31) states that interest in entrepreneurship includes having good feeling of



entrepreneurship, having attention to entrepreneurship and entrepreneurial courage. Senses of excitement are psychic atmosphere within oneself towards something different and give rise to complacency in a person so that he will feel happy about something. Feelings are closely related to one's personal, and then the response of good feelings in entrepreneurship will bring interest in entrepreneurship (Hantoro, 2005). Meanwhile, factors that arise interest as stated by Crow and Crow (1973: 22) are divided into three factors;

1) *The factor inner urge*, i.e. curiosity or an urge to produce something new and different. This encouragement can make a person interested in studying a science, conducting scientific research, or other activities that challenges. *The factor inner urge* is: a person's perception of self, self-esteem, personal expectations, needs, desires, satisfaction, and expected achievement. 2) *The Factor of Social Motivation*, means that an interest in efforts to develop themselves in science, which may be inspired by a desire to gain the ability to work, or their desire to obtain an award of family or friends. Social motivation is an urge to act that is not learned, but we learn in a social group in which we live. 3) *Emotional Factor*, which is the interest relating to feelings and emotions. For example, the success would lead to a feeling of satisfaction and interest, while failure can eliminate a person's interest. So, emotion is used to describe a very pleasant feeling or a very annoying

Attention is a state of the manner in which consciousness is focused and directed to a particular object with the same reaction, further enables sharp and clear observation of the object (Pasaribu, 1996: 20). According Slameto (2010: 105) Attention is the activities which are carried out in conjunction with selecting someone stimuli coming up from the environment. Thus, entrepreneurship is about focusing attention and awareness and attitudes towards a business field that endeared by giving reactions and willing creativity and creative in accordance with the business concerned.

Suryana (2011: 34) states that "courage to take expected risks first is a key in the business world, because the results that will be achieved will be proportional to the risk taken". These courage commitments have the same intent to have a strong determination to learn from successes and failures. In line with the above opinion, "courageous spirit in taking risks means independent minded and courage to start a business without fear or anxiety overwhelmed even under uncertain conditions" (Kashmir, 2012: 18). Thus, entrepreneurial courage is the courage to take expected risks previously, independently minded and dare to start a business without fear overwhelmed.

Factors of good feeling on entrepreneurs, having attention to entrepreneurship and entrepreneurial courage are related to each other. Therefore, being an interested entrepreneur's need the willingness, ability, skills, encouragement of family, environment, risk-taking and high confidence in achieving success.

The purpose of this study is to collect the data and describe how big the entrepreneurship



interest of Alumni of Fashion Study Program at JKK FT UNP who graduates on 2009 in terms of good feeling entrepreneurship, attention to entrepreneurship and entrepreneurial courage.

## **II. METHODOLOGY OF THE RESEARCH**

This type of research is descriptive quantitative research. The population in this study was Fashion Study Program at JKK FT UNP graduates of 2006 to 2009. Total population is 47 people, and using total sampling. The type of data in this study is primary data. Primary data were obtained from the respondents themselves dealing with the factors that affect entrepreneurship interest of Alumni Fashion Study Program at JKK FT UNP graduates of 2006 to 2009 were taken through a questionnaire. The data collection is done by using a questionnaire and through test validity and reliability. The first step in data analysis was as follows:

1. Determining the frequency of distribution
2. Determining the level of percentage
3. Classifying Technique

## **III. DISCUSSION**

Based on the research, the discussion of variable factors that affect interest in entrepreneurship consists of indicators of good feeling on entrepreneurship, attention to entrepreneurship and entrepreneurial courage. It is known by referring to the percentage and category obtained at each indicator of this study as follows.

### **A. Good Feeling on Entrepreneurship**

Based on the analysis that has been done, then the factors that affect entrepreneurship interest of Alumni Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of good feeling in entrepreneurship percentage is the highest value of 32%. It is in a class interval between 100 and 103, then the results of the descriptive analysis of data obtained showed good feelings entrepreneurship indicators including at very low levels with a percentage of 38.3%. It means that the alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 have less good feelings in entrepreneurship.

According to Wasty (2006: 37), "feeling can be interpreted as a psychological atmosphere that takes part personally in the situation. The opening up to a different matter with the state or the value of the self". Feelings are closely related to one's personal, and then the response of good feelings in entrepreneurship will bring interest in entrepreneurship (Hantoro, Sirod 2005). Crow and Crow (1973: 22) say that the interest arises because of three factors, namely a boost in self, motivational factors of social and emotional factors.

Alumni of Fashion Study Program have had knowledge and skills in terms of fashion, and they must have desire of the self to entrepreneurship. Especially when it is difficult to find employment, it should be graduates of the course of fashion to create jobs by entrepreneurship. If entrepreneurship



alumni, they can hire employee for some people so that unemployment will decrease. Indeed, for creating an entrepreneur need a strong mental readiness and supported by the ability and willingness to become an entrepreneur.

### **B. Attention to Entrepreneurship**

Based on the results of data analysis of the factors influencing the interest in entrepreneurship Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of attention to entrepreneurship, the percentage of the highest value of 40%. It is in a class interval between 40 and 41. The results of the analysis of data description obtained showed indicators of attention to entrepreneurship, including at a very low level of 55.3%. It may imply that the alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 is still less attention to entrepreneurship. The attention to entrepreneurship is the concentration of a situation or a person's attitude toward a business field that is liked by giving reactions and willingness of creativity with the business field, (Pasaribu, 1996: 20).

### **C. Couraging of Entrepreneurship**

Based on the results of data analysis of the factors influencing the interest in entrepreneurship Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of entrepreneurial courage, the percentage is the highest value of 41% it is in a class interval between 45 and 47. Then, the results of the analysis of data description obtained showed that courage entrepreneurship indicators are including the low level of 36.4%. It means that Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 for the courage to take risks in entrepreneurship is still lack. In line with the opinion of Suryana (2003: 14) "Courage to take expected risks firstly is a key in the business world, because the results that will be achieved will be proportional to the risk taken".

## **IV. CONCLUSIONS AND SUGGESTIONS**

### **A. Conclusions**

Based on the description in the discussion of the results of this study can be summarized as follows:

1. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of good feeling in entrepreneurship are in the very low levels (38.3%). It means that interest in entrepreneurship graduates of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 have less feelings of pleasure entrepreneurship.
2. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of attention to entrepreneurship are in the very low levels (55.3%). It means that entrepreneurship interest of graduates Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 is very low (lack of attention to entrepreneurship).



3. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of entrepreneurial courage are the very low levels (36.4%). It means that, in terms of courage entrepreneurship, entrepreneurship interest of graduates Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 are not had the courage to entrepreneurship.

## **B. Suggestions**

There are suggestion to parties based on the result of the research are as follows

1. Students of Fashion Study Program

It is recommended that students of fashion study program to increase their interest in entrepreneurship, so that they can manage a business, creating jobs, and achieve success in business.

2. Chairman of Fashion Study Program

- a. Advised to pay more attention and increase the role of entrepreneurship courses so that students of fashion can apply the knowledge and skills they have gained, in order to have an interest in entrepreneurship. They then can create jobs in the field of fashion after finishing his studies, in accordance with the objective of D3 Program.
- b. From the aspect of entrepreneurship education, this research gives input on the essential elements in Fashion Study Program especially in increasing student interest in entrepreneurship associated with good feelings in entrepreneurship, attention to entrepreneurship, entrepreneurial courage.
- c. However, the findings of this study have showed that all of the factors studied require improvement. It is hoped that all parties consider solutions both the department and the faculty, especially the chairman of the appropriate course to overcome these problems

3. Subsequent Researchers.

In subsequent researchers are hoped that this research can be used as a source of comparative literature and materials as well as consideration to further investigation. Because of the scope of the investigation is not yet able to describe all factors to entrepreneurship for alumni of Fashion Study Program. Researchers suggest the next researcher will reflect upon and examine other factors that affect the interest which has not been studied but influence entrepreneurship interest.



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EI-02-065

## DEVELOPING SKILLS OF COMMUNICATION, AND COLLABORATION VOCATIONAL EDUCATION PROGRAM THROUGH THE DESIGN AND IMPLEMENTATION OF INNOVATIVE LEARNING DEVICE AND WEB-BASED INSTRUMENT AUTHENTIC ASSESSMENT

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**ABSTRACT :** *Graduates of Vocational Education (PV) Indonesia general technical competence (hardskill her) pretty good, but soft skills are currently weak, particularly communication skills, and collaboration. This happens because the learning process too much emphasis on hard skills, while softskill its often overlooked. If this condition continues, the era of the ASEAN Economic Community (AEC) is allegedly the majority of graduates PV Indonesia unable to compete with foreign labor forces are known to have hard skills and soft skills better. Therefore, in order to graduate PV Indonesia unable to compete, the lecturer as a printer PV graduate labor is demanded to be able to develop and use innovative learning tools so that they can print out graduates who are not only good in hardskill mastery, but also good in soft skill mastery. The purpose of this study was to develop soft skills program students participating in PV especially communication skills, and collaboration. The method used is by developing innovative learning tools, and apply them in learning. To develop a learning tool used 4-D modeling approach. The developed devices are subject Fabrication Practices. Resulting from the implementation study learning tools that include Class Semester Plan (RPS), a medium of learning (modules), the WEB-based authentic assessment, and communication and collaboration capabilities of students increased significantly.*

**Keywords:** *learning tools, Communication and Collaboration Capabilities*

### I. INTRODUCTION

Article 15 of Law No. 20 of 2003 on National Education System explains that vocational education is higher education that prepares students to have a job with a certain applied skills equivalent to the maximum degree program. One of the organizers Universities Vocational Education in East Java is the State University of Surabaya (Unesa). In Unesa vocational education is organized in several faculty and packaged in DIII Non Education Program.

Based on the results of self-evaluation conducted in preparation for the accreditation obtained information that there are some weaknesses in the management system of vocational education in the Department of Mechanical Engineering Unesa. The weaknesses among others present in the process and learning outcomes Fabrication Practices. In the lecture / teaching practice Fabrication it still tends to be informative, yet directed to the active process of students to construct their own knowledge. In addition, the learning process is more centered on the lecturer (teacher-centered.), Has not been directed to student-centered learning (student-centered). The lecturer has not portray themselves as facilitators who educate students. Such conditions according to Joni (200) and Xaviery (2004), indicates that the learning process Fabrication Practices have not been implemented optimally. Naturally, if then the results of the evaluation itself also mentioned that graduates also have some





drawbacks, such as: (1) lack the ability to communicate, and (2) lack the ability to collaborate. In fact, the ability to communicate, and the ability to collaborate is the ability of graduates of vocational education a priority if you want to succeed in the age of globalization (Slamet PH. 2013). Based on the weaknesses of the process and learning outcomes, as described above, the researcher believes that one solution could be done was to make learning system. Improvements learning system can be started from the problem-solving and action-oriented learners using the system and learning resources in a broad sense, so that the learning process can be implemented optimally. The assumption used is more optimal learning process, the more optimal learning results anyway. As in the other subjects that the actual implementation of lectures conducted during Fabrication Practices also commenced with the preparation of the learning device consisting of Class Semester Plan (RPS) and Unit Class Events (SAP) for the field of science as well as the objectives that were defined. However, a condition that occurs is still not optimal implementation of learning and faculty less active there is a tendency to evaluate the lectures. On the other hand necessary for the lecturer of the course to the needs and development of teaching science subjects, including science Fabrication.

Poor ability of the communications and collaboration capabilities of the students indicated that it is important to pay attention to the lecture as a learning process to help improve communication and collaboration capabilities of students. For both these capabilities need to be designed and implemented new innovations in learning, especially in subjects Fabrication Practices so that the material and the lecture will be more meaningful. To facilitate the implementation of learning need to be developed innovative learning tools and is able to play an important role in the implementation process and is able to activate and motivate students to have an impact on improving communication and collaboration capabilities.

According to Sanjaya (2011), the learning device in particular RPS and SAP are used as a reference to translate the learning activities must contain at least the purpose of learning, teaching materials, teaching methods, learning resources, as well as the assessment of learning outcomes. For higher education, the form of RPS and SAP may have components that refer to the higher education curriculum that is set based development undertaken by the college concerned (MONE, 2003). Important components that support student learning activeness and there in units lecture event (SAP) covering student worksheet (MFIs), critical analysis, learning journal writing and giving a quiz at the end of each lesson.

On the implementation of the learning process Fabrication Practices as described above is also already using the method of discussion to build an active interaction between faculty and students and among students themselves. But it seems that teaching methods have not been structured properly, so the presence of SAP that accommodate learning strategies need to be clarified in order to become more effective and efficient.

An integral part in the learning device is the teaching material that can be realized in the form of teaching materials and assessment tools to help and measure the ability of students that can be



designed to coincide with the lecture. Especially for the availability of teaching materials Fabrication Practices for this is still an obstacle, and on the vocational education Mechanical Engineering Unesa until now no one has tried to provide a solution. This condition is partly due to inadequate teaching materials or supporting books Fabrication Practices lectures in the Department of Mechanical Engineering. Moreover, the structure that existed at most books Fabrication Practices not accommodated intents and purposes as arranged in RPS and SAP so it needs no adjustment. Therefore, for the learning practice Fabrication can be carried out effectively and efficiently in addition be supported by RPS and SAP needs to be supported by their teaching materials and assessment instruments that are accurate, can improve communication skills, and is able to improve the skills of collaboration of students who have proven their their effectiveness and efficiency.

From the background of the problem as described above can be seen that the ability of communication and collaboration capabilities of graduates of vocational education Indonesia generally weak, including vocational education graduates Unesa. Yet it is the competence needed work today. Therefore, as soon as possible a solution needed to be improved and implemented an innovative learning tool proven to significantly able to improve communication skills and collaboration capabilities of students participating in vocational education programs.

The purpose of this study is to produce innovative learning tools proven to improve communication and collaboration capabilities of their students significantly.

## **II. ASSESSMENT THEORY**

According to Sanjaya (2011), a good learning device capable of measuring the competence held by the students through evaluation instrument. According Benta, at., Al. (2009), the achievement of learning objectives, or which is a competency achievement can be measured through an authentic assessment. In the context of learning by using approach to scientific assessment type of portfolio is one of the four types of authentic assessment is recommended, as it clearly benefits can explore the capabilities of the students and also can be used as a component of evaluation feed back on the learning process has been implemented (Bryant and Temmins, 2002; Baume and Yorke 2002). Moreover Gronlund in Rusoni (2001: 2), suggests that the advantages of using authentic assessment types of portfolios are: (1) the learning progress of students can be seen clearly; (2) emphasis on the results of the students' best work had a positive influence on learning; (3) provide greater motivation to learn; (4) gives students the opportunity to work in accordance with individual differences; and (5) if executed properly can be a tool of clear communication about the progress of learning for the students themselves, their parents, and others.

Especially for vocational education / vocational, according to Bragg, D.D. (1995), after reflection on the invention and development, the use of authentic assessment widespread type of portfolio. According to Zita M. Wagner (1998), authentic assessment is an assessment of the type of portfolio is most appropriate for vocational education / vocational. Because besides having strong relevance to the scientific approach, it also has many advantages, among others: (1) able to describe



the learning outcome of students, both in order to observe, reason, try, build networks, and others; (2) tend to focus on complex tasks or contextual; and (3) allows learners to demonstrate their competence in setting more authentic

Along with the rate of development of science and technology is rapidly increasing, authentic assessment type of portfolio is also experiencing growth forms into electronic portfolio (e-portfolio) to support the implementation of learning. Based tasks, forms, as well as their possible application to the e-portfolio were identified as potentially develop communication skills that students will have an impact on cognitive abilities. This new form of web-based portfolio as it potentially supports the learning process while motivating students as reported in the results of the study Cheng Chang (2009). The results of the study by Meyer, et. al., (2010) also showed that the use of e-portfolio is able to improve communication skills, while recognizing student progress by examining a collection of his work. In addition to the progress and the ability of students will also be reflected in the e-portfolio (Barrett, 2000). It was also reported in the research results Cheng Chang, (2009) that the learning outcomes are accumulated over a certain period in the e-portfolio is able to increase the level of student motivation. RPS development and SAP are equipped with a means of evaluating the form of e-portfolio needs to be equipped with teaching materials as other critical components. Teaching materials can be realized in the form of textbooks, modules, practice guides and others. Furthermore Kemp, (1977) stated that good teaching material is a combination of knowledge (facts and detailed information), skills (steps, procedures, conditions and requirements) as well as attitude. In the selection of teaching materials which are effective according to Gerald & Ely in Karim, M (1980) must meet the criteria 1) the accuracy of cognitive (cognitive Appropriate), 2) the level of thinking (level of sophistication), 3) cost (cost), availability of materials (availability) and 5) technical quality (technical quality). While Romiszowski, A., (1986) suggest four important aspects in the preparation of teaching materials in the form of books, ie academic, social, recreational, and personal development.

Rokhman & Yuliati (2010), suggests that the teaching materials is an essential requirement in learning as a means of increasing interaction and communication. The reason is very acceptable for teaching materials that have a high relevance to the material and arranged systematically be able mengkodisikan learning process becomes more dynamic as well as build curiosity (curiosity) students is greater.

According Mulyasa (2006), teaching materials that can be shaped handouts, books, modules, posters, brochures, and leaflets. Teaching materials are packaged in the form of modules will be able to enhance the activity, motivation, and student achievement. In line with Mulyasa, Rachman (2000), the learning system with modules is one of the teaching and learning strategies that have been enrich science teacher, and a refinement of learning berprogram. Completion of the learning system modules such as this goes on, and experience shows that the results of this module teaching system can further enable learners. Vembriarto (1995), also said that the learning module with a lot of advantages of



which is learning centered on the learner (student-centered), the quality control is greater than the learning classical generally, the relevance of learning with the curriculum increased, and students learn thoroughly.

Of the various opinions that discuss about the module and a benefit as described above can be supposed that by implementing the module in a lecture to be able to improve the quality of the lecture itself. If the quality of tuition increases logically also be able to improve the competence of students. Increase student competency needs to be balanced with the increasing competence of lecturers.

Law number 14 of 2005 the Ministry of Education (2005), said that there are four competencies required of lecturers. Fourth competence in question is pedagogical, personality, social and professional. Lecturers are obliged to always improve their competence in order to improve the quality of the process pembelajaranya. No exception is also learning Fabrication Practices.

According to Ono and Ferreira (2010); Lesson Study (LS) capable of increasing the professional competence of lecturers, if implemented in a planned and sustained consistently. Characteristic of the implementation of the LS with the team that supports all stages of learning are basically into force as well as increased quality assurance of learning overall. Lecturer assisted models LS team members can explore the capabilities that improve performance and professionalism.

Safilu, (2013) in his research report that the LS is applied proven to improve the quality of the learning process that resulted in the rise of complex thinking skills of students. Professional development programs through the LS is basically the potential to reform and improve the learning process through improvement of learning tools that improve the quality of implementation. Impact directly or indirectly be felt by faculty and students, specifically in this study is expected to be able to increase the ability of students to the science of understanding the concept of Fabrication.

LS in every stage of development that includes cycles consisting of a plan that is planning learning activities were arranged with members of the team, do that the implementation of learning according to plan with team members act as observers, and see that reflection is done by all the team members to reflect on learning activities which has been implemented with the principle of kolegalitas and learning together will be able to provide many benefits for faculty and students.

Rock & Wilson, (2005) and Andrew (2012) in his research said that the activities LS is able to increase the confidence of lecturers to teach as well as inputs for the implementation of improvements following learning activities. In other words, the improvements applied to each cycle of the LS is able to improve the quality of learning that have an impact on improving the ability of understanding the concept of the student.

The importance of developing research learning device Practice Fabrication supported ratings autentik e-portfolios through Lesson Study activities carried out by the consideration that such efforts will build collaborative faculty based on the principle of collegiality while enhancing mutual learning in universities to build a learning community as conveyed Arani, et al, (2010 ). The team of lecturers who are members of the LS will systematically compile lesson plans and then implemented



as well as observation and evaluated. It is expected woke improving the quality of the learning process that will have an impact on student learning outcomes, through the development of innovative learning tools based scientific and authentic assessment based supported web.

Based on the exposure given it was necessary to the development of learning tools Fabrication Practices supported by authentic assessment e-portfolio through LS to improve communication and collaboration capabilities of students

### **III. METHODS**

This research was conducted in the Department of Mechanical Engineering at even semester 2016. Unesa innovative learning tools developed using 4-D approach model through the steps Define, Design, Develop and Disseminate. To determine the dynamics of communication and collaboration capabilities made instrument that compiled based on the definition of operational variables. Before use tested for validity and reliability, the new revised used to measure these variables. Data analysis is done by comparing Pre and post test using the instrument. Meanwhile, to test the feasibility or validity of the content, format, and language innovative learning tools researchers use judgement expert using a questionnaire.

### **IV. RESULTS AND DISCUSSION**

#### **A. Learning Tool**

This research has successfully developed an innovative learning tools for course practice Fabrication. This innovative learning tool designed using the scientific approach to eye Class Fabrication Practices consisting of Class Semester Plan (CSP), Events Unit Class (EUC), Module Fabrication Techniques, and web-based authentic assessment instrument. The product specifications are:

##### **a. CSP**

CSP product is in the form of a written plan that describes Class for one semester for courses Fabrication Practices will be applied to students of vocational education Unesa. This CSP is a new (innovative) by applying a scientific approach where the student-centered learning, and clearly reflected in lesson activities include 5M (observe, ask, try, reason, and communicate). CSP was developed to enhance the activity of the students, improve communication skills, and collaborative capabilities, so as to address the disparities that occur.

##### **b. EUC**

EUC is meant here is a written plan describing the course of the lecture plan in a meeting according to the needs time to teach specific competence in students. EUC is also designed so as to models, approaches, strategies, techniques, and tactics applied learning is able to enhance the activity, improve communication skills, and collaborative capabilities of students.

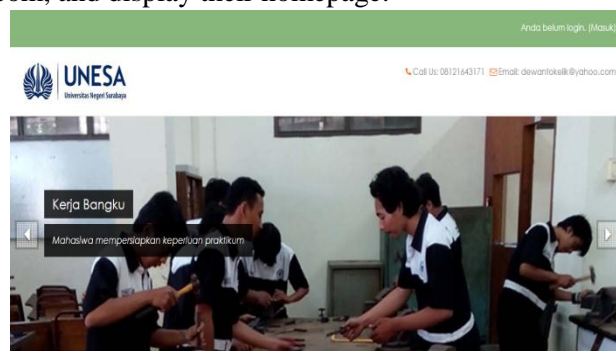
##### **c. Practice Module Fabrication**

The module is meant here is the innovative self-learning package by using a scientific approach. This module has been equipped with student activity sheets (MFI) include a series of learning

experiences Fabrication Practices planned and systematically designed, operational, and targeted for use by students, accompanied by guidelines for faculty use, and to help students achieve the learning objectives. This module is also equipped with a web-based authentic assessment tools. From the results of the validation test modules are executed by expert judgment developed learning modules have been otherwise very decent in terms of substance, decent in terms of its format, and quite feasible in terms of language.

#### d. Authentic Assessment Tools Based WEB

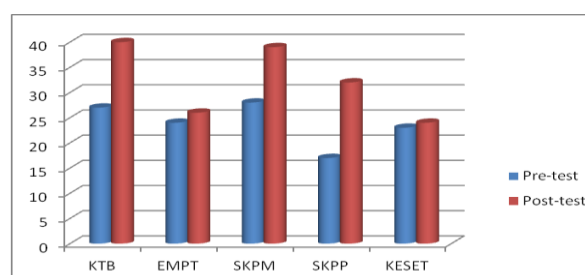
Web-based authentic assessment instruments or instrument ratings authentic kind of portfolio of supported web known as e-portfolio. This instrument has been designed to help students collect the results of the study to be more structured and systematic. Apart from being a place to store the tasks generated in digital form, there is also a comment field that became an important part of the communication without being limited space and time. E-portfolio generated capable of collecting all the tasks designed so that students more practical as well as efficient. Here is the web address <http://portofoliofabrikasi.com>, and display their homepage:



**Figure 1.** Home WEB-Based Authentic Instruments which have developed Researcher

### B. Communication Capabilities

From the results of learning by using innovative learning tools developed are presented in Table 1. that communication skills students participating in the program showed significant improvement after following study using innovative learning tools. It can be seen from the Post-test that tend to be higher than the pre-test communication skills. This communications capability measured value of the indicators that a person's ability to communicate effectively covering properties: 1) Disclosure (KTB); 2) Empathy (EMPT); 3) Attitudes Support (SKPM); 4) A positive attitude (SKPP); and (5) Equality. (KESET).

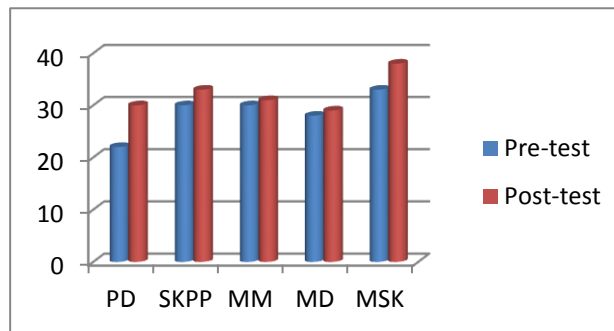


**Figure 1.** Value Pre-test and post-test Communication Capabilities

Shown in Figure 1 above that value openness (KTB), being supportive (SKPM), and a positive attitude (SKPP) increase quite sharply. This is because the learning process is designed with a scientific approach that requires all students actively involved 5M. Involvement in 5M is strongly suspected to be able to boost communication skills of students.

### C. Collaboration Capabilities

Collaboration capabilities of students after participating in learning by using innovative learning tools developed through this research also proved to be increased as shown in the following figure.



**Figure 2.** Value Pre-test and post-test Collaboration Capabilities

Values are measured from the collaboration capabilities indicator of the ability of someone who could collaborate effectively cover the attitude of: 1) Confidence (PD), 2) Positive (SKPP); 3) Want Respect (MM); 4) Providing Encouragement (MD); and Build Excitement Group (MSK). Shown in the table that the attitude of PD, SKPP, and MSK average student showed a rise quite sharply. This is allegedly because during the learning of all students in rotation practice immediately become a leader or project in doing a task (jobsheet). Pinpro is responsible for the completion of work on the assignment in a timely manner so as to coordinate his friends in the preparation of materials and tools required, making for a pattern, draw openings, making the workpiece, discuss in detail the steps the process. Through this process, students allegedly collaboration capabilities can be increased.

### V. CONCLUSION

From the results of research and discussion, it can be concluded that:

1. Successfully be building innovative learning tools for vocational education courses in subjects that include RPS Fabrication Practices, SAP, Module Fabrication Practices and WEB-based authentic assessment Software
2. The use of the learning results of this study proved able to significantly improve communication skills students participating in vocational education programs.
3. The use of the learning results of this study proved able to significantly enhance the collaboration capabilities of students participating in vocational education programs.



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## ELECTRICAL CIRCUIT LESSON OF MOBILE LEARNING IN ELECTRICAL ENGINEERING DEPARTMENT OF UNESA

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**ABSTRACT :** *The development of internet media have a big impact to people's lives, especially social media, not only as applications that are fun, but also as business applications and applications for learning. Social media is used as a learning applications can be designed using a programming device, and can be web-based with the aim to enhance the students' learning activities with reference to the concepts and theories of learning. learning model that uses mobile devices (mobile) have not been studied and is a relatively new area of research, because of the way it works that utilize mobile communication technology to support learning. Observations researchers showed that not all students have computers to access course material. The impact of the development of communication technology and mobile devices such rapid changes, then almost all students have mobile phones or mobile phone. In addition, the Internet can be accessed via mobile devices such as mobile phones, when the network becomes available. The combination of technology and the internet can be used for learning, the media called mobile learning (m-learning). This research aims to develop learning materials of mobile learning application, and perform with expert judgement of the content of m-learning applications. This research has produced the content subjects Electric Circuits 1 in the form of mobile learning applications, gained an average of learning outcomes and student response 74. the feasibility of the media m-learning for learning shows are agreed by 90%. While the effectiveness of m-learning aspect indicates strongly agree response by 90%. The results showed an average score of 90% student response, which means that m-learning application is very feasible to use in learning.*

**Keywords:** *mobile learning; e- learning; communication technology.*

### I. INTRODUCTION

Development of Internet technology goes very fast and almost everyone knew him and wanted to act with internet facilities. Various information can be accessed through the pages on the Internet web site address. The development of learning and following the development of technology, so that learning also take advantage of Internet-based electronic devices. Internet has several advantages such as: easy to obtain a lot of information, it can be used as a means of communication throughout the world both in written, audio or audio visual, unlimited space and time.

Learning with e-learning requires a computer or labtop for students , because not all students have a computer to access the material or content, but almost all students have a mobile or HP that can be used to open web pages if available internet network. Learning using mobile devices (mobile) is called mobile learning. Mobile Learning (M-Learning) is a blend or combination of Electronic Learning (E-Learning) and Mobile Computing to access a learning application at any time (anytime) and anywhere (anywhere)

The purpose of this study to find out :

1. What is the feasibility of mobile learning device in terms of the depth of electro content, syntax learning, and the use of technology?
2. How is validation of media experts, subject matter experts based on mobile learning?



3. How does the learning outcomes of Electric Circuits after students learning with m-learning in the Department of Electrical Engineering Unesa?

### ***E-learning***

In line with the development of information technology, people increasingly facilitated in obtaining the information, without limits of time and space. The development of multimedia technology raises many new applications, including education, and used as a means of learning. E-learning refers to an alternative method of teaching and learning using all electronic media, including the internet, network, audio/video tape, and CD-ROM (Tomei, 2009:46). Further, Tomei stated that learning with e-learning has advantage that students can learn without limits of time and space. E-learning also provides a one-stop service for teachers and learners in order to create and deliver educational content quickly, effectively, and economically (Tomei, 2009:46).

E-learning is an alternative method for teaching and learning using electronic media, the Internet, intranet, satellite, tape audio/ video, interactive TV and CD-ROM is the electronic media which are often used in learning, either synchronously (at the same time) or asynchronously (at different times).

### ***Mobile Learning***

Olofsson (2007:310) see learning as constituted in the lived in-world, i.e. the world as it is experienced in social practice, and as participation in a community with practice shaping and constitution knowledge and knowing and with learners gradually able to master procedures for talking and acting through participation.

New trends in the world of e-learning, utilizing devices and communication technologies (mobile), known as the term mobile learning (m-learning). Mobile learning is part of e-learning. Advanced multimedia technologies are used in distance learning systems, including multimedia authoring and presentation, web-based-learning, virtual environments, interactive video, and system Mobile Learning. M-Learning is a blend or combination of Electronic Learning (E-Learning) and Mobile Computing to access a learning application at any time (anytime) and anywhere (anywhere) (Shih T & Hung J, 2007: 273).

The main advantages of using mobile computers for learning are that they assist students' motivation, encourage a sense of responsibility, help organisational skills, help both independent and collaborative learning, act as reference tools, help track students' progress and assessment (Lorna Uden, 2007).

M-learning can shape the learning paradigm carried anywhere and an indefinite period. The function m-learning in the learning that supplements (additional) that are choice (optional), complement (complement), or a replacement (substitution).

The results of research on MOBIlearn project, it was found that 49% of students study from home or work space, 21% of learning outside the office. 5% studying outside the home, 2% study at a



friend's house, 6% of learning in a relaxed place, and 14% learned at the doctor's office, cafe, mall, or in car (Sharples, M., Taylor J., & Vavoula, G 2007: 221-247).

Although it has some advantages, m-learning will not completely replace the traditional e-learning. With limited computing resources, m-learning can not provide and/or access to learning resources together with the existing resources on e-learning. Resources available in m-learning will be very likely to be used as a supplement to e-learning as well as for the traditional learning environment if computer aided learning is not available.

Wireless communication enables mobile learning. With the capability of multimedia technologies on wireless connected notebook computers, PDAs, and even cellular phones, system developers are possible to implement distance learning systems on mobile learning (Shih T & Hung J, 2007: 277).

M-learning planning system, consisting of a management module and the mobile client. The system management module is one of the existing digital learning systems, through which the module manager carries out the management of m-learning. Such management includes adding m-learning courses and courseware, posting bulletins, and viewing the learning state.

Mobile client refers to the client software by the learners on mobile terminal, and it connects the application server to complete the relevant learning operation through wireless mobile network, WiFi wireless networking, and PC data cable synchronization (Han, Jun etc, 2010, pp 130-135).

## **II. METHODOLOGY**

This study refers to the 4 D model comprising the steps define, design, develop, and disseminate (Thiagarajan, Semmel, and Semmel, 1974). Development research is how to develop m-learning, which uses HP android, for the course of Electric Circuits, and then validated by expert judgement of IT media and content.

1. Define Stage is the stage of determining the format and the essential topics of Electric Circuits. Define stage is composed of five phases, namely the analysis of the rear face front end analysis, learner analysis, task analysis, concept analysis, and determine specifying instructional objectives (Thiagarajan, Semmel, & Semmel 1974).
  - a) Problems found in learning that not all students have computer to access the material, while the computer lab on Unesa use is very solid. On the other hand, almost all the students have a mobile (HP), so that the utilization of HP is not only limited to communicating with others through social media or SMS only, but use to access course material.
  - b). The samples are students who programmed the subjects related to this study, the subjects of Electric Circuits 1. Data analysis was performed through documentation and observation of behavior and activities of students who used HP support with android.
  - c). Task analysis is to identify the characteristics of the material related to the core competence ( KD ) in a course that is used for m-learning. Core competencies should be in accordance with

the objectives (adopt), and in accordance with the needs of the target (adapt). It can be seen from the syllabus, that is direct current, power, and voltage.

- d). Concept analysis is to draw up concepts systematically based hierarchy. These concepts are essential and relevant, established by considering the syllabus and work requirements , and the development of science and technology. Analysis of this concept is very important for planning m-learning.

Furthermore, it should be made the task analysis and concept analysis, and compiled more detailed indicators, and then further divided into several learning objectives and written in lesson planning. The learning objectives must be very detailed, so it is clear what will be measured or achieved in learning. The learning objectives consist of Audience, Behavior, Condition, and Degree (ABCD). In this phase, also specified evaluation tools, materials, and equipment needed in learning. The purpose of learning is used for test development in an effort to measure the achievement of learning objectives that have been set.

**Design Stage** consists of construction of criterion-referenced tests, media selection, format selection, and a preliminary draft. Construction of criterion-referenced tests are tests to measure the achievement of learning objectives which include process and student results. Criteria test to measure the absorption of students which includes theory and practice. Selection of media based on the concept that the essential and motivating students to learn, then the appropriate media is media that support HP with android for m-learning. The topics that are essential from certain subjects are arranged in the form of a synopsis and then compiled story board and draft master. This stage is called pre-production.

**Develop Stage**, comprising the steps of expert judgement and field trials. This stage is the stage of production to make m-learning applications. Before it is produced, all the learning tools and the synopsis and story board validated and reviewed by experts in the field of media, and the fields of electrical engineering or electronics to determine (a) the truth of the concept; (b) learning objectives; (c) the quality of the sound; (d) quality of pictures and other illustrations; (e) the relevance of questions/tasks and learning objectives; and (f) the quality of the layout. Furthermore, synopsis and scenarios, as well as a learning tool was revised based on feedback and results validation. At this stage of develop, the necessary technical design and m-learning infrastructure (network, audio, video, and textfile).

**Table 1.** Method of collecting data

No	Target	Instru-ment	Subject
1	Total use of android -based smartphone in the Department of Electronic and its utilization	Questionnaire sheet	Students
2.	Judgement experts on Android	<i>Check list</i>	Judge-ment experts
3.	Student response of android app	<i>Check list</i>	Students

4.	Student Learning Outcomes	Test	Students
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**Table 2.** Validation Instrument of Android app

No.	Aspect	Indicator	Total
A.	Display Quality	1, 2, 3, 4, 5, 6, 7, 8, 9	9
B.	Software engineering	10, 11, 12	3
C.	Curriculum	13, 14	2
D.	Materials presentation	15, 16, 17, 18	4
E.	Evaluation	19, 20	2
F.	Language	21, 22, 23, 24	4
Total			24

**Trial Stage.** M-learning trials conducted in small classes. At this stage, m-learning is tested to students taking courses Electric Circuits 1 in the Department of Electrical Engineering of FT Unesa. Empirically can be obtained from the data whether the m-learning is feasible to use in learning. The results of limited testing is used to give recommendations on follow-up studies and can be done for the next stage of disseminate stage.

### III. RESULTS AND DISCUSSION

Electric Circuits courses I conducted with lectures and gives examples and exercises, and the use of media power point. Problems found that subjects Electric Circuits 1 consisting of theory and practice in the laboratory to confirm the theory and the law on which the electrical circuit, but the students' scores less than satisfactory. Another issue, almost all the students have a mobile (HP), so that the utilization of HP is not only limited to communicating with others through social media or SMS only, but use to access course material. The learning-oriented m-learning because it uses a mobile device (mobile).

In design stage, developed an instrument for the validation of learning design and learning devices, questionnaire responses and achievement test. In addition, designing a story board for Electric Circuits 1.

This stage consists of stages develop expert assessment and field trials. This stage is the stage of content production m-learning courses, while the expert assessment has been carried out to provide input about the suitability of the material by the RPP. Based on the results of expert assessment, the product can be tested m-learning in the classroom.

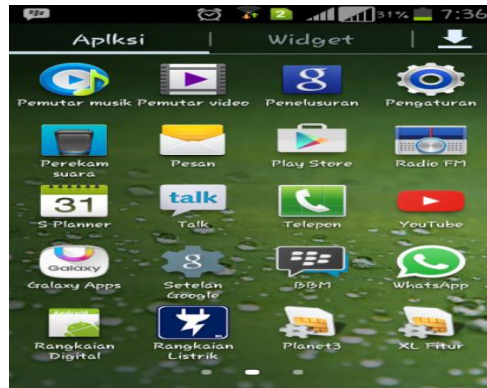


Figure 1. android m-learning



Figure 2. Home

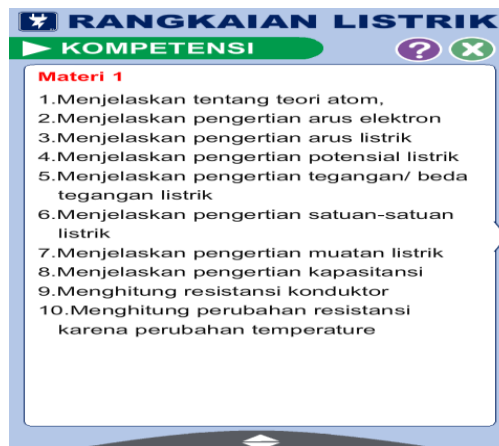


Figure 3. Competence



Figure 4. M-learning Menu



### A. Validation Media and Learning Tools

The validation of media and learning tools, including media android m-learning, lesson plans, and post-test are as follows:

#### 1. The results of expert validation of Information Technology (IT )

Validation of media experts in IT media m-learning, consists of six aspects: (1) the quality of the display, (2) software engineering, (3) the presentation of the material, (4) evaluation, (5) language, (6) maintainable and (7) compatibility. Having seen and tested, the results are as follows :

**Table 3.** Validation result of expert of Information Technology (IT)

No	Aspect	(%)	
1.	Display Quality	80	Good
2.	Software engineering	80	Good
3.	Materials presentation	80	Good
4.	Evaluation	80	Good
5.	Language	80	Good
6.	<i>Maintainable</i>	100	Very good
7.	<i>Compatibi-lity</i>	100	Very good
<b>Average</b>		<b>85,7 %</b>	<b>Good</b>

Average score validations 85.7 % . So we can conclude that m-learning media according to media experts in Information Technology is used as a medium of learning .

**Table 4.** The result of validation of judgement expert of subject matter

No	Aspect	(%)	
1.	Display Quality	85	Very good
2.	Software engineering	85	Very good
3.	Curriculum	90	Very good
4.	Materials presentation	100	Very good
5.	Evaluation	100	Very good
6.	Language	95	Very good
<b>Average</b>		<b>92,5%</b>	<b>Sangat Baik</b>

Based on the results of questionnaires validation of subject matter experts in the table above, the average results of the validation 92,5%. Then by subject matter experts are learning media is excellent for learning.

### B. Validation of Teaching Material (RPS)

RPS assessment criteria consist of: (1) the formulation of learning objectives, (2) the selection and organization of teaching materials, and (3) methods of learning.

**Table 5.** Validation results of RPS

No	Aspect	(%)	
1.	The formulation of learning objectives	90	Very good
2.	The selection and organization of teaching materials	75	good
3.	The methods of learning	90	Very good
<b>Total</b>		<b>85%</b>	<b>Very good</b>





RPS validation questionnaire results in the table above were obtained an average score of 85% validation. Then the Semester Implementation Plan ( RPS ) is very suitable as a teaching materials.

### C. Response Analysis

Questionnaire responses aimed to find out how the responses of students to the learning of Electric Circuits 1 using m-learning media . This questionnaire consists of 22 point declaration in which each statement with five answer options.

**Table 6.** Recapitulation student response

No.	Aspect	(%)	
1	Product	90	Strongly agree
2	Effectiveness for Students	90	Strongly agree
<b>Total</b>		<b>90</b>	Strongly agree

Aspects of the product showed a response strongly agree (90%) on the feasibility of m -learning media as a medium of learning, while the aspect of effectiveness for students strongly agree responses also showed 90%. From these results, showed an average score of 90% student response, which means all very amenable to m-learning media.

### D. Student Achievement

Student achievement should be measured using a test instrument. In such instruments , there are 4 essay that represents some of the indicators on the basic competence is apply all kinds of electrical circuits. The lowest and highest of student achievement are 52 and 92, with an average 74 from 34 students.

## IV. CONCLUSIONS AND RECOMMENDATIONS

### A. Conclusions

This research has produced m-learning media for Electric Circuits 1, with an average student achievement was 74. The results of student responses on aspects of the product showed a response very strongly agree on the feasibility of m -learning media are used as a medium of learning by 90%. Meanwhile, in the aspect of effectiveness for the students showed a response 90% strongly agree. From these results showed an average score of 90% student responded which mean that states strongly agree on m-learning media.

Students prefer learning with mobile learning, because it can be visualized and integrated with other media such as graphics, text, audio and video, and animation.

### B. Suggestion

Some feedback from students who do not have HP with android system, want to be facilitated so that they can also learn through HP. The material on HP needs to be expanded. Who wants to make android application takes a long time, and also involves a skilled person. We have to make scheduling should be tight enough to be on time to be implemented during the learning. Making this android application.



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EI-02-025

## MULTIMEDIA ANIMATION IN IMPROVING CONCEPT MASTERY OF CRYSTAL DEFECTS IN ENGINEERING MATERIALS COURSE

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**ABSTRACT:** *Students' difficulty in engineering material course, identified from the results of preliminary study, lies on the materials related to micro-structure of atoms. Difficulty in understanding this material is due to its abstract nature. On the other hand, this material is very important because it determines the properties of the material. Theoretical learning in the form of existing verbal symbols is not sufficiently representative to explain the necessary system concept, so it is possibly inaccessible by learners, and the resulting effect is inadequate learning experience. This results in mistakes when constructing an intact system of engineering material both on atomic microstructure and changes system of material properties based on real application. This research is closely related to efforts to improve the learning quality of engineering material, especially mastery concept of Crystal Defects. This research aims to compare the improvement in learning quality in the form of increase in concept mastery between the students who used multimedia animation and those who used picture media. The research method used is experimental method conducted in two classes, which are an experiment class using multimedia animation and a control class using picture media or handouts. Research results showed a significant difference in the increases of concept mastery between the students who used multimedia animation and those who used picture media and handouts, with the increase in concept mastery using multimedia animation being higher. This happened because there is long-term memory resulted from the learning using multimedia animation.*

**Keywords:** *Multimedia, Animation, MMA, Crystal Defects, Concept Mastery*

### I. INTRODUCTION

Difficulties in understanding abstract, complex and dynamic concepts are the problems in the learning of Engineering Materials. The most recent data of the students who managed to solve the problems related to atomic crystal structure, atomic structure changes, and atomic interaction that causes the changes in the properties of metal, only reached 41.6%. It can be seen that many students expressed difficulties in studying atomic crystal structure. The difficulties appear because the learning media used are still abstract, so it is hard for the students to describe, illustrate and imagine the movement of atoms in the crystal defects.

Given the importance of Engineering Material course, and based on the data showing that the students experience difficulties in the material of Crystal Defects, an improvement effort is required to make the process easier to understand. An attempt that can be conducted is using media that is not only theoretical, but also practical, economical, accessible and teachable, thus allowing the material to be studied repeatedly. The efforts to meet the practical, economical, accessible and teachable criteria will be performed by manipulating theoretical model (pictures) into realistic model in the form of multimedia animation (MMA).



Multimedia animation has manipulative characteristic, which is being able to transform theoretical model in to realistic model (animation), so it can draw attention in the learning process and make it easier to understand the learning materials.

In order to master the engineering materials course, which is considered difficult, it is necessary to do an improvement of the lecture so it is no longer difficult, although it would not be immediately understandable, but at least it would not be boring if it is repeated or studied alone so it could eventually be mastered. One technology that could be used for this purpose is information and communication technology (ICT), considering that nowadays generally students can easily operate computers to be used in learning. One of the alternative utilizations is in the form of e-learning, virtual reality and interactive multimedia.

E-learning research had been done, in which browser training-based e-learning media using program content management system (CMS) JOOMLA had been tested with good results when being used in the learning of training course about maintenance/manual transmission service and components at vocational schools (Prabowo et al. , 2009). Web-based E-learning does not only improve efficiency but also inspire the students to gain strong interest in learning (Huang et al., 2011).

Researches on the implementation of interactive multimedia (MMI) had been shown to be able to improve the quality of learning. Interactive multimedia-based learning is proven effective in increasing the achievement of critical thinking ability of elementary school student teachers (Masitoh, 2011), improving the ability to read the projected image among vocational students (Anam et al., 2009), and improving learning outcomes competence in assembling and installing the brake system among vocational students (Harsono et al., 2009).

Multimedia animation on engineering materials has been created by Callister but the animation is still limited to: 1) the crystal structure in the form of unit cells, but not including the characteristics of each unit cell, which actually determine the mechanical properties of the material; 2) field and the direction of crystal, but not including phase diagram, which actually determines whether or not the material is easily molded, or determine the hardness of the material (Callister, 2004).

Generally, this research aims to create learning media, while specifically, this research aims to understand the improvement of concept mastery in engineering material course by implementing multimedia animation (MMA) for vocational school student teachers in production machine competence program.

## II. RESEARCH METHOD

Two groups are required to see the extent of the improvement of concept mastery in learning using multimedia animation. The first group is experimental group, consisting of students who use multimedia animation while the second group is control group, consisting of students who use picture media. The division of these thinking groups is determined by the results of the initial pretest conducted on the students before the treatment is given. The research design used in this study is Quasi-Experimental Design in the form Nonequivalent Control Group Design. This is because subjects in this research are human beings, who are complex and because it is difficult to control external and internal factor that can influence the variables. Therefore, this method is considered to have stability to provide the estimated information, which is obtained correctly and is approaching the accuracy of real experimental research whose requirements are difficult to fulfill in educational research. The experiments were conducted on two classes, which are experimental class using multimedia animation and control class using picture media. In this research design, there are two groups, which are experimental group and control group. Both groups were given a pre-test to discover their initial state whether there was any difference between the experimental group and the control group. Design pattern on this research can be seen as follows:

**Table 1.** *Nonequivalent Control Group Design*

<b>Group</b>	<b>Pre-test</b>	<b>Treatment</b>	<b>Post-test</b>
Experiment	$T_{E1}$	X	$T_{E2}$
Control	$T_{K1}$	Y	$T_{K2}$

Information:

$T_{E1}/T_{K1}$  = Initial test given to students.

X = Learning using E-Multimedia Animation.

Y = Learning using Pictures and Handouts.

$T_{E2}/T_{K2}$  = Final test given to students.

The difference of two averages of two samples is used to determine whether the experimental group and the control groups have any difference in N-Gain (normalized gain) based on Hake (2002), namely:

$$(N - Gain) = \frac{\% \text{ actual gain}}{\% \text{ potential gain}} = \frac{\% \text{ skor postes} - \% \text{ skor pretes}}{100 - \% \text{ skor pretes}}$$

In this study, descriptive analysis of N-Gain was also performed using N-Gain criteria based on Hake (2002), namely: 1) The increase with "high-gain", if (N-Gain) >



0.7; 2) increase with "medium-gain ", if  $0.7 \geq (N\text{-Gain}) \geq 0.3$ ; and 3) increase with "low-gain ", if  $(N\text{-Gain}) < 0.3$ .

### III. RESULT AND DISCUSSION

The result of preliminary studies shows that the students who took engineering materials course encountered difficulties on the material about abstract calculation and movement of atoms. Considering the importance of engineering materials course, and based on the data showing that students have difficulties at the material about Crystal Defects, an effort of improvement is required in order to make the process easy to understand. One attempt to do it is using media that is not only theoretical, but also practical, economical, accessible, and teachable, thus allowing a material to be studied repeatedly. The efforts to meet the accessible criteria will be performed by manipulating the theoretical model (pictures) into realistic model in order to be teachable in the form of multimedia.

Multimedia animation of atomic Crystal Defects is created so that learning is sufficiently representative to explain the concept of a system realistically so it becomes accessible for learners, there fore causing learning experience (Purnawan, 2006). The data from students' responses shows that 80.47% of the students agree on the learning using multimedia animation. Meanwhile the data from pretest and posttest on the control and experimental classes was used to calculate the value of N-Gain, which is the increase of students' ability. N-Gain Values are presented in Table 2.

**Table 2.** Results of the calculation of pretest, posttest, and N-Gain of Concept Mastery of Crystal Defects.

		Score	Crystal Defects	
			Class	
			Control	Experiment
Concept Mastery of Crystal Defects	<i>Pre Test</i>	Highest	45,00	65,00
		Lowest	10,00	10,00
		<b>Average</b>	<b>26,61</b>	<b>49,65</b>
	<i>Post Test</i>	Highest	80,00	95,00
		Lowest	25,00	75,00
		<b>Average</b>	<b>49,19</b>	<b>86,45</b>
	<i>N-Gain (%)</i>	Highest	76	93
		Lowest	7	44
		<b>Average</b>	<b>31</b>	<b>76</b>

The result of data calculation of concept mastery of crystal defects in control class is as follows: (a) pretest scores: the minimum score is 10.00, the maximum score is 45.00, and



the average score is 26.61, all of which is on the initial ability with the category of “not passed”; (b) posttest scores: the minimum score is 25.00, the maximum score is 80.00, and the average score is 49.19, all of which is on the initial ability with the category of “not passed”; (c) percentage of N-gain: the minimum score is 7, which is on low category. The maximum score is 76, which is on medium category, and the average is on 31, which is on medium category. Meanwhile for the experiment class, the result is as follows: (a) pretest scores: the minimum score is 10.00, the maximum score is 65.00, and the average score is 40.65, which is on the initial ability with the category of “not passed” for the minimum score and average score, and on the category of “passed” with C score for the minimum score. (b) posttest scores: the minimum score is 75.00, the maximum score is 95.00, which is on the category of A score, and the average score is 86.45, which is on the category of A- score. (c) percentage of N-gain: the minimum score is 44, the maximum score is 93 and the average score is 76, which is on medium category.

The increase of concept mastery of crystal defects material using Multimedia Animation achieved an average of 76% or high category. This is higher than the average increase of concept mastery using picture media, which reached 31% or medium category. Therefore, Crystal Defects MMA is proved to be able to improve the concept mastery in Crystal Defects with higher percentage to the high category.

Development of science aims to understand how students learn. In the efforts to apply the science of learning. In order to achieve the purpose above, educational experts created various educational media with different emphasis and suitable principles. For the research on and production of multimedia, Mayer created seven principles in multimedia design, namely: multimedia, spatial closeness, temporal closeness, coherence, modalities, redundancy, and individual differences.

The basic principle of the production of multimedia animation as a result of research that is finding is the involvement of learners/students in giving their opinions and thought simulation. E-MMA on engineering materials was created to learn actively which produces media that is student-centered, although it has not yet been created for all materials. The narration was made in the form of questions to be answered in the minds of learners, who are provided time to think. It is intended to engage learners in giving their opinion, and it is expected to get learning result of 70%. Subsequently the answers are displayed in animated form to correct students' thought. It is also intended to engage learners in simulations of thought, in order to increase their learning outcomes in the hope of reaching 90% as a result of involvement in the simulation. The basic principles of the creation and products of E-MMA



are producing better learning outcomes and leaving mark, which combines text read, voice heard, still and moving images or animation seen. The learning outcome is deeper because there is Long-term Memory.

#### IV. CONCLUSION

The increase of concept mastery of crystal defects using MMA reached an average of 76% or high category. This is higher than the increase of concept mastery using picture media or handouts, which reached the average of 31% or medium category. Therefore, the crystal defects MMA has been proven to increase the concept mastery of Crystal Defects material to a high category

#### V. ACKNOWLEDGEMENT

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EI-02-026

## DEVELOPMENT ON PRODUCTION BASED TRAINING ON AGRO INDUSTRY EXPERTISE COURSE TO IMPROVE STUDENTS' COMPETENCIES IN FOOD DIVERSIFICATION BASED ON LOCAL RESOURCES

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**ABSTRACT :** *The research approach was developmental research for improving, implementing and evaluating a production based learning (PBL on subject of Technology Processing of Animal Product at Study Program of Education on Agroindustry Technology, Universitas Pendidikan Indonesia. Syntax of Production based learning are (1) Explanation of the objectives and competencies to be achieved; (2) Explanation of course material; (3) the making of group where each member of the group is divided according to the division in the company; (4) Preparation of company profile by each group; (5) SOP for each part by each group; (6) Practical manufacture of processed products by each group - syntax 1 to 6 can be repeated according to the number of products produced by each group, each group member should play different role in every different , so that every group member possessed the skill in every work part of producing a product; (7) Naming the product and work report by each student. The result showed that there was improvement in students' knowledge seen from student's test score. The result also showed that there was improvement in student's skill seen by performance assessment.*

**Keywords:** *Technology of Animal product, Production based learning, design based research*

## I. INTRODUCTION

Vocational education has an important role to provide qualified workforce. Since the Study Program of Education on Agroindustry Technology, aims to fulfill the need of qualified vocational teachers on agro industry, its curricula has been develop by ratio of 60% agriculture processing science and 40% pedagogic science (Cakrawati et al, 2014). Alumna from this program are expected to have several competencies including psychomotor as they had to train students' skill in processing food. According to (Baker et al, 1981), students phsycomtor skill derived from their teacher.

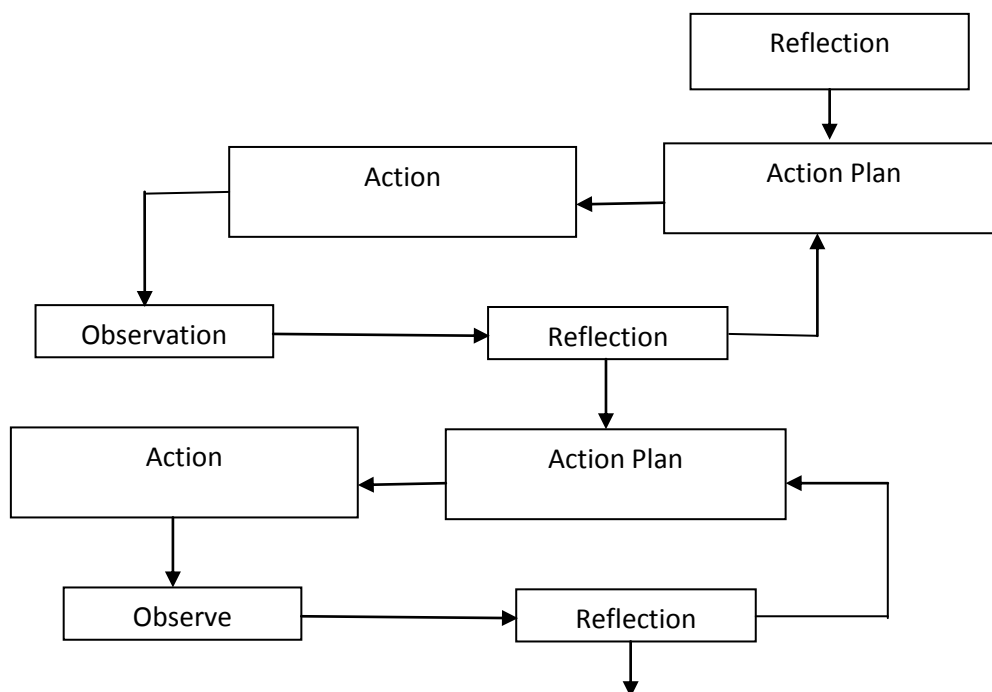
Secondary vocational teacher acquired the competencies through college courses, apprenticeship and individual study (Findlay, 1989). It can be said that learning activities in university is important to produce excellent teachers. According to (Mclean and Camp. 2000) curricula in university program of agriculture or preservice teacher often conducted in the form of experiential learning. Roberts, (2006) stated that learning in the form of experiential can occur in the classroom or laboratory such as experiments or project. university has independency in designing curricula, course planning and teaching activities therefore teachers can properly develop curriculum that fulfill students need. Chung, (2015) proposed problem based learning technique because this learning technique was proven able to increase students motivation to learn proactive, improve student's critial thinking and problem solving knowledge also develop skills and attitude accroding to industries' expectation.

Learning at different places, such as laboratory, classroom and workplace provide possibilities to develop students' knowlegde and skill, also build their attitude towards many situations. Therefore Vocational Education Program should improve learning quality by developing learning experience (Onstenk, 2009).

The research in this article is action based reseach of students' experience in production based learning consist of occupation specific subject, which is Processing technology of animal product. In this course, students are expected o produce food product from animal such as yoghurt and ice cream. The aim of the study was to examine students' experience with formative asesment in workplace learning..

## II. METHODS

The research conducted using action research on the basis of class action research proposed by Kemmis dan Mc Taggart (2000). The action research focus on improvement on syntaks of Production Based Learning to improved learning process. Kemmis and Mctaggart action research model consist of four components, there are planning, action, observe and reflection. Research flow chart stated in picture below.



#### A. Data Collection

Data collection techniques in this study are:

- (1) written post test conducted at the end of cycle 3 and cycle 6 to determine the final results of student learning after learning development model Production Based Training;
- (2) Reports about products made. Practical reports are made individually in the form of a paper on processing technology processed products that have been implemented. The paper not only contain practical implementation process, but starting with a review of the raw materials used up to the observations of the product. In this study, the student must make practical reports four refined products, namely: purple yam ice cream, yogurt with fruit leather dyes dragons.

#### B. Data Analysis

Data obtained from the test result furthermore processed and converted according to Universitas Pendidikan Indonesia's academic guidelines then distributed in table of frequency distribution. Students who have score below 70 need to be remedial before continue to the next cycle. Project reports were scored based on teacher's guideline with ratings range 4 = very good, 3 = good, 2 = adequate, and 1 = less. For students who get less value, then the student must rectify its report.

### III. RESULT AND DISCUSSION

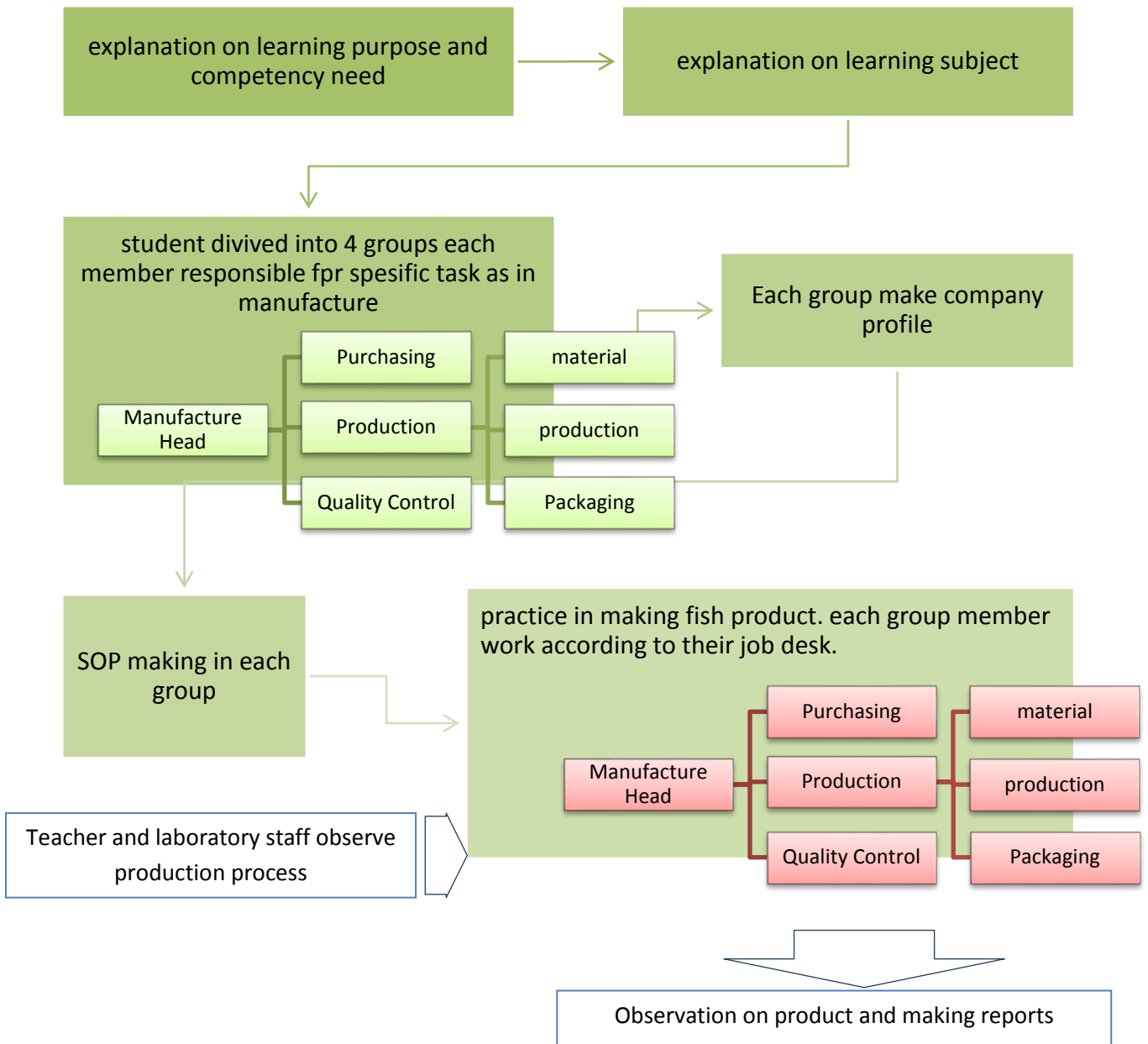
Production based learning is slightly different with project based learning, but almost simmilar with work based learning. In production based learning, students are given project to produce fish product that stated by the teacher. This learning also applied student-centered learning that according to ((Harmer, 2014), teacher act as tutor that helps student in their learning process by supporting them, if necessary. It is expected that with less teacher control, students have more responsibility for their learning. There were three steps conducted in the research; preparation, implementation and

evaluation. In the preparations steps, researcher did some production trial on making fish ball and craker from fishbone. Production trial was needed to know time needed to make the products and to make sure the laboratory have all the equipment to do production.

Before the implementation step, researchers do some reflection and make improvement on production based learning syntaks, as stated in Picture 2. Improvement was made to make student feel motivated since they are given real problem, as in real manufacturer, each member has spesific task and responsible with their task shown by organisational diagram and also jobdesk that each group make. Students were making standard operational procedure (SOP) on each production step, so that production process was controlled. according to (Harmer, 2014), giving the student, the opportunity to explore learning process is important matters in production based learning. Production based learning not only improve student's hardskill but also soft skill especially the ability to work in group. Since according to (Hanney & Savin-Baden, 2013), in production based learning, students are exposed to a complex series of interaction between group member and they develop their communication, planning and team working skill.

Implementation of production based learning was conducted with Class action research, consist of 3 learning cycles. First cycle was explanation on production based learning where students was given task to create SOP, company profile and jobdesk on each member. Second cycle was explanation of subject which is the principal of making fishballs and fishbone craker, it was conducted in laboratory. Third cycle was producing fishballs and fishbone crackers in laboratory. Students were working suited with their jobdesk. Learning process was begin when students buy raw material for their product since they were expected to have knowledge on selecting good raw material with limited budget. They also learn to calculate the amount of raw material to buy in accordance with the product to produce. After third cycles are finished, researched continue with reflection and evaluation. The refection resulted that students and teacher need to adapt with the new learning process. So teacher need to provide more time for students consult after class, for example in making SOP and process flow of making fish product.





**Picture 2.** Syntaks of Production Based Learning

Students assesment was conducted using written post test and reports. The result show that there were increasing in students score. the main advantage of production based learning are improving academic result, the development of softskills and hardskills, increased student motivation and enjoyment, enhanced outreach and engagement beyond academia and advantages for lecturers (Harmer, 2014).

#### IV. CONCLUSIONS

1. Development on learning syntaks are the addition of students tasks of making jobdesk, SOP and organizational charts. Syntaks development was purposed to give student experience of working in “real worksite”

2. Implementation of Production based learning help improve student academic achievement, softskills and hardskill, shown by inceasing in student's test score, students ability to work in group, ability to solve problems.

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**EI-02-044**

**PRACTICALITIES OF INTERACTIVE MEDIA BASED LEARNING  
SUBJECTS ANIMATION TECHNIQUES 2 DIMENSIONS  
VOCATIONAL HIGH SCHOOL (SMK)**

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**ABSTRACT :** *This research is motivated by the lack of media use by teachers during the interactive learning process that is still not shaped print modules. This study aims to produce draft media-based interactive learning valid and practical subjects 2D Animation. This study develops interactive multimedia-based learning media using Adobe Director software. This type of research is a research & development (Research and Development). To see whether the Media E-Learning-Based Video is valid and practical, expert test. The results showed that the aspect of Student Interests (92.33), aspects of the Learning Process (92.88), the aspect Improved Student Activity (91.73), the aspect of Time Available (93.33), and aspects of evaluation (91.66). The practicalities of the students are very practical (92.38%). Based on the above data it can be concluded that the Interactive Media Based Learning have a valid and practical.*

**Keywords:** *Learning Media, Animation Techniques, Practical*

## **I. INTRODUCTION**

The all-round development of these technologies, the information is presented using the technology. The technology is very instrumental in all aspects of life, including in the field of education. In the field of educational technology are instrumental to advancing education, one of which as a developer of learning media in the form of multimedia. More advanced multimedia technology has been promising a big potential in the revamp of the Ordinance a person to learn, gain information, customize information and more. Multimedia provides opportunities for educators in developing a learning technique, resulting in a product of learning media.

Multimedia is expected to be easier to determine the way how learners can absorb information quickly and efficiently, as well as being able to develop the creativity of learners in the learning process. Learning media has a role as important as educational factors to the other, but sometimes less noticed by the teacher. Whereas in the selection of appropriate learning media, adjusted based on the material to be delivered with the goal to be achieved is one of the keys to success in a learning based on the curriculum that has been set by the Government.

The learning that has been in Government in school as an elementary school, middle school, high school and especially Vocational secondary school (SMK). This is a school that is expected to produce graduates who can work in the corporate world as well as in the industrialized world.

For students of SMK, mastery of this Animation Techniques can support and facilitate the work in the area of his expertise. Good work in the business world and the world of industry or entrepreneurship,



basic capabilities in the field of design animation will really help them. Basic Animation Techniques utilization can be studied by all students of SMK competency skills whatsoever. Animation techniques that are studied in General by all students of SMK Multimedia.

In accordance with the regulation of the Minister of national education in 2006 about number 22 Standard contents, subjects of engineering Animation 2 Dimesnsi aims so that learners have the ability to design animation in using computer technology in everyday life as well as the application of computer in accordance with the competency standards of work.

The applied learning with learning methods and media that is used in the form of conventional media in the form of: (1) modules; (2) the Board; (3) motion picture projection showed that the learning process takes place in a conventional and focuses on the process of memorizing on understanding the concept. As a result, the level of understanding of students towards the learning material is low. In addition, learning methods and media like the above do not give ample opportunity for students to learn independently.

Based on the results of the interviews obtained from productive subjects teachers concerned on 17 February 2015 at SMK Negeri 2 Pariaman, found some problems in the process of teaching. Media used by teachers at a time when the learning process is still not interactive i.e. shaped print module so that the lack of motivation of the students in the learning process.

In the process of learning delivery learning material is still one way direction causing the suboptimal process of learning techniques of two-dimensional animation done by the teacher to the students, because the semester 2 teachers should immediately complete all meetings within 3 months of the next three months while the student will carry out the work practices of the industry (Prakerin). This is a demanding teacher to add hours of learning that continued in the afternoon.

The learning process of students having difficulty in the implementation of pratikum in labor, because not yet optimal understanding of the students on the material on the subjects of engineering a 2D Animation looks less active students that leads to weak learning process giving rise to a situation of a class that is less conducive. Whereas the existing facilities at the school are adequate, such as: the existence of labor computer, and LCD projectors. However, inadequate utilization of the facilities in the building an interesting learning media for the sake of lancarnya learning process. Meanwhile, the demands of the criteria which must be reached on the subjects of productive technique of animation 2D is 75. This will be a problem faced by teachers in the learning process. Thus it takes a formula for overcoming the problems faced by the teacher during the learning process.

Based on the above problems then it can be formulated in this research issue "is the development of interactive multimedia-based learning media using Adobe Director software on a 2 dimensional animation subjects for students of Milwaukee Public

## **II. RESEARCH METHODS**

### **a. Development Model**

The type of research that will be done is research and development (Research and

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development/r & D). R&D is a research method that is used to produce a particular product. Products that will be developed in this research is Interactive Multimedia-based learning Media.

b. The Subject Test

The subject of trials for the development of interactive multimedia based pemebelajaran media using Adobe Director software for material this 2 dimensional Animation Techniques is 30 students of Class XI a 2 Semester SMK N 2 Pariaman vocational Multimedia.

c. Procedure Development

This research will be developed using the Model Research and Dovelopment (R & D) Sugiyono, among others:

1) Potential Problems

According to Sugiyono (2014:298-299), potential is everything when harnessed would be value added, while the problem is the deviation between expected with that happening. And it can be concluded that the problem could be a potential if it can be utilized.

The first step in the research is doing interviews to productive subjects teachers majoring in multimedia class XI SMK N 2 Pariaman, and found that the subjects Employed 2D Animation using only the media print module.

Based on the results of interviews and observations already made, the researchers concluded that the problem in this research that is media of learning in the form of "the print module" is still less than optimal in the delivery of material on 2D Animation Techniques subjects, because these subjects will be accompanied also by pratikum. In the process the 2D Animation Techniques pemebelajaran, the teacher in question also noticed that students have difficulty in understanding the material presented. While the teachers given time only 3 months to 15 x (time) meeting in the complete material Engineering subjects 2D Animation, because after that the students will follow the process of the "Industrial Court Practice" (Prakerin).

2) Data collection

After potential problems are found then the next needs to be collected in a variety of information or data. According to Sugiyono (2014:300), having the potential problem can be shown and factually and uptudate, then the next needs to be collected in a variety of information that can be used as a basis for the planning of a specific product that is expected to resolve the issue. Here the required research methods. What method will be used for research subject to problems and accuracy objectives are reached.

The data gained during observations in SMK N 2 Pariaman form RPP, Syllabus, and materials Engineering Animation 2 dimensional multimedia vocational class 2 CMS.

Based on information and data from the results of observation and interview subjects to teachers of engineering Animation 2D class XI SMK N 2 Pariaman, found that highly visible media needs will process the achievement of learning objectives. Researchers wear information and results of such data



as the basic reference point in the planning process of learning media development. Learning media development based on the steps of its development.

### 3) Product Design

The resulting products in research and development (Research and Development) is very diverse. In the field of education, the resulting products are expected to increase productivity of education, that is, graduates of which there are many, qualified, and relevant to the needs (Sugiyono, 2014:300-301). This research will produce learning materials in the form of interactive multimedia-based learning media on subjects 2D Animation Techniques.

At this stage the researcher began to design and make product design interactive multimedia-based learning media using software Adobe Director to grade XI SMK N 2 Pariaman on 2D Animation Techniques subjects.

### 4) Pratikalitas interactive multimedia-based learning media

Test the practicalities of media-based learning using interactive multimedia software Adobe Director for 2 dimensional Animation subjects who tested cobakan on students. The practicalities of analysis results by students obtained using test question form. The full test results data practicalities in brief by students shown on table 11.

**Table 1.** The Test Results Of The Practicalities Of Media-Based Learning Using Interactive Multimedia Software Adobe Director.

No	Practicalities Media	otal	Value Of Practicalities (%)	Criteria
1	Student interests	1108	92,33	Very Practical
2	Learning process	418	92,88	Very Practical
3	Improvement of Student Activities	688	91,73	Very Practical
4	Time Available	280	93,33	Very Practical
5	evaluation	275	91,66	Very Practical
Total			461,93	
Average			92,38	Very Practical

According to the table 1 above, it can be concluded that the results of the analysis of the value of the practicalities of interactive multimedia based learning media using Adobe Director software for 2D Animation subjects by students is 92.38% with a very practical criteria. With the result that score, it indicates that the interactive multimedia-based learning media use Addobe Director software is very practical use by students in the learning process.



### III. RESEARCH INSTRUMENTS

The research instrument was a sheet of pratikalitas learning Media development. Sheets of this instrument contains aspects of the assessment of the interest of students, the learning process, an increase in activity, the time available and the evaluation on subjects of engineering animation.

Analysis of pratikalitas using Likert scale based on sheets of pratikalitas, with these steps:

a. Scoring for each used a scale of 1-5 with a provision:

Value 5 = very practical

Value 4 = practical

Value 3 = quite practical

Value 2 = less practical

Value 1 = not practical

b. Add up the score of each indicator pratikalitas

c. According to Trianto (2007) the granting of the value validity is given by the formula:

$$\text{Practical value} = \frac{\text{skor yang diperoleh}}{\text{skor maksimum}} \times 100 \%$$

According to Arikunto (2008) to determine the degree of validity of learning modules developed, kriteri used can be seen in the following table:

Table 2. Category Level Practicalities

No	Tingkat Pencapaian	Kategori
1	90-100	very practical
2	80-89	practical
3	65-79	quite practical
4	55-64	less practical
5	0-54	not practical

### IV. RESULTS AND DISCUSSION

The research of Multimedia-based learning Media Development Interkatif Software with Adobe Director

According to Sugiyono (2006:298) research process starting from the steps as follows: (1) the potential and problems, (2) Pengeumpulan, (3) data product design. Design Validation (4), (5) revision of design, (6) testing products, Product Revision (7), (8) trial usage, product Revision (9), (10) Mass Production, steps in the development of this research is limited to step 7.

a) Potential and problems

The problem often encountered by teachers at a time when the learning process is still lack of media that will be used by the teacher at the time of delivery of the materials and time limitations which belonged to teachers in completing the material in Engineering subjects 2 dimensional



Animations i.e 3 months for 15 times. In this case the researchers see teachers still use media in the form of printed books, so students are less motivated and enthusiastic at the moment following the learning process.

b) Data collection

Media design-based learning using interactive multimedia software Adobe Director, while material is designed based on the potential and problems. Data collection started from direct observation at the time of the student's learning process, an analysis of the material, and characteristics of the students. The following are descriptions of the results of the data collection, namely:

1) Observations

Learning media used in subjects 2 dimensional Animation students of SMK N 2 Pariaman are still limited Multimedia Majors who just use the print book at the time of the submission of material by teachers is concerned, this has resulted in students haven't been able to fully understand the subject matter 2 dimensional Animation.

In addition, teachers are given only three months to 15 times in completing all the material on the subjects of engineering Animation 2D, because half of the semester (3 months) the next student will carry out field work Practice (STREET VENDORS). This is a demanding teacher to add hours of learning that continued in the afternoon. Thus, students have difficulty in the implementation of the dilabor, because pratikum has not been optimal understanding of the students on the material on the subjects of animation 2 dimensions.

2) Analysis of the material

The material to be developed in a media-based learning using interactive multimedia software Adobe Director is concerned on 2 dimensional Animation subjects of Class XI semeseter 2. The basic competence to be achieved are composed on KD: 3.1 "Understand Techniques Animai Tweening", KD: 3.2 "understanding object creation Technique in the application of 2-dimensional", KD: 3.3 "understand how to Give Audio effects on a 2 dimensional Animations".

3) Characteristics Students

Characteristics of students in the analysis include the background of the students, the ability of the students both in Audio, Visual, and Audio and Visual experience that aims to help researchers in developing interactive multimedia-based learning media using software Adobe Director of animated material used in 2 dimensions. This is very important for the characterisitics of paying attention to the abilities, traits, and the experience of the students either by individuals or groups.

4) Product Design

The design of the product design interactive multimedia-based learning media using software Adobe Director to grade XI SMK N 2 Pariaman on 2D Animation Techniques subjects.





**Figure 1.** A Menu Of Interactive Multimedia-Based Learning Media



**Figure 2.** Menu Animation Interactive Multimedia-Based Learning

c) Analysis of Pratikalitas Interactive Multimedia-based learning Media

Analysis on the practicalities of 30 students of Class XI SMK N 2 Pariaman Multimedia vocational test analysis results, the practicalities of the obtained average value 92.38% with the very practical criteria. The results of testing analsis praktiklitas media-based learning using interactive multimedia software Adobe Director for mat 2 dimensional Animated lesson on variables of interest students with a value of 92.33% of the criteria is very practical, learning process variable with a value of 92.88% of the criteria is very practical, variable increase in activity of students with a value of 91.73% of the criteria is very practical, there is enough time variable with a value of 93.33% very practical criteria, evaluation and variable with a value of 91.66% of the criteria is very practical.

Meperlihatkan this percentage criterion that this learning media can enhance the learning interest of students and are interested in using this medium as a medium of instruction, with an excess of display media has a colour combination that is interesting and Nice, the font that is used in accordance with the rules of writing, use of media, there are video tutorials on each material covered, exercises that are multiple choice questions with random, interesting material dishes easy to understand student material, can be enabled in the sound, as well as the more effective use of time in the process of learning material delivery.

## **V. SUMMARY**

Based on the research that has been done, it can be concluded the Media-based learning using interactive multimedia software Adobe Director for subjects 2 dimensional Animations Vocational secondary school (SMK) stated very practical by students with a value of 92.38% criteria "very practical". This assessment is based on a variable interest students, the learning process, the student's activities, time available, and evaluation.

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## **DEVELOPING PHYSICS LEARNING INSTRUMENT FOR VOCATIONAL HIGH SCHOOL BY USING CONSTRUCTIVISM APPROACH**

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**ABSTRACT** : Learning paradigm has transformed from teacher-centered to be student-centered. The methodology has also changed from expository to be more participatory as well as textual turn out to be contextual. Developing Physics learning instrument of C-ID (Constructivist Instructional Design) developed by Willis. Willis gives reference for constructivist approach which follow four steps: define, design, development, and dissemination. The use of this design is based on the consideration the opportunity of collaborative involvement of teachers and learners. The relevant experts can be involved as a passive partition team in the process of software development. Here is the qualitative and qualitative assessment result by: (a) learning design expert for product components assessed that this learning instrument product development is feasible to be used; (b) Physics material experts assessed this product development that has been already fit for use in teaching Physics for the tenth grade students of the first semester in Vocational High School; (c) Physics teacher gives an assessment that it fits for use for the tenth grade students of the first semester in Vocational High School; and (d) learners assessed that the contents of teaching materials is very good and interesting to be learnt. Quantitatively, the feasibility test results of using the learning instrument according to instructional technology experts, field of study expert, teachers and students showed an average of 96,5% based on indicators of the feasibility by using Physics learning instruments. Therefore, this Physics instrument by using a constructivist approach is very feasible to be used for the tenth grade students of the first semester in Vocational High School students, mainly for technology group accross Malang.

**Keywords:** *Physics Learning Instrument, Constructivist Approach.*

### **I. INTRODUCTION**

The implementation of education unit level curriculum (SBC) requires a paradigm shift in education and learning, in particular on the type and level of formal education (schooling). Such changes must also be followed by a teacher who is responsible for the organization of learning in schools. Learning to accommodate the implementation of the curriculum must also be changed from what has been usual that tends to be linear, static and mechanistic lead to innovative learning [11]. Innovative learning is learning which is based on the constructivist paradigm that always accommodate the initial knowledge as the starting point [7]. During this time, most of the wide range of learning including science based on Bloom's taxonomy has three domains: cognitive, affective and psychomotor. In practice, it has not been balanced and holistic, which is generally only focuses on the goals of cognitive and avoid affective purposes. As a result, the learning activity is: (1) not pleasant, pose a negative attitude towards science subjects; (2) passive, dominated by the teacher lectures; (3) monotonous, does not allow the development of creativity; and (4) are not effective, the amount of time provided is not maximized utilized for achieving competence of learners [3].

Today, Physics learning in vocational school still dominated by the use of classical methods and lecturing, in which the teacher as the center and learning resources that often dominate the

learning activities. Activities learners only listened to the teacher and record things that are considered important. The teacher explains the Physics of Material only limited to product and process slightly. One reason is the density of the material to be discussed and resolved by the applicable curriculum. Whereas in learning Physics is not enough emphasis on the product, but more important is the process of proving or get a theory or law. Reality is often encountered in Physics learning in vocational, though teacher always gives the opportunity to ask the students or put through a method demonstration / simulation, but usually only a small proportion of learners who use the occasion. There is no incentive for learners to actively participate in learning activities. Teachers need to motivate learners to understand, explain and apply science in their lives.

Development of learning tools will never stop from time to time. In addition, the development of learning tools that already exist should be enriched with options. The more choices available will facilitate teachers and students in conducting learning activities optimal. There is several alternative development instructional design are able to raise the activeness in learning and motivate learners to learn as much as possible and ask and express their opinions. One of the alternatives that can be done is the development of learning based on cognitive theory refers to the constructivist learning theory.

Based on the descriptions above, there is a need / urgency to develop learning tools with the constructivist approach, in this case is the development of learning tools in Physics for Vocational High School. Formulation of the problem in the study are: (1) how is the Physics learning device at Vocational High School with a constructivist approach ?; and (2) What is the feasibility of vocational learning device Physics by using constructivist approach? the purpose of research and development: (1) generate a Physics learning device at Vocational High School with a constructivist approach; and (2) test the feasibility level for Physics learning device in vocational high school by using constructivist approach.

Constructivism, as a fundamental principle underlying philosophy of constructivism is all knowledge is constructed (built and not perceived directly by the senses [4]. Knowledge is the result of the construction of cognitive reality through one's activities. Someone forming scheme, categories, concepts and knowledge structures. The formation process this runs continuously with each reorganized for their new understanding has characteristics consistent constructivist approach.

The role of the teacher is not only to transfer the knowledge he has mastered to the students, but more as a mediator and facilitator who helps learners can construct their knowledge quickly and effectively. For that teachers should be able to: (a) creating a constructivist learning environment; (B) explore the initial knowledge of learners; (C) use learning strategies that enable learners can learn independently; and (d) creating teacher-learner interaction and learner-learner service.

Constructivist learning environment, teachers must prepare questions and referrals to stimulate learners' active learning. Learners are given the opportunity to speak his mind so that teachers know





whether their ideas were right or wrong. Constructivism to the learning process, teachers need to learn the initial knowledge of learners, through this initial knowledge of teachers will help learners develop understanding. Learners who argued one reviled not, on the contrary their opinions are considered. Learners are given time to think and formulate their ideas, without being chased time.

Constructivism on learners, learners are given the opportunity to speak his mind so that teachers know whether their ideas were right or wrong. In the implementation of learning learners are given the opportunity to make a hypothesis, test hypotheses, solve problems, express questions, express ideas to form a new konstruki contained in the student worksheet (LKS). Constructivism to the learning process, teachers must help students actively learn, pursue the Material and encouraged to ask questions. Teachers need to prepare questions and referrals to stimulate learners' active learning. Teachers need to conduct ongoing evaluation and learning process to include in the evaluation. Constructivism to learning strategies, teachers need to use the scientific method in the invention process, so that learners feel finding their own knowledge. In addition learners are given the opportunity to seek approaches and its own way of learning and discovery.

Constructivist approach in learning helps students to internalize, shaping or transforming new knowledge ". Constructivism became the basis for several theories of learning, for example the concept of change theory, meaningful learning theory, and the theory of the scheme [2] .According to Piaget, any knowledge that a knowledge of the physical, logical-mathematical science, and social sciences. The important thing is not the kind of knowledge but on the actions or activities of learners towards an object and interaction with others. Vigotsky stressed the importance of social interaction with other people who know better and are culturally well developed. According sosiokulturalis, activities of a person in understanding something influenced by participation in social practices and cultural that exist, such as the situation of the school and friends. The situation of the school, friends in the class also has a big share in the development of learners' knowledge. Studying with friends in a study group for many learners will help them build a more convincing knowledge [8]. Vigotsky emphasis on the process of interaction between learners with learners, learners with teachers, and the environment (infrastructure of learning). Activities in groups of learners work together and interact with each other to solve problems in LKS (student worksheet).

The most important contribution in Vigotsky theory is the emphasis on the nature of socio-cultural learning. Vigotsky believe that learning occurs when children worked in the "Zone of Proximal Development" (ZPD) [7]. According to the concept of zone of proximal development, psychological development depends on external social forces at once the inner strength of the children. The tasks in the zone of proximal development is something that they still can not be done alone but a child can actually be done with the help of a friend or an adult who is more competent. Teachers memberikanscaffolding (assistance) necessary to the group and independent learners in the individual



activity. Scaffolding can also occur in groups where the students are better able to provide assistance to other learners. Assistance given by the teacher could: in the form of tips, warnings, encouragement, describes the problem into another form that allows learners to be independent.

In the lesson plan with a constructivist approach, the activities that have to be assessed through the question "what concepts will be given in learning Physics ?" Or "competencies that must be mastered if learners? and how activities should be managed in each phase in order to achieve understanding of the concept or the competence terkuasainya ?. The activities in each phase must be arranged so that the learning objectives achieved. Competencies are psychomotor and affective for example, will be more effective when controlled through such activities as practical. Lessons are based on the constructivist view of learning more emphasis on top-down instead of bottom-up ". Top-down means that learners begin to solve complex problems, and then solve or find the necessary basic skills. By contrast, in the bottom up, students begin by learning the basic skills gradually towards the more complex skills [7]. The use of the approach constructivist learning implications to the components of the learning system, minimal impact on the following components, namely: (a) learning objectives, (b) learning content, (c) resources strategy, (d) environmental management, (e) the relationship between teachers and learners, and (f) evaluation.

The learning objectives in the view of constructivism is building awareness. That understanding is important, because the understanding will give meaning to what is learned. Therefore, the pressure to learn is not to acquire or find more, but more important is to give a more meaningful understanding [5].

Emphasize the constructivist view of learning environment. To that end, the learning strategy needs to be directed to the following Materials: (a) presents a real problem in the appropriate context to the level of development of learners; (B) learning is structured around primary concepts; (C) teachers encourage learners to ask questions themselves; (D) encourage learners to find the answer to his own question; (E) encourage students to express opinions and appreciate his point of view; (F) challenging learners to gain a deep understanding, not just to complete the task; (G) encourage learners to work collaboratively, (h) encourage students to dare to accept responsibility; and (i) assess the process and learning outcomes of students in the context of pembelajaran. Komponen-component learning device Physics for high school Kejuruan yang developed include: (a) the syllabus or learning program, (b) lesson plan, (c) teaching materials, ( d) teaching material, (e) the student worksheet (LKS), and (f) the assessment procedure. The syllabus developed in this research includes the development of three subjects, namely the kinematics of motion, dynamics of motion, and the frictional force.

Lesson plan (RPP) is a program plan manifested in the form of learning program plans to use the constructivist approach. The lesson plan is drawn up so that learners can construct their own



knowledge, because the main characteristic constructivistics approach is giving chances and opportunities for learners to construct their own knowledge. Components of the plan the learning program include: the identity of the school, the standard of competence, basic competence, indicators of learning outcomes, learning objectives, learning materials, models and methods of teaching, learning steps, instructional media, and assessment.

Teaching materials are arranged in the form of printed media contains materials, learning topics, tasks undertaken by learners. The learning topics description contain important information that is required in learning and are presented briefly. Teaching materials are applied in the development of learning Physics research for class I the first half consisting of three subjects, namely the kinematics of motion, motion dynamics, and style gesek. Lembar student work contains about: the purpose, hypothesis, tools and materials, work step, the question- questions and conclusions. Tools and materials, contains explanations of the tools and materials to be used for practical activities. Explains the work step, the procedures of activities to be done by learners in doing practical work.

## **II. RESEARCH METHODS**

### **A. Development Model**

Development model of instructional design used to produce the product components are learning device Physics design of constructivist learning approach (Constructivists-instructional design = C-ID) adalah model R2D2, namely: reflective, recursive, design, and development. R2D2 model structure consists of four stages, namely: (a) define; (B) design; (C) development ; and (d) dissemination [3]. the learning technology experts and learning materials expert testing are from the State University of Malang and State University of Surabaya. Test users was done by teachers of SMKN 1 Singosari Malang and SMK Negeri 6 Malang. While the subject of the trial are: the first grade students at SMK Singosari-Malang and SMK Negeri 6 Malang.

### **B. Trial Stage**

Pilot activities consist of three stages: (a) expert test, (b) a group test, and (c) field test. Test experts covers two parties: (a) instructional technology experts, (b) content expert field of study and, (c) subject teachers of Physics . Content expert field of study, is expected to provide input about the truth of the contents, the present, and the organization of the course content. Once the product is revised, test subjects group trial involving as many as 20 students. Learning software products are rated by learning technology and Physics teacher consisted of: (a) planning for learning, (b) the implementation plan of learning. Learning software products are judged by the content experts and teachers of Physics consists of: (a) teaching materials and (b) the student worksheet (LKS). While the feedback by learners is the content of Physics teaching materials.

### **C. Data Analysis Technique**



There are two techniques of analysis used to process data from the trial results in this study is a feasibility level analysis to determine the feasibility of developing a product prototype. Furthermore, the feasibility of the product model of the learning device is determined based on criteria [13; 6; 10]. The criteria or benchmarks used to curb the entry of the element of subjectivity that is in itself assessors. The criteria, the researchers led by kiteria, followed point by point, not based on personal opinion [1]. The criteria or benchmarks, researcher can be more steady in assessing the object to be assessed because no standards are followed. Scores were used to assess the product's development of learning tools such as Table 1 below.

**Table 1.** Product Development Assessment Scores

Score	Description
4	Very proper
3	Proper
2	Less proper
1	Improper

To give meaning to revise the decision making learning software products based on the criteria specified in Table 2 as follows:

**Table 2.** Achievement and Eligibility Criteria

No.	Achievement (%)	Feasibility Level	Criteria
1.	80 %- 100 %	Very feasible	No need to be revised
2.	66 %- 79 %	Feasible	Need to be revised
3.	56 %- 65 %	Less Feasible	Need to be revised
4.	0 %- 55 %	Not Feasible	Need to be revised

### III. FINDINGS

#### A. Syllabus and Lesson Plan Trial by Instructional Technology Expert and Physics Teacher

The components of the syllabus and learning implementation plan which was considered / addressed by instructional technology expert and Physics teachers are: the identity of subjects, basic competencies and indicators of learning outcomes, learning materials, media and learning resources, the activities of learners in the learning, the activity of the teacher in the learning, and assessment of learning. Data test results in Table 1.

**Table 3.** Assessment by Instructional Technology Expert Learning and Teachers on the Syllabus and Lesson Plan

No.	Assessed Components	Assessment by Instructional Technology Expert		Assessment by Physics Teacher	
		Score	Achievement	Score	achievement
1	Subject Identity	4	100 (%)	4	100 (%)
2	Basic competence and learning outcome	4	100 (%)	4	100 (%)

	indicator				
3	Material, media and source of learning	3.67	91.75 (%)	3.33	83.33 (%)
4	Students' activity in learning	3.83	95.75 (%)	4	100 (%)
5	Teachers' activity in learning	3.83	95.75 (%)	4	100 (%)
6	Teachers' activity in learning	4	100 (%)	3.50	87.50 (%)
Mean		3.89	97.21(%)	3.81	95.14%)

## B. Trial by Subject Teacher and Material Experts

The components of teaching materials are rated / addressed by the content expert and professor of Physics are: cover, objectives, materials, exercises, answer keys, a list of references. Cover reveal: the identity of teaching materials that clearly shows the user class teaching materials that clearly, revealing images that motivate learners to study Physics . Data test results in Table 2.

**Table 4.** Assessment by Material Experts and Subject Teacher

No	Assessed Components	Assessment by Material Expert		Assessment by Subject Teacher	
		Score	Achievement	Score	Achievement
1	Material cover	4	100 %	4	100 %
2	Purpose	4	100 %	3.60	90 %
3	Content of the material	3.88	97 %	3.83	95.80 %
4	Exercise items	4	100 %	3.60	90 %
5	Answer key	4	100 %	4	100 %
6	References	3.75	93.75 %	4	100 %
Mean		3.94	98.46 %	3.84	95.97

## C. Testing Student Worksheet by Expert Content Material Physics and Physics Teacher

The components of student worksheet (LKS) rated / addressed by subject Material experts and teachers of Physics are: cover, goals, tasks and time allocation, work space. Cover of student worksheets include: identity of the student worksheet, and the students' worksheets. Interest in student worksheets appeared: simple formulated objectives, clarity of objectives to be achieved learners, and penggunaan words are operational. Data test results in Table 3.

**Table 5.** Results of the Assessment by a Subject Material Expert and Physics Teacher on Student Worksheet (LKS)

No.	Assessed Components	Assessment by Material Expert		Assessment by Subject Teacher	
1	Material cover	4	100 %	4	100 %

2	Purpose	4	100 %	4	100 %
3	Task and time allocation	3.75	93.70 %	3.34	83.50 %
4	Task and time allocation	4	100 %	3.34	83.50 %
Mean		3.94	98.43 %	3.67	91.75 %

#### D. Trial by Students

The components of teaching materials that are rated by the students are: (a) the cover design; (b) the clarity of the instructions at the beginning of the chapter; (c) the size and font in teaching materials; (d) the clarity of learning objectives; (e) the clarity of exposure to the material in each chapter; (f) the suitability of the picture with the material in the teaching materials; (g) examples of problems can help understand the material; (h) of interest at the beginning of each chapter section may be helpful to understand the material; (i) the clarity of sentences in practice questions; (j) the clarity of formulas can help understand the material; (k) in the material of teaching materials can help improve understanding of the material; (l) the answer key can help to solve problems; (m) teaching materials make it easier to understand the Physics material; (n) the use of language makes it easy to understand the content of the material; (o) examples of problems can help understand the material; (p) static illustrations can help understand the material; (g) the content of teaching materials to attract attention; and (r) can be motivated to follow the learning. Data test results is in Table 4.

**Table 6.** Data from the Response or Assessment by Students on the Teaching Materials

No	Assessed Components	Students' Response Score	Achievement	Students' Response Score
1	Cover Desain	3.42	85.7 %	Very interesting
2	Size and font for the material	3.85	96.4 %	Very easy
3	Clarity of the baterial in each unit	3.85	96.43 %	Very clear
4	Formula claririty in helping them up to learn	3.71	92.86 %	Very clear
5	Problem evaluation in teaching materials can help students to improve understanding of the material	3.71	92.86 %	Very helpful
6	Answer key can help them to solve the problem	3.42	85.71 %	Very helpful
7	Learning material can ease them up to understand the phisics material	100	100 %	Very helpful

8	Static illustrations can help them to understand the material	3.57	89.29 %	Very helpful
9	The contents of teaching materials can motivate them to follow the study	3.71	92.86 %	Very motivated
Mean		3.73	93.45 %	

#### IV. PRODUCT DEVELOPMENT STUDY

The final product development learning tools include: the syllabus and lesson plan, teaching materials and student worksheet. The results of data processing of assessment by experts learning technology to the syllabus and lesson plan results obtained 97.21%, and the data processing of assessment by teachers against SMK Physics syllabus and lesson plan obtained result of 95.14%. Based on the results of the technology experts assessment of learning technology experts and teachers of the syllabus and lesson plan developed included in the criteria for valid and can be used without revision. Hasil data processing of assessment by experts on the material experts teaching materials Physics results obtained 98.46% and results data processing of penilaan by teachers of Physics to Physics teaching materials results obtained 95.97%. Based on the results of the assessment by experts on the material and the teachers of Physics teaching material included in the criteria of valid and can be used without revision.

The results of data processing from the Physics expert assessment of the student worksheet results obtained 98.43%, and the data processing of judging by the Physics teacher at SMK on student worksheets obtained result of 91.75%. While the results of data processing of responses by learners in vocational high school on Physics teaching materials results obtained 93.45%. Based on the teaching of Physics developed is valid and can be used without revision.

Product development device Physics learning outcomes with this constructivist approach is one alternative that can be used by the Vocational Education. This learning device has been tested and the results are valid criteria to be implemented in Vocational High School. The device that was developed based on that study Physics with a constructivist approach is to develop thinking skills possessed by students through problem solving.

The development of the Physics learning device by using the constructivist approach is based on the belief that learners will build new knowledge by combining information obtained and prior theknowledge they had. In accordance with the constructivism view, constructivist learning approach provide the availability of information and offers the opportunity of learning resources such as through a friend in the group. Furthermore, the interaction between individuals in the group have been shown to have a significance in achieving the ability of learners in problem solving. Overall, this development research has shown evidence that the development of Physics learning tools by using constructivist



approach can be used and developed as a means to improve the quality of learning in Vocational Education.


## **V. CONCLUSION**

The components of the learning device products that are rated by instructional design expert on the syllabus and lesson plan is feasible to be used to study in Physics learning at Vocational High School. In addition, the field study expert assessed that the teaching materials and student worksheet (LKS) development are feasible to be used or applied in Physics learning in Vocational Education. Teachers of Physics give an assessment of the syllabus, lesson plan, teaching materials and student worksheet (LKS) considered suitable for use in high school Physics learning in Vocational High School. Subject group trial assessed that the content of the Physics teaching materials is very good and interesting to learn. Teachers are encouraged to master the principles of constructivist learning approach and disseminate the developed Physics learning product device with a constructivist approach to Physics teachers.





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**EI-02-050**

**PROTOTYPE APPLICATIONS OF BLENDED LEARNING  
ON THE LESSONS OF PROJECT MANAGEMENT INFORMATION  
SYSTEM (MPSI) IN COLLEGE**

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**ABSTRACT:** *This research is further than the initial research has been done on the lessons of project management information system (MPSI). Included in the seminar of the International Conference on Technical and Vocation Education and Training, High on a hill on the 16th-17th-October 2015, organized by the State University of Padang (UNP). As well as on The 2016 Jambi International Seminars on Education (JISE) in Jambi, Indonesia, 3-4 April 2016. The results of initial research showed, that the quality of the teaching model of face-to-face with MPSI (konvensioanal) are on enough categories, so that needs to be developed a Blended Learning model that is merging model of face-to-face with e-learning model, in order to improve the quality of teaching for the better. The results of a pretest data analysis on a class of experiments and classroom control, showed results not much different, 12.32 for classes experiments, and 11.12 for the classroom control. Test of normality that is done for the second class also shows a normal distribution. Where  $r$  count for a class experiment =  $0,0060 < 0,1772 = r$  tables, and  $r$  count for class control =  $0,0572 < 0,1772 = r$  tables. Now this research has already come to the stage of prototype application design blended learning, will be in validation by an expert of computer design.*

**Keywords:** Model of face-to-face, E-Learning, Blended Learning, Pretest, MPSI, Prototype

## **I. INTRODUCTION**

Designing e-learning that is part of a blended learning model of learning, of course need to be supported with the against the model needs analysis, applications used, web form and content that will be designed, so that applications are designed not impressed just move the subject matter into the form of manual degital (e-learning).From the needs analysis process has produced a prototype e-learning applications, as part of a blended learning model for information systems project management lessons (MPSI). This application is designed using PHP application, MySQL database, Wondershare Quiz Creator. Prototype of this application has two functions, i.e. admin and users. Admin is used by professors of the teaching material to manage tuition MPSI, users are students who will be utilizing the web application in the lesson MPSI online. The prototype of this model named Blended Learning Center (BLC).

## **II. THE CONVENSIONAL MODEL OF LEARNING, E-LEARNING, BLENDED LEARNING**

### **A. Conventional Learning Model**

Conventional meaning by Convention (Agreement) General (such as custom, habit), traditional. In relation to the improvement of the quality of education, the conventional approach is an effort to improve the quality of education that is based on the paradigm of rigidly input – process – output. Something to do with the process of teaching and learning, learning approach as already commonly

used in the learning activities in the classroom are called conventional learning approach [5]. Conventional learning approach is an approach which is done by combining a variety of learning methods. In practice this method is centered on the teacher (teacher centered), teachers are more dominating in the learning activities. Method of learning is done in the form of methods lectures, granting and faqs. The conventional approach is the approach to learning that many implemented in current school which uses a sequence of activities, awarding examples and descriptions of exercises[1]. This learning approach is thus closer to methods lectures. Lecturer becomes a deciding the course of the process of learning or a source of information. While passive students with listening to the lecture carefully and take note of things that are considered important .

Lecture method is a method of delivering learning materials with oral communication. This method is an economical and effective to convey information and understanding. However in the learning of students with this method tends to be passive, it puts the teacher as the final authority, setting the pace in classical determined by faculty, so that this method is less suitable for the formation of the skills and attitudes of college students[9].

The method of questioning used in the learning process very large role, as with the questions formulated in Nice, with the appropriate filing technique, it will be able to:

- a). Increase the participation of students in the teaching and learning activities.
- b. Aroused interest and curiosity students to problems that are being tried.
- c) Develop mindsets and learn active students.
- d) Directs the process of thinking, because good questions help students to determine good replies.
- e) Focused the attention of students to problems being discussed. [10]

Metode granting task in the term a day day referred to by homework. In fact this metode wider than homework, because students learn not at home but maybe in laboratorium, in the library or in certain other places [8]. The implementation consists on three fase:-old lecturer gives students working on a task, and is responsible to the-old lecturer what has been learned, worked, generally fulfillment in the form of FAQ, discussion or a writing test.

Based on the above explanation can be concluded that the approach of learning conventional observations this is learning approach combining metode talks, FAQ, and the granting of a task in the process of learning in class. This conventional approach had the characteristics of among other things:

Based on the above explanation can be deduced that the conventional approach in the review of this is learning approach combining metode talks, FAQ, and the granting of a task in the process of studying in class..

This conventional approach had characteristics among others :

- a) Lecturer considers the ability of the students of the same,
- b) Use the class as the only place to learn,
- c) teach more speaking engagements,
- d) Separation of subjects is apparent.
- e) provide activities



that do not vary, f) one-way communication, g) learning emphasizes the achievement of the effect of interaction based on the orientation of the Group, h) Teaching using only the books and the information only from the lecturer, i) only assess the results of the study.

The advantages of conventional learning approaches as follows:

a) save time and costs, b) Students can organize better questions and free up the subject matter taught, c) students who have the ability to understand the material more quickly can help her friend who was slow, so there is no need to find a concept independently, d) Teacher easier understand the ability of college students and its characteristics.

The conventional approach to learning is a weakness :

a) student experience depends greatly on the knowledge and experience of lecturers, b) lectures active to transfer knowledge, student only receive from lectures, c) the spread of intrusional does not allow students to learn actively, let alone experienced a process of profound truth level assessment.

## **B. E-Learning Model**

E-Learning is a word that is often used for all educational activities that use computer or internet media. There is a terminology that has a meaning similar to the e-learning, web based learning, online learning, computer-based learning/training, distance learning, computer-aided instruction. E-learning is basically has two types namely synchronous (same time) and asynchronous (not at the same time). With advantages: (1) costs, (2) Flexibility of time, (3). The flexibility of the site, (4). The flexibility of learning speed, (5). The standardization of teaching, teaching Effectiveness (6), (7) the speed distribution (8). The availability of On-Demand, (8) process automation of administration. And weaknesses are (1) culture, (2). Investment, (3). Technology, (4). Infrastructure, (5). Material [7].

E-learning as a form of information technologies applied in education in the form of a virtual school, or as a process of teaching and learning in digital form via the internet [11]. Lectures online by using the internet facilities, can be done in the form of: A Fully online course, lessons with content ranging from 80-100% online with web-based technology support, no face-to-face lectures. A blended or hybrid course, lessons with content ranging from 30-80% of lectures online, using the web-based technology, and reduce the number of face-to-face meetings in the class. A web-enhanced course, technology based lesson content, ranging from 1 to 29% of face-to-face lectures [4]. Many design e-learning lessons are not appropriate, generally still shaped text books and a little animation. Not all learning can be done with e-learning (Web), so this research produces new innovations in teaching that is mixing the web and face-to-face learning, known as blended learning [2]. Based on this encouraging researchers do initial research towards teaching MPSI. The results of this research became reference in developing model BL

## **C. Blended Learning Model**

Blended learning is a combination of learning experiences face-to-face and online. The basic



principle is direct communication face-to-face and written communication online [8]. Blended learning also was defined as:

- Integration of face-to-face and online learning to help improve learning experiences in classrooms and expand knowledge through the use of information and communication technology. Blended strategy improve student involvement in learning through online activities, and increase the effectiveness and efficiency of the time in college.
- A learning that combines online and face-to-face. The proportion of content that is delivered online, typically using the online discussion, and some face-to-face meetings. "The Sloan Consortium blended program defines conducted between 30 per cent and 79 per cent of the content is delivered online, the rest of the learning content delivered by teachers/lecturers through face-to-face or other web-based methods of non, such as textbooks.
- Combination of multiple approaches to learning. Blended learning can be achieved through the use of resources "blended", virtual and physical resources] 15].

Another definition of blended learning in the journal portagaruda.org is:

1. Thorne (2003), Blended learning is a combination of multimedia technology, CD ROM, video streaming, virtual classroom, voicemail, email and phone conference, animated text online. All of this combined with traditional forms of training in the classroom.
2. Harding, Kaczynski and Wood (2005), Blended learning is an approach to learning that integrates the learning of traditional face-to-face and distance learning that uses online learning resources and a wide selection of communication that can be used by teachers and students.
3. Wilson & Smilanich (2005) concluded that blended learning is the use of the most effective training solutions, applied in a coordinated manner to achieve the desired learning objectives.
4. MacDonald (2008), the term blended learning is usually associated with incorporating online media on learning programs, while at the same time retaining contacts face-to-face and other traditional approaches to support students. The term is also used in asynchronous media such as email, forums, blogs or wikis coupled with technology, text or audio sinkronus [12].

Blended learning model is not merely a temporal construction, but rather as a re-design the learning model with the following characteristics:

1. A shift from a model of learning TCL to SCL, where students become active and interactive.
2. Increased interaction between the student-instructor, students, student content, and external resources.
3. The assessment mechanism of formative and summative integrated for students, lecturers and teachers [6]

From some of the blended learning defenisi and description of the etymology can be interpreted as that, the process of learning with a blended learning not to instead of traditional learning, but rather



to improve the quality of the learning process by making use of a wide range of approaches, utilizing a wide range of media and technology.

**a) Blended Learning Model Web Centric Course (BLWCC)**

Development of Blended Learning Model built in categories including on MPSI lecture Learning Management System (LMS), Web-Centric Couser with several advantages: (a) Increase the level of interaction between students learning with the teacher or instructor (enhance interactivity), (b) allow the occurrence of interaction of learning where and when (time and place flexibility), (c) reach learners a broad in coverage (potential to reach a global audience) , (d) facilitate the completion and retention of learning material (easy updating of content as well as archivable capabilities) [11]. Five keys to developing models of blended learning: 1) a Live Event, 2) Self-Paced Learning, Collaboration, 3) 4) 5) Performance Assessment Support Materials [3]. As well as the three models (Web Course, Web-Centric Course, Enhanced Web Course) and five models (Supplemental, Replecement, Emporium, Fully Online and Buffet) be an option in the development of model BL [14]

A blended learning model that was designed in the shape of this research model replacement/Web Centric Course under the name BLWCC, where this model will compress the meeting in the classroom with online with a percentage of meeting online is greater than the meeting in the classroom that is, eight times online (66,67%) and face-to-face four times (33,33%) for the meeting to 1, 3rd meeting, meeting and meeting of the 7th to the 12th.

**III. RESEARCH METHODOLOGY**

Do need analysis as the initial research to look at the quality, effectiveness, and the question of conventional learning lecture lecture on MPSI. Try to fix the issue and find out the cause. The spread of the now instrument is performed to measure the quality of learning, now grouped into four dimensions of the dispersion in grating instrument (organizing strategy delivery strategy, learning, learning, learning management strategies, the evaluation study). Data on sports and on analysis using SPSS application and fishbone diagram. The initial results of the study will be used as a source for developing learning models BL with Borg and Gall.

**IV. RESEARCH RESULTS**

The output of the research results are published in this journal is divided into two parts, namely the results of conventional perkuliah the initial research, design development and model BL MPSI.

**A. Convensional Lecture**

Processed data from SPSS application research and analysis of fishbone diagrams, obtained the description answers questions posed to 54 students as follows:

**Table 1.** Description of Respondent Answer



Deskripsi Jawaban Responden					
Dimensi	N	Minimum	Maximum	Mean	Std. Deviation
Starategi Pengorganisasian Pembelajaran	54	22.00	50.00	38.8333	4.90956
Starategi Penyampaian Pembelajaran	54	27.00	90.00	39.9074	9.00999
Starategi Pengelolaan Pembelajaran	54	12.00	35.00	25.1852	4.92615
Evaluasi Pembelajaran	54	14.00	30.00	23.0926	3.95860

Tabel A: Sumber: Data Primer yang diolah

From the description of the response calculated actual mean of each grating instrument (Anwar, 2003) with the results of calculations put the quality of teaching MPSI are in the category enough.

## B. Prototype Aplikasi Blended Learning (BLC)

The design of Blended Learning on lecture MPSI named BLMPSI stands for the model to be built that is Blended Learning Management Information System Project, with a design as follows.



Figure. 1 Prototype Blended Learning (BLC)

To be able to use this BLC, students must register itself as a participant in College MPSI, then they will have access to login to memanfaatkan all material that has been provided. As a lecturer and Manager of this web material will also get a login.

### 1. Lecturer as Admin BLC

There are some facilities provided for faculty as the manager of this website, namely:

#### a) Admin Login Menu

After the username and password is entered, the lecturer will be brought to the lecture material management menu.

Figure 2. Admin Login Menu

b) Admin Blenden Learning



**Figure3.** Admin Management Menu

Lecturers can manage this website, by selecting the menu provided, each grouped according to their function. The menu contains a Web Completeness class, user, articles, and announcements.

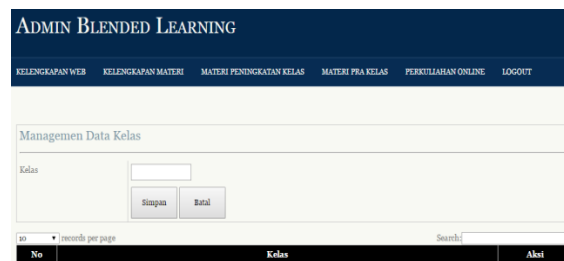
c) Web Complementary Menu



**Figure 4.** Web Complementary Menu

If you want to manage the classroom, teachers can choose the content classes, look like the following:

a. Tampilan Kelas



**Figure 5.** Clas Display Menu

And so are the other content will menyedia management facility for lecturers as admin.

2. Students as Users

To take advantage of this web, students should log in first.



**Figure 6.** Menu Login Mahasiswa

Setelah username dan password di entrikan, mahasiswa dapat memanfaatkan semua fasilitas belajar yang telah disediakan, diantaranya:





Figure 7. Display Menu Lecture MPSI

a. Menu Lecture Materials MPSI

This menu contains the syllabus, Sap and modules Lectures. Students can choose the content they want. The display of the following:

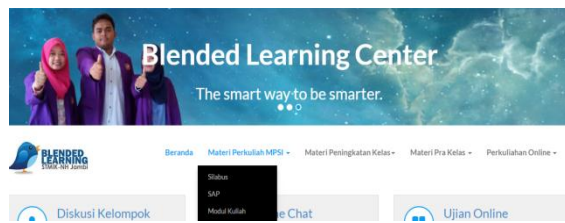


Figure 8. Display Menu Lecture

If a student chooses the syllabus, syllabus display will appear, containing a summary and general purpose of the syllabus, and the syllabus can be downloaded by students.

Daftar Silabus

No	Ringkasan	Tujuan Umum	Aksi
1	Manajemen Proyek Sistem Informasi (MPSI) merupakan mata kuliah bersifat keilmuan dan keterampilan, dengan matakuliah ini diharapkan mahasiswa dapat menangkap, memahami dan kemudian mengaplikasikan prinsip-prinsip manajemen dalam sebuah proyek sistem informasi secara menyeluruh dan benar. Materi MPSI ini dibagi atas beberapa bagian: (1) Konsep Dasar sistem informasi dan manajemen proyek, (2) Fase Metodologi Manajemen Proyek dan Peran Manajer Proyek (3) Fase Inisialisasi dan Presentasi Proposal (4) Fase Perencanaan; (5) Fase Perancangan; (6) Fase Pengembangan; (7) Fase Delivery; (8) Fase Pemeliharaan Sistem	Mahasiswa secara kelompok dapat melakukan assessment penerapan Manajemen (pengelolaan) dengan baik pada suatu Proyek Sistem Informasi tertentu yang dipilihnya sendiri	Download

Figure 9. Display Menu Syllabus

b. Material Improvement Class

This menu contains an interactive simulation, examples of additional material, the problem and the solution, discussion groups, online chat rooms, interactive tests online. The display of the following:



Figure 10. Material Improvement Class

If a student chooses test interactive, interactive test list menu appears as follows:

Daftar Tes Interaktif

10 records per page Search:

No	Judul Tes	Penjelasan	Aksi
1	evaluasi penguasaan materi bab-2	mahasiswa diminta menjawab soal ini, sebagai evaluasi terhadap penguasaan materi metodologi manajemen proyek	Ikuti
2	evaluasi penguasaan materi bab-1	mahasiswa diminta untuk menjawab soal ini, sebagai evaluasi terhadap penguasaan materi konsep sistem informasi dan manajemen proyek	Ikuti

Showing 1 to 2 of 2 entries

Previous 1 Next

**Figure 11.** Interactive tes overview

Test title lyrics, menu descriptions and the action that the student can do to start doing tests against the understanding of the material that has been pelajarinya, the test is done online. It looks as follows:



**Figure 12.** Interactive test overview

Quiz is filled by way of cheque klis at the correct answer, then submit it, it will pop up the next question. The application of blended learning prototype already contains all of the content, and in this journal researchers shows only in part only, it shows a picture of a model of BLC built for MPSI lecture

## V. CONCLUSION

Blended learning model application prototype is only a miniature of the application to be applied on the lecture MPSI. This prototype will be final after the model validation by the validator, and fully tested cobakan on lectures MPSI. The results of the response of the model to this end will be published in the next journal.

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**EI-02-053**

**MODEL OF BUILDING CONSTRUCTION CERTIFICATE USING  
REGIONAL MODEL COMPETENCY STANDARDS AND PROJECT-  
BASED LEARNING IN CONSTRUCTION SERVICE DEVELOPMENT  
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**ABSTRACT :** *The purpose of the study is to develop model of test for education and training certification in construction development institution (Lembaga Pengembangan Jasa Konstruksi / LPJK) using Regional Model of Standard Competency (RMCS) and Problem Based Learning (PBL) as the bases. The study aims at evaluating the following elements, namely: (1) to evaluate significance of the test for education and training certification in construction development institution (Lembaga Pengembangan Jasa Konstruksi/LPJK), and (2) to disseminate the findings of the studies in developing test for certification. The methodology is quasi experimental study with nonequivalent control group design. The subjects are 160 construction employees of the construction development institution. The data collection methods are cognitive and skill tests as well as observation. Furthermore, the data are analyzed using variance analysis. The findings are (1) the group of employees being given the RMCS model and open-ended PBL strategy during construction training has significantly better learning outcome rather than the group of employees being given closed ended PBL; and (2) The group of employees with more than 5 years of experience in building construction shows better result than one whose experience in building construction is less than 5 years in the building construction training. Conclusions (1) Combination of RMCS and open-ended is a more effective learning strategy for building construction training compared to close-ended PBL; (2) There is a significant difference between the group of employees who has more than 5 years experience in building construction and the employees whose experience in the field is less than 5 years; the former group has better learning outcome than the later.*

**Keywords:** Regional Model of Standard Competency (RMCS), open-ended (PBL), closed ended (PBL), and task skill

## **I. INTRODUCTION**

The underlying reason for developing certification that refers to Regional Model of Standard Competency (RMCS) is the need to improve quality, effectiveness, as well as competence of employees, training system and mobility of skilful employees that keeps evolving. In addition, working attitude in the present and future develops rapidly due to rapid development of construction technology, equipment, building materials and also innovation of labor union. The model is going to have implications towards understanding and skills in type and sector of building construction and civil engineering as a whole when it is applied for education, training and certification. Skillful employee development in Malaysia, Singapura (NSRS), and Australia (NTIS) also refers to Regional Model of Standard Competency (RMCS) (ILO, 2006). Developing competence can be used to identify one's work ethics or employee's gradually and extensively in human resource management (Boyatzis, 1982; Lawler, 1994; Spencer & Spencer, 1993; Ulrich, 1997). Not only do the characteristics that have been established by the employees give fundamental background for recruitment and selection, but they also develop effective strategies.

Developing competence that refers to RMCS involves: (1) task skills (skills in fulfilling tasks/ responsibility); (2) skills in managing tasks/ responsibility (task management skill); (3) ability to overcome unexpected issues carefully and effectively (contingency management skill); (4) ability to adjust to working situation (job/role environments skill); and (5) ability to transfer and adapt to different or new working situation (transferable management skill) (ILO, 2007). Developing competence aims at fulfilling need and improving efficiency, productivity or profitability or a vision to provide world class service (Rodriguez, 2002). One of the strengths of RMSC competence model is developing business and strategy of construction service institute to meet the need and demand from stakeholders. Besides that, competence model gives ideas about general core competence for the need of particular workers in construction service institute. Competent workers will encourage transfer and/or adaptation for new and different working situation. Correlation between competence and activities related to building construction or civil engineering work gives clarity as well as individual and group work ethics for the success of the institute. Simultaneous correlation between strategic plan and competence in an institution enables the institution to establish recruitment strategy, selection and training effectively to support projective need of building construction service institute in the future.

Urgency of certification test development that refers to Regional Model Competency Standards (RMCS) involves: (1) on-going effect of globalization and development that of technology and equipment for building construction that has massive impact towards tasks and responsibilities of building construction service institute; (2) developing skill, execution of tasks and responsibility that require the most current technology, equipment and building material; (3) regional collaborations in building construction and civil engineering; and (4) current change in labor market where required skills have always evolved (ILO, 2006).

Standard of competence that refers to RMCS basically uses the following aspects as the major foundation; they are: (1) what task/ responsibility an employee can do in his/her working station in reference to his/her job description?; (2) to what extent the expected working performance match the actual working performance, working condition and environment?; and (3) what standard used to identify and measure that an employee has or has yet been able to perform his/her job as expected?

In order to fulfill need for skillful employees, it is vital that building construction service institute analyze need for and qualification of human resource as well as improving human resource's ability through certification or competence test. The purpose is to ensure construction service industry sustainability in providing competitive construction service. Furthermore, institute for certification test can prepare and develop competence program that meets need of building construction service institute. In developing the required standard competence, it is important to use Regional Model of Competency Standard (RMCS) as reference as it has been established by ASDEP ILO for the Asia Pacific regions. Development of certification testing model that refers to RMCS has some of the



following characteristics namely: (1) employees carry out meaningful construction work through carefully planned education and training; (2) employees carry out their job based on relevant knowledge, skillful and working attitude that suit their work (ILO, 2007).

Empirically, competence test used project-based learning that emphasizes on contextual learning through activities (building construction and civil engineering-related work) in building construction field (Cord, 2001; Thomas, Mergendoller, & Michaelson, 1999). Project-based learning focuses on concepts and main principles (central) from a discipline of knowledge, involves learners in problem-solving activities and other meaningful tasks, gives opportunity for learners to be autonomous learners, constructs their own abilities and eventually learners will create meaningful, realistic products (Okudan and Sarah, 2004). Furthermore, advantages of project-based learning (PBL) are: (1) improve employees' motivation, (2) improve problem-solving abilities and understanding, and (3) develop collaboration between employees/ learners (Moursund, 1997).

Other considerations to develop RMSC certification model are some factors that affect construction service institution working performance; the factors involve human resources or building construction employees and finance, placement of employees based on their level of education experience and skills. Institute for construction service development is given mandatory to carry out certification test and registration for building construction service institute that involves classification, qualification, certification of skills and expertise in construction or civil engineering work. Besides those responsibilities, it also is given responsibilities for research, development, education and training as well as role of arbitrary, mediation and evaluation for experts in building construction service, consultants and contractors (*LPJK Nasional*, 2008).

In carrying out training and development program, it is essential to conduct an analysis towards need, goal, target, content and principles previously in order to have effective and meaningful training. According to Spencer, 1993; Dessler, 2009; and Umar, 2003, successful training happens due to the following reasons namely change of staffs, technology, responsibilities, law and regulations, economy, new working pattern, labor market need, social policy, employees' aspirations, variety in working performance and equal opportunity. As an addition, the training itself can be carried out in 2 (two) places, on the job training and outside the office. Based on Soekirman, 2011, some factors that may affect one's working experience are time, frequency, type of responsibility, implementation and outcome. Foster states that there are some indicators that determine working experience namely 1) length of time or work, 2) level of knowledge, 3) competence towards job and equipment. Experience and skills of employees and coordination between stakeholders can also improve performance of an employee.



## **II. METHODOLOGY**

The second-year experiment towards the program and the model use quasi eksperimental design since the researcher does not have full control over variables that influence subject of the study. Experimental design for the study is nonequivalent control group design factorial 2x2 (Montgomery, 1984). The subject of the study is 160 participants of certification training. The data are obtained using instruments and problem-solving tests using building construction and civil engineering-related tasks with project based learning. Data analysis used variance analysis followed by Posthoc tes using SPSS 16 (Santoso, 2010).

## **III. FINDINGS AND DISCUSSION**

### **A. Findings**

Based on the findings of variance analysis (SPSS16)  $F_{ratio}$  is 10.628 where probability  $0.001 < 0.05$ ; it means  $H_0$  is rejected. It shows that open-ended Project Based Learning and closed-ended Project Based Learning as strategy for training show significant difference. Group of employees being given RMCS and open-ended Project-Based Learning as treatment has higher score than that given closed-ended Project Based Learning as treatment in problem-solving training using Civil Engineering Building Construction issue as the problem. Moreover, analysis using Post Hoc Test shows probability of ( $p=0.001 < 0.05$ ), then  $H_0$  is rejected. It means there is a significant difference open-ended Project-Based Learning and closed-ended Project Based Learning.

Based on the analysis,  $F_{ratio}$  is 4.421 with probability  $p=0.037 < 0.05$  and  $H_0$  is rejected. It means there is a significant difference between group of employees with more than 5 years of working experience and that with less than 5 years of working experience. The earlier group has higher score in the training than the later group. Furthermore, based on Post Hoc Test, probability is  $p=0.037 < 0.05$  and  $H_0$  is rejected. It means there is a significant difference between a group of employees with more than 5 (five) years of working experience and group of employees with less than 5 (five) years of working experience. Based on interative analysis,  $F_{ratio}$  is 0.054 with probability  $p=0.817 > 0.05$  and  $H_0$  is accepted. It means there is no significant interaction between PBL as training strategy and working experience in the result of problem-solving training using Civil Engineering Building Construction issue.

### **B. Discussion**

Based on the findings of the study, the group of employees being given RMCS and open-ended Project-Based Learning has significantly better performance compared to another group of employees being given RMCS and closed-ended Project-Based Learning in problem-solving training using Civil Engineering Building Construction issue.

Education and training refers to process where an individual develops capabilities, skills, attitude and other behavior in building construction servive industry and society. Education has



important role to develop one's ability to understand knowledge, skill, attitude and useful technology (Winkel, 2005). Therefore, educated and skillful person will be able to develop his/her thought pattern, attitude and behavior in solving a problem he/she encounters. In addition, Regional Model of Standard Competency (RMCS) facilitates independence in terms of (1) independence in carrying out tasks/ responsibility and skill in work management (ILO, 2007). Education also improves employee's capability by enhancing his/her understanding towards knowledge, skills, attitude, information technology, as well as construction and building material technology; these are related to issues related to building construction and civil engineering. Developing competence is part of developing personality, capability, knowledge, skill and attitude of an employee. It functions as reference for education institute stake holder for evaluation and recruitment of new employees (Tripathi, 2010). Besides, it can also be used for recruiting employees who requires strong background knowledge as well as increasing productivity, quality and other advantages.

Knowledge and training can be defined as planned effort of an organization to increase knowledge, skill and capability of its employees. Training and development are 2 (two) similar concepts that is enhancement of knowledge, skills and ability. Training emphasizes on developing capabilities to fulfill specific task in the present while development emphasizes on developing skills to fulfill future work, which is carried out using integrated approach related to other activities to change working behavior.

Employee training is planned effort of an industry to facilitate transfer of any knowledge, skill and behavior related to construction work (Riggio, 2009). Training is basically an activity to develop employee's ability by improving his/her knowledge, skills and behavior to fulfill specific task/ responsibility. It is a process where employees are taught which knowledge, skills and attitude they need to carry out their job description (Dessler, 2009).

Training refers to *"training competence that is delivered by a trainer to a group of workers who are all together at the time place and in the same place"*(Chan, 2010). Therefore, training is giving information (knowledge, skill and attitude) by an instructor to a group of employees at the same time and place. Different from the previous statement, Lair, Naquin, and Holton (2003) state that training is experience, discipline or a set of procedure that enables participants to get new ability as what has been determined prior to the training. Training aims at delivering required knowledge, skill and attitude to carry out work-related responsibility. It is a direct effort to increase working achievement.

On the other hand, Noe (2010) states that training is carefully planned effort from construction service industry to facilitate training for employees towards building construction and civil engineering-related competence. Competence in this context refers to knowledge, skills, and attitude to enhance working performance. Training refers to efforts to enhance abilities (knowledge, skill and attitude) in technology for construction work and building material used in building construction and





civil engineering work. The goal of training is to meet need as well as to increase understanding and mastery towards knowledge, skill, attitude and development of technology for construction work and building material used in building construction and civil engineering work. The competence training is beneficial for various aspects of human resource starting from selection of individuals, development and performance management for strategic planning of construction service institute in civil engineering.

Findings of studies in construction show that majority of employees or 96.4% have yet attended any training on how to work well that is training related to job specialization, health and safety at work. There is only 3.5% employee that has attended training. Such small percentage happens because: (1) training requires relatively large fee and (2) there is a lack of information about the required training (Piri, Sovian, 2012).

An alternative to improve performance of construction employees is to provide certified training related to their work (Raymond, 2010). Construction employee is vital element in enhancing productivity of construction industry in construction service. Employee is the main factor to increase productivity of construction industry and, therefore, labor productivity should always be maintained, developed and improved. Employee is human resource with the largest influence towards improvement, development and capacity of construction industry productivity.

In developing employee's understanding about building construction and civil engineering correctly, labor's competence should be trained based on their tasks and function. Development and training can help employees to understand and improve knowledge, skill, and behavior in understanding technology for construction work and building material used in building construction and civil engineering work. Besides understanding, they also are beneficial for improving competence of construction employees towards team work as culture at work and identify new competitors who bring new culture that is the most current technology for construction work and building material. It helps the construction employees to develop their skills to work with the latest technology and understand how effective team work results in qualified construction service (Noe, et al, 2008).

Education and training strategy for certification test using open ended Project-Based Learning of which basis is Regional Model of Standard Competency (RMCS) can develop employee's independence in terms of (1) collect, organize and analyze information about building construction and civil engineering employees, (2) communicate ideas and information, (3) plan and organize activities related to building construction and civil engineering, and (4) develop dynamic collaboration including teamwork (ILO, 2006).

Influence of Education and Training using RMCS and PBL. The result of variance analysis in Table 5.5 about the result of training show that  $F_{ratio}$  is 10.628 with probability  $0.001 < 0.05$  and thus,  $H_0$  is rejected. It means group of employees being given open-ended Project Based Learning as



treatment has better result compared to the group being given closed ended Project Based Learning as treatment in building construction training. Furthermore, the ration of Adjusted R Squared = .75 that means the influence of training strategy towards the result of the training is 75%.

Education that refers to Regional Model of Standard Competency (RMCS) is based on the competence required by building construction field as a whole starting from cognitive, affective and kinesthetic (skills) domain. The standard competence being developed has flexibility to anticipate change in new field of work. The developed competence allows an individual to (1) carry out building construction or civil engineering-related work, (2) organize in order that the job can be carried out well, (3) overcome unexpected that might change any plan that has been designed previously, and (4) use his/her ability to solve any problems and carry out his/her duty in different working condition (BNSP, 2005). Besides, key competence an employee should master is (1) collect, organize and analyze information about building construction and civil engineering work, (2) communicate ideas and information, (3) plan and organize activities, (4) work together with other people or in group; (5) use ideas and mathematic formula, (6) solve problems and (7) use the most current technology, equipment and materials.

Open ended Project Based Learning as strategy for training uses constructivism as underlying foundation; the strategy gives opportunity for employees to construct basic concept of building construction and civil engineering themselves after experiencing real-life working situation. Real-life working situation refers to any situation that can be analyzed using the five senses as well as that which can be thought and carried out by employees. By developing employee's ability in problem-solving through project-based learning during the training, it is expected that the employees can think rationally and make reflection about both product and process oriented problem-solving procedures. They are also expected to analyze and evaluate solutions they have been using so far. Jonassen (2000) states that development of knowledge and higher-order skills can be achieved through training and problem-solving tasks about complex building construction issues or within ill-structured problem domain.

By developing problem-solving ability and skill in building construction and civil engineering through project-based learning, it is expected that employees can think rationally and make reflection about problem-solving process not only product-oriented one but also analyze and evaluate the solution they have been implementing so far. Jonassen (2000) states that development of knowledge and higher-order skills can be achieved through training and problem-solving tasks about complex building construction issues or within ill-structured problem domain.

Civil engineering and building construction foundation as training materials are essential components to motivate employees in solving issues related to basic of building construction. Schoenfeld (1992) mentions that when employees solve problems related to basics of construction,



they have deeper understanding and reconstruct theoretical and practical concepts of building constructions they have learned previously. Stanic and Kilpatrick's (1989) explain that project-based learning in civil engineering and basic of building construction has helped employees to achieve the purpose of training since things they learn have met the real-life context on their working place (construction sites). Furthermore, project-based training is experience that helps employee understand, reconstruct knowledge, develop thought pattern, analysis and problem-solving ability (Booker & Bond, 2009, Polya, 1973).

Project Based Learning, derived from constructivism, refers to training strategy that uses construction as the theme (reality or events related to civil engineering and building construction) or problems as means for employees to develop and increase both theoretical and practical theories, critical thinking ability and train themselves to overcome building construction-related issues. During project-based learning, knowledge is gained through discussion, sharing experience, knowledge, skills and attitude while employees carry out meaningful construction work. Employees actively participate in solving various building construction-related issues such as one about foundation or structure and construction of roof. During the process, employees construct their own knowledge with supervision from an instructor; however, the instructor does not play dominant role to develop employee's knowledge, instead the employees actively develop their own knowledge.

In developing employee's skills to solve complex construction issues, it is vital that the employees face complex construction issues on a regular basis. Solving sophisticated construction-related issues requires argument, knowledge, skills and constructive attitude (Cerbin, 1988). In order to overcome issues related to building construction or civil engineering work, one requires argumentation during the process, should be rational and gives some evidence to claim his/her stand that what he or she is doing has already been correct (Carr, 1999; Toulmin, 1958, 1984). In problem solving process, argumentation becomes important aspect in formal analysis which becomes accumulation of easy-to-understand ideas as well as formulation of ideas and belief (Kuhn, 1991). The problem-solving requires argumentation to find solutions from various different perspectives, point of view and opinion, develop and select logical solution and support the solution with valid data and evidence (Voss, Lawrence, & Engle, 1991). Argumentation is a variable that can significantly predict employee's working performance to be able to understand and solve sophisticated problems related to building construction and civil engineering (Hong, Jonassen, & McGee, 2000).

Despite the importance, employees are not used to developing convincing arguments (Cerbin, 1988). The group of subject that solves civil engineering and building construction-related issues gives more extensive arguments. To solve civil engineering and building construction-related issues, employees needs more support (knowledge and skill) to argue due to the importance of coming out with and support alternative solutions. Correlation between argumentation and problem-solving



particularly civil engineering and building construction-related issues is significant. Furthermore, the effect of supporting argument is consistently transferred to production of arguments to overcome individual problems. Employees use argumentation script and in the mean time solve problems individually.

Based on the principal design of the training, then procedure of closed ended Project Based Learning (conventional Project Based Learning) training implemented in the study follows the following sequence, namely (1) establish and elaborate goal of training, (2) organize and develop materials (text and assignments) for closed ended Project Based Learning (conventional Project Based Learning) training, (3) design and develop test as instrument that measure learning outcome (understanding towards concept and problem-solving ability), (4) design and arrange scenario for training, (5) implementation of training programs, and (6) evaluation. Implementation of training program refers to the following steps namely (a) apperception, (b) explaining concept through lecture and/or demonstration, (c) guided exercise or assignment and (d) feed back. In conclusion, the strategy for closed ended Project Based Learning (conventional Project Based Learning) training is naturally as follow: (1) problem-solving is described as linear process; (2) problem solving as series of procedures, and (3) basic of construction problem solving is a set of procedure to memorize, practice and be accustomed of.

Discussions on Influence of Working Experience. Based on the result of analysis in Table 5.5,  $F_{ratio}$  is 4.421 with probability  $0.037 < 0.05$  and  $H_0$  is rejected. It means there is significant difference between group of employees with more than 5 years of experience and group of employees with less than 5 years of working experience in solving Building Construction-related issues.

Working experience is process of developing knowledge, skills, attitude in carrying out their work continuously. Working experience is evaluation about length of time or working experience an individual has so that he or she can understand his/her job description and execute his/her job well (Foster, 2001). In carrying out his/her construction work, an employee is expected to work effectively and efficiently. It means employees need time for work and working experience in construction industry or similar field. Need for experience is challenge for human resource management since it should give opportunity for employees who consistently are involved in construction industry and other similar industries. It provides real experience and brings some implications towards professionalism of the employee.

Result of Spearman analysis towards comparison of factors and perception that affect productivity of repairmen and employees based on overall working experience shows different perception between employees with less than 5 years working experience, 5 to 10 years working experience and more than 10 years working experience (Riscon, 2013).



Construction industry in achieving productivity depends upon active participation of employees. Performance of construction workers is the result of performance qualitatively and quantitatively achieved by construction workers in fulfilling his/her job task suitable with type of tasks he/she is responsible for in particular period of time (As'ad, 2002). Performance is derived from job performance or actual performance which means working achievement or actual achievement someone gets. Performance refers to results of someone's job that gives a lot of contribution towards industry. Some factors that affect performance are education, motivation, job satisfaction, working environment, compensation, working experience, stress level, communication, economic and technical aspects as well as other behaviors (Daniel, 2009).

Working experience is parameter of working time or period an employee has spent to understand responsibilities one job has and the employee has carried out the responsibilities well (Foster, 2001:40). Working experience refers to how well and how much time an employee spends to fulfill his/her job and type of tasks based on his/her competence. Thus, it can be concluded that working experience is level of understanding, knowledge, skills and attitude of an employee at work that can be measured based on knowledge, skill and behavior the employee has devoted to finish all his/her job and responsibilities.


In carrying out a project, one of the most determining resources that causes success or failure of the project is employee. Type and intensity of project activities change over the cycles so that number of employees, type of skills and abilities should meet the ongoing change. In the project, the largest number of employees is field workers. Field work is closely related to physical work on construction sites (Pramuji, 2008). According to Langford et al. (1995), 40% of total cost of construction project is devoted for cost of employees. As the consequence, it is vital to keep improving employee's performance and productivity. Another aspect to take into account is factors that help improving productivity at work.

#### **IV. CONCLUSION**

Training and education using RMCS and open-ended Project-Based Learning (PBL) is more effective than training and education using RMCS and closed-ended PBL based on the result of Building Construction training. There is significant difference between group of employees with more than 5 years of experience and one with less than 5 years of experience. The group of employees with more than 5 years of experience shows higher score in building construction training than the one with less than 5 years of experience. There is not any interaction between PBL and working experience in the Building Construction training. It means open ended Project-Based Learning (PBL) and working experience improves the result of building construction training separately.



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**EI-02-058**

**SCHOOL BUILDING CONDITION AND PREVENTIVE MAINTENANCE  
OF VOCATIONAL SCHOOLS AS A MEANS OF ENHANCING  
COMPETENCE MILE STONE IN THE FIELD OF VOCATIONAL  
STUDENTS IN ORDER TO ENHANCING COMPETITIVENESS  
OF GRADUATES TO FACE MEA**

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**ABSTRACT** : *Standard facilities and infrastructure of vocational schools include the minimal requirements of the land, classrooms, libraries, laboratories, workshops, needed to support the learning process (MONE, 2004). Educational facilities is one of the instrumental factors in supporting the mastery of competencies in the fields of vocational school students. The research objective is to get actual condition of school facilities, infrastructure of building / utility at 22 vocational school in Malang, 24 vocational schools in Malang district and 6 vocational schools in Batu cit. Data collected by observation guide and direct observations to school. From the data collected all schools do not have the document building treatment, the rate of destruction and repairment data> Damaged buildings data are not recorded. There were no treatment plan of school facilities. based on data findings , schools pay less attention to the important role infrastructure conditions in the form of student competency.*

**Key Words**: Building Maintenance, building condition

## **I. INTRODUCTION**

Naturally, school facilities and infrastructure that in schools over time will be damaged. Damage will arise from the effects of weather , temperature changes , misuse or lack of maintenance. These factors gradually reduce the function of school infrastructure that led to the school infrastructure becomes damaged ( Syafrudie , 2003) . Nursing school regularly and scheduled is a way preventing school damage . The infrastructure life span is treated regularly and scheduled make the building and other facilities becoming increasingly long. Preventive maintenance is a form of conscious action taken to keep the school facilities and infrastructure are always in ready to use. Preventive maintenance can also be interpreted as an act of minor repairs, up to the condition of the tool and the infrastructure of the school can be used optimally. Therefore, the requirement of preventive maintenance activities carried out in a planned and programmed at certain times. Preventive maintenance of school facilities includes periodic checking, cleaning, repainting buildings and furniture. Action such as tuning, cleaning, replacement, calibration of the laboratory equipment is also an effort part of preventive maintenance. Form of preventive treatment can be performed minor repairs on the building / buildings in one school unit. If necessary the activity would be replacement components to increase the working capacity of facilities so that the school operational costs on maximies infrastructure use effective. In a number of vocational schools, maintenance of facilities often overlooked. School building maintenance activities often found exceeded. While there, the budget allocation for facilities and infrastructure found small schools. Preventive maintenance are

intended to maintain the facilities and infrastructure (physical buildings and other school equipment), so that the life span of school infrastructure accordance with the school building plan. By performing preventative maintenance avoid damage to school building before its time. According to education ministry decision Number 031/0/2002 article 68 explicitly states that the government organize preparation of materials, standardization policy formulation educational facilities. This is in accordance with education ministry decision number 129a / U / 2004 dated October 4, 2004, on minimum service standards in education. In order to improve the quality of education, government has taken various efforts to improve the quality of education facilities and infrastructure, including building standards and school furniture.

Educational facilities is one of the educational resources that need attention in the learning process . There needs to be a mapping infrastructure conditions were actually in school as a reference in the planning and procurement of buildings in secondary vocational schools. Mapping the infrastructure conditions allows schools and districts to perform maintenance and procurement in accordance with local financial capacity.

By doing preventive maintenance will improve the performance of equipment and supporting school infrastructure. Preventive treatment will suppress the cost of repairment on a large scale, and will be able to maximize the lifetime of the building and supporting equipment. The implementation of a preventive maintenance program to encourage school facilities and infrastructure to produce the right information in the maintenance of school buildings, laboratories , and other supporting buildings. Through these research activities will be obtained data and accurate analysis of the condition of te building vocational school in Malang , Malang district and Batu

## **II. PREVENTIF MAINTENANCE**

Preventive maintenance according to public works minister regulation number 24 / Prt / M / 2008 on guidelines for maintenance and upkeep of buildings included in post construction activities. At this stage the maintenance of school buildings conducted periodically , regularly during the construction work has been completed . That work is : 1 ) maintenance of the wall paint ; 2 ) maintenance paint door frames and windows 3 ) maintenance of tile on the floor and around the building ; 4 ) maintenance replacement tiles, ceramic floor and wall .

According to the regulations the Minister of Public Works No. 24 classification of maintenance work includes continuous care (regular, routine ) ; periodic maintenance and emergency repairs; total repairs and improvements. On going treatment includes: cleaning of drainage channels of rubbish and dirt: cleaning the rooms and the yard of debris and dirt; Cleaning the glass, windows, chairs, tables, cupboards, clearing grass and shrub irregular; cleaning and watering bathroom /WC to maintain health. In the regular maintenance activities include repair and painting of the frames, doors, walls and other



building components that already looks dull; repair mebeulair ( cabinets , chairs , tables , etc ) and repainting; security checks on the play facilities or place of the ceremony; tile repair damaged / broken; plaster coating on the walls were cracked or chipped; cleaning and drying floor hallway pages or exposed to rain / water stagnant.

Emergency repairs include repair the damage to the unforeseen and dangerous / harm if it is not anticipated as soon as possible ; temporary repairs completed quickly strived so, the damage does not get worse and learning activities are not disrupted . Preventive maintenance activities that will lead to poor condition of the building will fall /fast break. Poor maintenance of buildings and interfere with the function of school activities, jeopardize the safety of students, the cost is more expensive rehabilitation . Lack of care by means of a bathroom / WC will be unhealthy and cause disease . According to ministry education decision no. 24/2008 , building maintenance activities carried out on the roof; sills and doors; glass wall; floor. shower / WC; electricity and clean water furniture ; sewer / drainage of dirty water .

### III. RESEARCH METHODS

The study focused on school infrastructure conditions arising during its use. Information about the condition of school buildings, mapping to the problems that arise with regard to the school building. Data collected and analysis of the condition of the buildings is a major update of this study relates to preventive maintenance of school facilities and infrastructure . This research is descriptive, which describe the condition of the building vocational schools in Malang , Malang district and Batu .

**Table 1.** Variable Descriptions Research

NO	VARIABLE	INDICATOR
1	roof	tiles , ridges, lisplank , ceiling
2	the walls of the school building	cracks , stucco , paint the walls , moss and crust
3	doors and windows	paint, hinges and hangers , locks
4	floor	integrity , slick , color , popping
5	Rest room	drains, walls , toilets , tubs , walls and doors, accessories
6	The drains clean / dirty	condition and function

The study population was all the vocational high schools buildings that are in in Malang ( 21 schools ), Malang District ( 24 schools ) and Batu ( six schools ). Sampling was used to observe the roof condition, walls , doors and windows, flooring , restroom as well as water supply and sewerage at schools .



The data collection is done by observation to each school and assess the condition of the existing building, as well as observations correspond study variables . Data from observations are matched with the data existing at vocational school facilities and infrastructure of education authorities at Malang district, Malang and Batu.

Instruments trials conducted in five vocational schools in Blitar . The test is done to get feedback on the readability of the instrument, and at the same validation attempts how the instrument measure what should be measured. A test instrument used to test the reliability of the instruments used to measure time . Test results used to improve and abort instrument invalid, and repair of instruments that need to be maintained because the indicator is not represented by any other instrument .

Data observations and structured interviews, processed for getting data on the condition of the building , the symptoms appear the damage most of the vocational high school building were observed . Used descriptive analysis techniques , and observation data tabulation is done using the checklist from the school buildings . Data obtained from the research instrument administered . The data collected in this study a note on the observation sheet, and the response on the instrument . Data were analyzed descriptively for trends in each indicator. In order to know how the condition of the school preventif care data analysis was done by analyzing the results of field observations using Excel worksheet in an Office program .

#### IV. RESULT

From the 51 vocational schools observed in Malang, Malang district and Batu , the data observations are tabulated as follows

**Table 3.** Conditions Infrastructure Damage in Schools

REGION	NUMBER OF SCHOOL	LIGHT	MEDIUM	HEAVY
SMK STATE / PRIVATE MALANG CITY	21	604	7	1
SMK STATE / PRIVATE MALANG DISTRICT	24	316	23	8
SMK STATE / PRIVATE BATU CITY	6	80	0	3

Based on table 3 , from 21 secondary schools in the public and private vocational Malang observed found 604 lightly damaged building, 7 rooms were medium damaged and one room at a school in a badly damaged condition . While vocational schools from 24 public and private in Malang district there are 316 school buildings were slightly damaged, 23 moderately damaged buildings and 8 heavily damaged building . Average of 6 schools that were observed in Batu, 80 lightly damaged buildings and three buildings in severely damaged condition





**Figure 2.** Medium Damaged

Based on the existing damage, school located in Malang district has the highest number of heavily damaged buildings. It was 8 heavily damaged buildings spread across 24 schools, three buildings spread across 6 schools in Batu city, and only one building was heavily damaged in the city of Malang spread over 21 vocational schools. In the region of Malang district had 23 damaged buildings were spread across 24 schools while in Malang has 7 damaged buildings were located in 21 schools, while in Batu city there was no medium damaged building of the 6 schools .



**Figure 2.** Havy Damage

Based on data in table 3, shows that the school building at a vocational school in Malang were damaged lightly, compared with the condition of buildings in the district of Malang and Batu city. Lightly damaged buildings in Malang totaly 604 buildings spread across 21 vocational schools. Respectively who have mild impairment rate is poor districts 316 schools across 24 school and Batu city with the amount of damages 80 buildings spread across 6 schools



**Figure 3.** Minor Damage

**Table 4** .School Facility Conditions



<b>SCHOOLS</b>	<b>RAIN WATER CHANNEL</b>	<b>SEWERAGE</b>	<b>WASTE DISPOSAL</b>	<b>FIRE GUARD</b>	<b>TRANSPORTATION</b>	<b>LIGHTNING ROD</b>
Public / Private Smk In Malang City	21	21	14	12	17	11
Public / Private Smk In Malang District	20	20	17	6	11	11
Public / Private Smk In Batu	6	6	4	4	4	5

From 21 vocational schools in Malang have channels for rainwater, all schools have a sewerage . There were 14 schools from 21 schools in Malang which has waste disposal facilities, and 12 schools in Malang which has the means of fire prevention . Only 17 vocational schools out of 21 vocational schools that have transportation across the room, and only 11 schools that have adequate lightning rod.

From 24 vocational schools in Malang 20 schools have rain water channels, there are 20 schools that have sewerage facilities, 17 schools that have waste disposal facilities Judging from the availability of fire prevention, there are 6 vocational schools out of 24 schools providing fire prevention facilities , 11 schools provide space transportation, and only 11 vocational schools that conduct the lightning rod on his school buildings. When observations focusing on channel rainwater and sewage disposal facilities , all vocational schools in Batu city ( six schools ) already have this facility . There are four schools that have waste disposal having the means of fire prevention, as well as having space transportation. And there are five of the six schools that have and provide the means lightning rod.

In general, secondary vocational schools in Batu city has utility facilities are better than the schools n Malang city and schools in the district of Malang . There are approximately 70-90 % of the schools are in Batu equipped rain water disposal facilities, sewerage, waste disposal, fire prevention facilities, transportation, space and means lightning rod. Condition and completeness of facilities in Batu city was good infrastructures, because the facilities and utilities is in good condition and function.

This utility facilities ensure the implementation of preventive maintenance, the aquaduct and sewerage avoid class and existing buildings in the school of wet, muddy and damp, keep building walls stay dry and keep it from moss . The existence of channels for rainwater and sewage treatment assure the walls and paint the walls becomes easy, thus keeping the lifetime of the walls in the vocational school. By any means waste disposal, school grounds, library space, workshops and laboratories and sports facilities will be free of domestic waste by implementing schooling activities Waste treatment ensures all school infrastructure remain higenes and protect all citizens of the school in order to remain healthy and able to move up. With the availability of a fire prevention measure is

one means of preventive maintenance that ensures all buildings and rooms in school supporters awake damage and malfunctioning as a result of the fire, as well as the lightning rod. By the presence of lightning rod, all school buildings are protected from possible lightning strikes, so as to minimize the possibility of catastrophic damage caused by lightning, guarantee and safeguard the life of the school building became longer

## **V. CONCLUSION**

- 1) Overall all schools observed undocumented preventive maintenance, so that the rate of damage and data repair damaged parts of the school buildings are not recorded . The volume and frequency of damage to all schools in the observation not recorded, while the preventive maintenance plan in all schools that were observed are not scheduled .
- 2) In Malang city has a public and private vocational schools damaged highest severity There are 604 lightly damaged buildings spread over 21 schools in Malang . From interviews indepth schools generally do not have a schedule of improvements to the living room space slightly damaged, although the damage not too annoying little damage it will develop into moderate and severe damage
- 3) Vocational school swere located in Malang district has a broken building and the most numerous of the three regions studied two levels . As many as 23 buildings were damaged in a state of being. Records of the data indepth this school are generally already know the condition infrastructure with moderate damage . As the floor popping and almost all chipped floor tiles, wall plastering not intact, the ceiling fell and the ceiling hanger propped here and there. There are no plans for a fixing to alleviate the problems that exist in schools in the district of Malang . This condition has begun to interfere with the use of space and has begun to harm the students , because the floor is peeling prone on the legs, causing injuries and accidents when the student play activ movement.
- 4) There are eight buildings in severely damaged condition in Malang, three buildings were severely damaged in Batu city and one heavily damaged building in the city of Malang. Damage form as roof had started uneven. The composition of precarious when viewed from a distance curved downward, indicating a critical supporting structure already fragile, and will soon collapse . These events generally caused by construction of roof rafters started fragile. Plafond hanger in class already started propped up in various places. Severely damaged condition is very harmful to students and teachers in the classroom or other buildings such as workshops, labs or libraries . The room should be abandoned , by reason of any building should no longer be used .
- 5) From a number of 51 schools in Malang, Batu and Malang district have largely has utility facilities (channel rain water, sewer, waste disposal, a fire prevention measure, means of transportation space and a lightning rod), Some schools are not equipped with utility facilities.



There were less sewer, have no means of fire prevention, and lightning arrestors. This utility ensure ability implementation of preventive maintenance, the aqueduct and sewerage avoid class and the building of the wet, muddy and damp, keep building walls stay dry and keep it from moss. The existence of channels for rainwater and sewage treatment assure the walls and paint the walls becomes easy, thus maintaining the life of the school walls. By means of waste disposal, then page class, library, workshops and laboratories and sports facilities will be free from domestic waste. With the availability of a fire prevention measure ensures all buildings and rooms in school supporters awake damage and malfunctioning as a result of the fire. By the presence of lightning rod, all school buildings are protected from the possibility of a lightning strike, which minimize the possibility of catastrophic damage due to lightning, guarantee and safeguard the life of the school building became longer.

## **VI. SUGGESTION**

- 1) Preventive maintenance of school buildings is one of the important problems in the success of teaching learning process. Preventive maintenance is an important factor for the survival of a school system . If schools were not cared for, it will be broken , minor damaged will trigger further damage, so that the school will spend cost to restore the function of damaged buildings . Schools required to do and create a system of preventive maintenance on buildings at the school, scheduled, planned, complete documented treatments, shapes maintenance activities, budget. Schools should have a plan of care , and provide inventory buffer .
- 2) In Malang has a public and private vocational schools of the city were minor damaged 604 buildings, minor damaged buildings are spread across 21 schools . The damage as lisplank began to collapse, window glasses, broken doors, or hinges jammed, gutter damaged, or floor tipping. This damage must be repaired in order not to spread. By performing preventive maintenance when the damage still small, the cost of repairment (wages, materail building and repair time) light and not to burden the finances of the school .
- 3) Vocational schools that are located in Malang district has the most broken building. As many as 23 rooms from 24 schools in the state damaged . Records from the data indepth all schools representatives generally already know the condition of the building . Moderate damage as floor popping, chipped floor tiles, wall plaster cracked and intact, ceiling fell and the ceiling hanger propped here and there , already endanger students studying in the room were damaged . At this stage of this damage , repairs can no longer be delayed, may not use the word later, must now, as a delay would cost the students and teachers who are using the room.
- 4) In the secondary vocational schools that have building conditions severely damaged as construction of a broken order horse, purlins crumbly powder and moth eaten , ridge bent and sagged, should not be used. Building collapse in heavily damaged condition is only a matter of



time, maybe the day after tomorrow or next month . on the building condition was heavily damaged should to be fenced off so no one could enter into it .

- 5) A time for schools to have and save documents building drawing, as build drawings, so if there was damage on installations or utility building will be easily found and easily anticipated how to improve. Planning is necessary to provide preventive maintenance earnest efforts in order to anticipated damage the school building components. The effort is to make the building drawing and availability maintenance plan and minor improvements to the school buildings and incorporate the component of these treatments in the document school funding document plan (RAKS), so the school's physical building can be maximized its use.

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EI-02-046

## DEVELOPMENT OF LEARNING MEDIA USING INTERACTIVE MULTIMEDIA SUBJECT ASSEMBLY ON COMPUTER IN SMKN-8 PADANG

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**ABSTRACT** :The aim of research to develop an Interactive Multimedia good for the subjects of computer assembly and Networking Computer Engineering Department at SMK N 8 Padang. This study research and development by the method of Instructional Development Institute (IDI). This study begins by defining the problems that occur in the learning process, and continued to develop a multi-media interactive learning is able to overcome the problems. Furthermore, the resulting media testing the validity, practicalities, and effectiveness. Research result ; (1) Providing an Interactive Multimedia on the subjects of computer assembly majoring in computer engineering and networks, (2) Multimedia Interactive declared invalid on the content aspect with good criteria (72.8%), and the aspect of the design is very good (74.9%), (3) Test practicalities of interactive Multimedia based on the response of Master stated practical with a value of 89.38%, while on the practicalities of interactive Multimedia based student response is otherwise very practical with a value of 90.28%, and (4) Effectiveness of instructional media interactive multimedia in terms of the percentage complete learn student of 32 students, there are 28 students with grades above KKM and 4 students with grades below KKM with a percentage of 87.5%.

**Keywords:** Interactive Multimedia, Validity, practicalities, Effectiveness

### I. INTRODUCTION

Sekolah Menengah Kejuruan (SMK) or Vocational High School is a technology and vocational education at the level of upper secondary education (SLTA), with the aim of producing graduates who are skilled and competent in the field of technology and vocational skills in accordance with the chosen spectrum. Vocational graduates are expected to become the supplier of labor-power professionals that are needed in support of national development, and able to compete professionally in the era of the Asean Economic Community (AEC), which has been in effect since the early 2016's.

One characteristic of vocational education, students are not only provided the science and knowledge is sufficient, but must be equipped with the skills to apply that knowledge in human life. Therefore science and the ability to implement equal importance in vocational education. That requires a variety of techniques and methods of effective learning in every learning process. Each method of learning requires a good learning media and effective for the learning process can run smoothly and effectively in achieving the learning objectives.

One of the subjects taught in vocational especially in the department of Computer Engineering Network (TKJ) is the assembly of the computer. Computer assembly is one of the subjects of the group C2 (Productive). Based on observations made on the subjects of computer assembly TKJ Department at SMK Negeri 8 Padang, there are still many learning outcomes of students who are under the minimum completeness criteria (KKM). The percentage of student learning outcomes in subjects Computer Assembling class X TKJ-1 only 44.8% of the 29 students who passed the boundary

KKM, while in class X TKJ 2 only 37% of the 27 students who passed the boundary KKM. This shows that student learning outcomes are low because there are many students who do not reach the limit KKM.

In addition, interviews were conducted on students and teachers in mind there are a number of factors that make the learning outcomes of students does not meet the standards KKM, including: (a) Less interactive learning media exist, (b) the difficulty of explaining material particular subject in the abstract without support effective media, and (c) the relatively low motivation of students to learn. Because the learning process requires knowledge of computer assembly supporting the much more abstract in its mechanisms and procedures, so it is often ditemui difficulty in explaining to the students effectively, so it would need to develop a medium that can help students better understand existing learning materials. Actually, there are a number of media slide show has been used by teachers in the learning process, but the media used it still has the disadvantage that only contains learning materials without any video / audio support and training / quiz therein so that the lack of interaction of students in learning. While learning media is one tool to facilitate the process of transfer of knowledge from the teacher to the student, in the learning process there are some important things that should always be considered by the teacher that is, teachers should not be focused on the media and teachers should develop instructional media that make students feel interested and motivated to learn

Based on the background of the problem, the problem is formulated as follows:

- a. What kind of interactive multimedia line with the subject computer assembly?
- b. How is testing the validity, practicalities, and the effectiveness of interactive multimedia that has produced them?

The purpose of this study are:

- a. Developing interactive multimedia on the subjects of computer assembly.
- b. Measure the validity, practicalities, and the effectiveness of interactive multimedia that has developed it.

## **II. LITERATURE STUDY**

Media is anything that can be used to deliver a message from the sender to the receiver so that it can stimulate the mind, feelings, concerns, and interests as well as the student's attention such that the learning process occurs (Sadiman, 2012:7)<sup>8)</sup>. Fleming (1987: 234)<sup>2)</sup> states the media serves to set an effective relationship between the two parties, namely students and content. Furthermore Latuheru (1988:14)<sup>5)</sup> states that the media is learning materials, tools, or techniques used in teaching and learning activities with the intent to educate the communication process of interaction between teachers and students can take place in appropriate and useful. Based on those opinions, it can be the sense that the learning media is all materials, tools, methods or techniques used to convey information



from the source (the teacher) to recipients of information (students) during the learning process so as to achieve the learning process better and effective.

While multimedia is taken from the word multi and media. Multi means many and media means media or intermediary. Multimedia is a combination of several elements of text, graphics, sound, video and animation that produces an interesting presentation. Vaughan (2006:2)<sup>12)</sup> states that "Multimedia is a combination of text, art, sound, animation and video delivered to users with computers or electronic equipment and other digital manipulation". This is in line with the opinion of Hofstetter (2001:2)<sup>4)</sup> which states that "Multimedia is the use of computers to display the information they combine text, graphics, audio and video so that users can navigate, interact, create, and communicate with the computer".

From the opinion of some experts can be concluded multimedia is the use of computers to create and combine text, graphics, audio, video and animation, where the result of the merger of these elements will display information that is more interactive.

The development of learning tools is a set of processes or activities undertaken to produce a learning device based on the theory of development that has been there. There are several models of development that are often used, among other things: (a) model of software development according to Kemp, (b) development model of learning by Dick & Carey, (c) Development Model 4-D, and (d) Model IDI.

IDI Model (Instructional Development Institute) developed by the University Consortium for Instructional Development and Technology (UCIDT). IDI Model has been validated by a consortium of four universities: Michigan State University, Syracuse University, the United States International University, and the University of Southern California. At IDI models prinsi principles apply a systems approach that involves three stages, namely invention (define), development (develop), and evaluation (Evaluate).

Of the four models of the development of learning tools described above, each of which has advantages and disadvantages, researchers are using IDI development model because this model according to the problem of the background for this study. Model IDI has steps are clear, simple and sequentially in conducting a research and development has been validated by a consortium of four universities.

### **III. DEVELOPMENT METHOD**

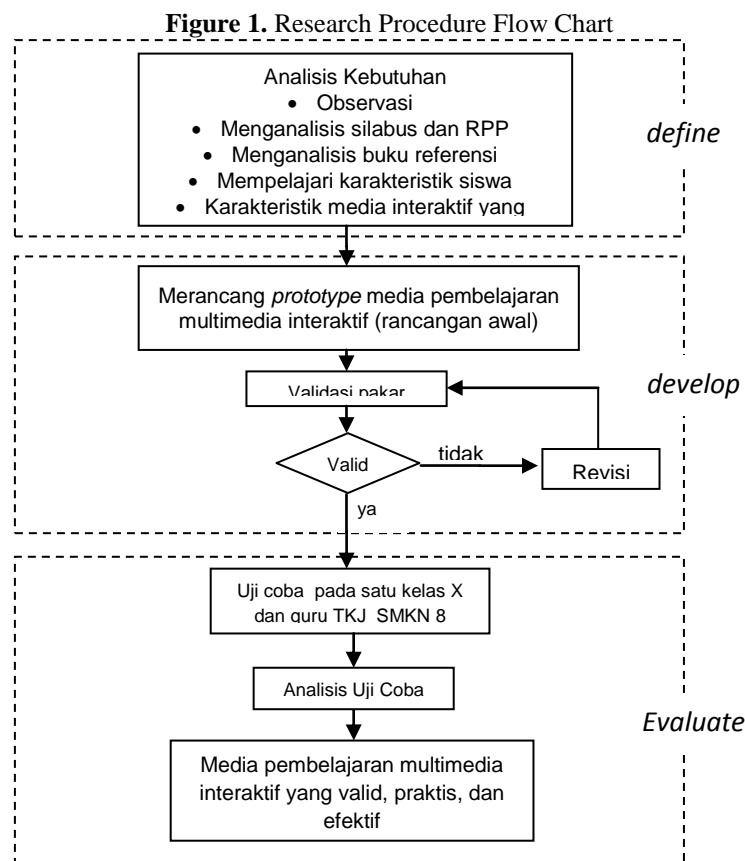
This research included in research and development (research and development). According Sukmadinata (2005: 164)<sup>10)</sup>, and Sugiyono (2012)<sup>9)</sup> research and development is a process or steps to develop a new product or improve existing products, which can be accounted for. The development model used is a model of Instructional Development Institute (IDI). According to Gustafson and Branch (1997: 58)<sup>3)</sup>, IDI apply prinsi guiding systems approach that involves three



stages, namely invention (define), which contains step-by-step analysis of the background and problem identification, development (develop) which contains the preparation of the initial form (prototype ) products and validation of the product, while the step third stage is the stage of evaluation / assessment (evaluate) which contains the steps of testing and analysis of test results coba.dengan research procedures as described in the chart below (Figure-1).

The data used in the development of this media is the primary data, meaning that the data obtained directly from the research subjects from experts / media experts, expert learning content, from students and teachers who are implementing learning with interactive multimedia. Data retrieved through the deployment of instrument and through statistical formulas. The instruments developed in this study through a validation process instrument and practicality test process through a team of experts.

Data analysis techniques used in this research is descriptive data analysis technique by describing the validity, practicality and effectiveness of using interactive multimedia. Data obtained from the questionnaire validity test material validation and media obtained from the experts / specialists.



**Figure 3.1. Research Procedure Flow Chart**

The data is then analyzed using Cohen's kappa coefficient with SPSS to determine the level of agreement of the experts / specialists in assessing the validity of. The test data obtained from the

practicalities of teachers, while the media keterpakaian level of students. Analysis by the practicalities of teachers and students using the following formula:

$$\text{Nilai Praktikalitas} = \frac{\sum \text{Skor masing - masing item}}{\sum \text{Skor maksimum item}} \times 100\%$$

As for determining the level of practicality guided by the following table (Table-1).

**Table 1.** Category practicalities of Interactive Multimedia

No	Tingkat Kepraktisan (%)	Kategori
1	$\geq 80$	Praktis
2	$\leq 79$	Tidak Praktis

*Sumber : Modifikasi dari Purwanto (2009: 82)<sup>7)</sup>*

Analysis of efficacy seen from the results of learning by measuring the level of mastery learning students obtained from the multiple-choice test. If the individual student learning outcomes is greater than or equal to the minimum completeness criteria (KKM), the students declared complete. Learning is said to be effective when the number of students who achieve mastery greater than or equal to 85% in the classical style.

#### **IV. RESULTS AND DISCUSSION**

Steps being taken in the development of interactive multimedia learning media, according to the model used IDI.

##### **A. Development Results**

###### **a. The discovery phase**

The discovery phase (define) is performed to get a picture of the conditions in the field. This stage is to analyze the needs (needs analysis) required for the process of making media interactive multimedia learning.

###### **b. Stage of Development**

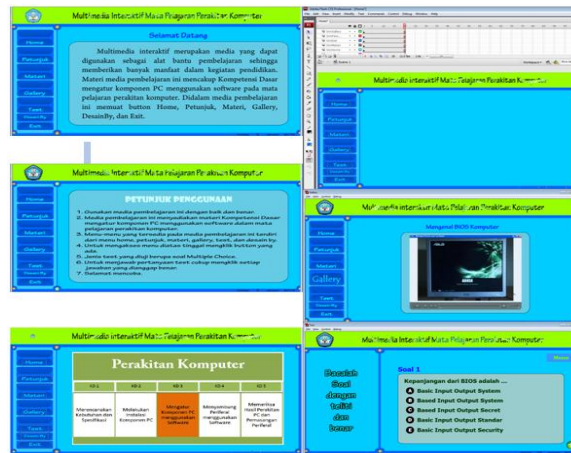
The results of the discovery phase (define) is used for the next stage of the development stage (develop). At this stage the following steps:

- 1) Designing a prototype (preliminary draft)
- 2) The design of the display

After the process of making media interactive multimedia learning is completed, the next media interactive multimedia learning is validated by experts who will assess the validity of instructional media are subject matter experts and media experts. Each expert validation completed questionnaires that had been developed based on the aspects that have been determined. In the questionnaire provided the stuffing part to give suggestions for improvement of this interactive multimedia learning media. Therefore, from the questionnaire will be obtained by reference to the revision and improvement of



interactive multimedia learning media. Some of the visual results of the development are shown in the following (Figure 2).



**Figure 2 :** Several Main Display Design Interactive Multimedia

## 1. Evaluation Results

### a. Validity test

Results of the assessment of each aspect of the indicator is given validator summed and calculated according to the percentage of votes aspect that has been made. Results validari validator concluded that both agreed on 11 aspects of the indicators provided, eight aspects of interactive multimedia content validation indicator located on the criteria of good and very good with a percentage of 72.8%, so the validation of interactive multimedia contents can be declared invalid.

While the design validation validator concluded that both agreed on 12 aspects of the indicators provided, 9 aspects of interactive multimedia design validation indicator located on the criteria of good and very good with percentages of 74.9%, thus validating the design of interactive multimedia can be declared invalid.

### b. Test practicalities

Test practicalities of interactive multimedia on the subjects of computer assembly taken from a questionnaire had been distributed and the teachers and students.

#### 1) Test the practicalities based on the response the practitioner / teacher

Practicalities related to the ease of use of interactive multimedia developed. The practicalities of data obtained through questionnaires filled out by two teachers TKJ SMK Negeri 8 Padang, from stuffing the questionnaire can be viewed practicality media. The results of an assessment of the practicality of multimedia in the aspect Ease of use on average 90% (practical), a 77.5% effectiveness (not practical), and the interpretation of the media 95% (practical), with an average of 86.33 (Practical).

#### 2) Test the practicalities based on responses Students

Student test results obtained on the practicalities of the ease of use of the media 90.83% (practical), the look and appeal of the media 88.33% (practical), and the efficiency of 91.67% with a mean time-rata 90,28% (Practical).

c. Test Effectiveness

In this study, the effectiveness of the test is done by looking at the percentage of students in the classical learning completeness, value posttest followed by 32 students, there are 28 students with grades above KKM and 4 students with grades below the KKM. Thus the percentage of students who reached the KKM is 87.5%. According to the theory, "A class is said to be complete learning (classical completeness) if in the class are  $\geq 85\%$  of students who have completed their study" (Trianto, 2010). So it can be concluded that the use of interactive multimedia learning media on the subjects of effective computer assembly.

## **B. DISCUSSION**

The results of the research and development of multimedia interactive learning media use which do have in common the results of relevant research conducted by Delianti (2013)<sup>1)</sup> about the development of instructional media Interactive Multimedia CD on the subjects of the first semester of ICT class X SMAN 2 Bukittinggi. Validity test results, the practicalities and effectiveness of Interactive Multimedia CD was declared valid, practical, and effective to be used as a medium of ICT. Similarly Maulana (2015)<sup>6)</sup> conducted a study on the development of instructional media CD Interactive on training eye Basic Networking computer and network engineering. Results obtained from this research and development as follows: (a) The validity of Interactive CD expressed very valid on the content aspect, and interest, whereas the aspect of media and languages declared invalid (b) the practicalities of Interactive CD based on the response of teachers after going through the validation otherwise practical, while on the practicalities of Interactive CD based on the responses of students after going through the validation is otherwise very practical (c) Effectiveness of Interactive CD affective from their improving student learning outcomes characterized by an increasing number of students who passed the KKM as many as 28 students.

The results of this study and the results of relevant research states that the interactive multimedia learning media can be used in various fields of science, by adjusting the teaching materials that will be developed with interactive multimedia designed. So it can be concluded that the Interactive Multimedia is one of the media that a valid, practical, and effective for use in the process of studying the subject of computer assembly department of Computer and Network Engineering class X semester of I.





## V. CONCLUSION AND SUGGESTIONS

### A. Conclusions

Based on the results of research and discussion it can be concluded as follows


- a. Interactive multimedia instructional media for subjects Assembling Computer has is developed using a model of Instructional Development Institute (IDI).
- b. Interactive Multimedia has been developed to support the subjects Computer Assembling turned out to meet the requirements of test validity, practicalities and effectiveness that deserve to be a good medium of learning.

### B. Suggestion

Based on the development constraints obtained during field trials, can be suggested some of the following:

- a. Suggested the teachers who teach the assembly of the computer to use this interactive multimedia learning media, in order to help improve student learning outcomes and support from the school to facilitate the use of multimedia tools are required of teachers
- b. For students who use this interactive multimedia learning media in order to further explore the potential of self so as to develop the understanding, skills-expertise, and creativity

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## **THE NEED OF VOCATIONAL TEACHER STANDARD COMPETENCIES AND PROFESSIONALISM CONCEPT IN INDONESIAN VOCATIONAL EDUCATION SYSTEM**

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**ABSTRACT** : *The Indonesian government had ratified Law No. 14 2005 on Teachers and Lecturers and it become the first Indonesian government provision which acknowledges teacher as a profession and became the main regulation on how the teaching profession in Indonesia should be administered. The regulation of Indonesian Minister of National Education No. 16 2007 has define standar competence of any type of Indonesia teachers except vocational productive subject matter teachers. This article review any literatures relating with teacher professionalim and competency standard, linking to some steps in teacher professionalism development program, and showing how the competency and professionalisme concept are needed in each program. The five program meant here are: (1) bachelor in teacher education in universities; (2) teacher professional education (PPG); (3) teacher performance assessment (PKG); (4) annual teacher competency test (UKG); and (5) teacher continuing professional development (PKB). Each program need the conception of professionalism and competency standard as a referent in designing the program so that the absent of it's definition in the government policy is a missing link in the teacher professionalism development chain.*

**Keywords** : vocational teacher, teacher competency standard, teacher professionalism, vocational teacher ,  
**CPDINTRODUCTION**

While many experts still debating whether teacher are a profession or not (Leiter, 1978; David, 2000; Ornstein & Levine, 2008), the Indonesian government had ratified Law No. 14 2005 on Teachers and Lecturers. It's the first Indonesian government provision which acknowledges teacher as a profession and became the main regulation on how the teaching profession in Indonesia should be administered. It means that officially Indonesia had fully recognized teacher as a profession. The law explicitly says that teachers are professional educators whose tasks are to educate, to teach, to guide, to direct, to train, to assess, and to evaluate students in formal preschools, elementary schools, and secondary schools (article no 1). It also explained that professional means occupation or activities carried out by a person and become a source of income that requires skills, expertises, or competencies which meet certain standards or norms, and requiring a professional education (article no 2).

According to other regulation - Indonesian law No. 20 2003 on the National Education System, Law No. 14 2005 on Teachers and Lecturers, Indonesian Government Regulation No. 19 2005 on National Education Standards, and Government Regulation No. 74 2008 on Teachers - teachers are required to hold an academic qualification, mastering a set of standar competencies, and holding a teacher certificate. Article No 4 of Government Regulation No. 74 2008 states that the teaching certificate for teachers should be acquired through professional education programs (PPG) which held by universities that organize teaching oriented study programs, both held by government and society. PPG stands for 'Pendidikan Profesi Guru' (Teacher Professional Education), a one-year pre-service teacher certification based on the Indonesian Minister of Education and Culture Regulation No. 87 2013

(Yuyun, 2016). In its process, before the regulation of pre-service Teacher Professional Education being implemented, the Indonesian government should certify the existing teachers in advance. It conducted by portfolio assessment in the first step, and then by PLPG, stand for '*Pendidikan Dan Latihan Profesi Guru*', a teacher professional education and training, such several days short course consists of pedagogical, subject matter, teacher professionalism, and class action research refreshing (see Yuyun, 2016 for detail).

The Indonesian government had also ratified a regulation of teachers' standard competencies and academic qualification, which was the regulation of Indonesian Minister of National Education No. 16 2007. This regulation had clearly defined teachers' academic qualification and standard competencies for preschool teacher, elementary school teacher, and general secondary school teacher, but it has not regulated the standard competence and academic qualification of secondary vocational school teacher. In the case of vocational teacher, it just regulate the normative and adaptive subject matter teachers for vocational school, but not yet for the productive one. Even though, vocational teachers are referring to the ones who teach productive subject matter rather than normative and adaptive ones. Productive subject matters are those which build vocational students hands-on experience and skill. Productive subject matter teachers train, rather than teach, the students how to do, rather than what to do, something in the field of job. In other words, the core of secondary vocational education is in the productive subject matter rather than the normative and adaptive one. It means, the absence of its standard competence in the regulation is a serious problem due to the need of its field practice.

In this article, I will deeper review the absence of the standard competency definition in the Indonesian regulations and its urgency (means the following effects of its absence on the practice of the Indonesian vocational education system). But, before, I will also deeper review the meaning of teacher professionalism and competencies based on the existing literature, including handbooks, conferences, work books, and journals.

As the background described above, some existing problems can be identified: (1) there still a debat among education expert whether teacher is a profession or not; (2) the regulation of Indonesian Minister of National Education No. 16 2007 has define standar competence of any type of Indonesia teachers, but special case for voational teacher, it completely has not define it at all; (3) the absence of the definition of vocational teacher standard competence in the regulation effects a series of any program related to professional vocational teacher development.

This artical will briefly explain: (1) how Indonesian government positioning teacher profession in its national education system? (2) how (in what position) the vocational teacher professionalism concept and standard competence is needed?; And (3) how vocational teacher professionalism concept and standard competence should be developed?



This article focuses on any issues of vocational teacher in the Indonesian education policy, especially correlating to the definition of its competency and professionalism standard. Based on the literature study and design of teacher professionalism development masterplan, it will be shown how the vocational teacher competency standard formulation and professionalism concept are needed.

## **I. REGULATION AND LITERATURE REVIEW**

### **A. Vocational education in Indonesian education system**

In Bahasa Indonesia, there are two terms which have a same meaning as ‘vocational education’ in English, they are ‘*pendidikan kejuruan*’ and ‘*pendidikan vokasi*’. ‘*Pendidikan kejuruan*’ is a kind of expertise education in secondary education (Act No. 20 2003) whereas ‘*pendidikan vokasi*’ refers to expertise education in higher education (Act No. 12 2012). In this paper, the term ‘vocational teacher’ refers to teachers who are teaching in vocational school at the secondary education level. However, in general it can be concluded both ‘*pendidikan vokasional*’ and ‘*pendidikan kejuruan*’ is an education that prepares labor-skilled workforces who are ready to work in the work field.

Indonesian law No. 20 2003 on The National Education System states that vocational education and technology is a type of education that prepares students to work in a particular field. Government regulation No 29 1990 states that secondary vocational education is education programs in secondary level education that promotes the development of learners' ability to carry out certain types of work.

In the Article 15 Act. No 20 2003 on the National Education System states that the purpose of secondary vocational education is to prepare students especially to work in a particular field. Thus, it can be said that the output of secondary vocational education is graduates who have the capabilities to work as skilled technical workers in the appropriate field of work. Also, it can be concluded that the measure of its success is how much their graduates are absorbed in the world of work. Therefore, various factors that play a role in the learning process in vocational school should be oriented to the achievement of these objectives, such as: teachers, infrastructure, governance, funding, curriculum, technical support staff, etc.

### **B. Teaching as a profession**

Educational practitioner claims that teaching is a profession, just like a doctor, lawyer, accountant, and some other else. But there are many authors say that teacher could not be compared with such professions. Here I will explore the nature of the word ‘profession’ itself before we judge which one is true or false. I will begin with its epistemological meaning and then followed by some opinions from expert around global literature.

According to Business Dictionary ([businessdictionary.com](http://businessdictionary.com)), ‘*profession*’ means “Occupation, practice, or vocation requiring mastery of a complex set of knowledge and skills through formal education and/or practical experience. Every organized profession (accounting, law, medicine, etc.) is governed by its respective professional body. While ‘*professional*’ respectively means “Person

formally certified by a professional body of belonging to a specific profession by virtue of having completed a required course of studies and/or practice. And whose competence can usually be measured against an established set of standards". There might be some difference in any other dictionaries, but will not to far from above formulation.

In Indonesian education system, teacher acknowledged as a profession since 2005 when the government legislates Law No. 14 2005 on Teachers and Lecturers. Here, teachers are define as "*professional educators whose primary tasks are educating, teaching, guiding, directing, training, assessing, and evaluating students on early childhood formal education, primary education and secondary education*" (article no. 1), while professional defined as "*occupation or activities carried out by a person and become a source of income that requires skills, expertises, or competencies which meet certain standards or norms, and requiring a professional education*" (artichel no. 2).

So far, it seems to be true that teaching is a profession, at least in Indonesian national context. It has clear definition about its task. The Regulation of Indonesian Minister of National Education No. 16 2007 on Qualifications and Competency Standards for Teachers shows Indonesians government's seriousness to position teacher on an established status by giving clear standard of teachers' qualification (formal education requirement), tasks (a requirement of expertise and competency standard) as a profession should be. Indonesian teachers also have been having its professional organization far before Indonesian independence day, namely PGRI – stand for *Persatuan Guru Republik Indonesia* (Teacher Union of the Republic of Indonesia) – which have been operated since 1912. This organization also have established membership mechanism and professional ethics as we can see on [www.pgri.or.id](http://www.pgri.or.id).

Now, let's review some authors' opinions that do not completely agree regarding teacher as a profession. Leiter (1978) said that teacher is not completely a professional status because their individual autonomy is often under organizational control. He states "teachers are monitored by their administrators in terms of the consistency between their performance and the standards set before. As a result of this, they are directed and shaped by the administrators to achieve organizational goals so their autonomy is restricted."

Other experts prefer to propose some characteristics of a profession as a check list to judge whether teaching is a profession or not (David, 2000; Ornstein & Levine, 2008). According to Ornstein & Levine, who has resume from some author including Davids opinion, there are some caharacteristics of a profession: (1) A sense of public service; a lifetime commitment to career; (2) A defined body of knowledge and skills beyond that grasped by laypersons; (3) A lengthy period of specialized training; (4) Control over licensing standards and/or entry requirements; (5) Autonomy in making decisions about selected spheres of work; (6) An acceptance of responsibility for judgments made and acts performed related to services rendered; a set of performance standards; (7) A self-

governing organization composed of members of the profession; (8) Professional associations and/or elite groups to provide recognition for individual achievements; (9) A code of ethics to help clarify ambiguous matters or doubtful points related to services rendered; (10) High prestige and economic standing. Then, Ornstein identify there are 4 characteristics which teaching could not meet, they are: point no (2), (4), (5) and (10).

Those criterias comply with Barber's professional characteristics which had proposed before (Barber, 1965), which are: (a) a high degree of generalized and systematic knowledge; (b) orientation primarily to community interest rather than to individual selfinterest; (c) a high degree of self-control of behavior through codes of ethics in the process of work socialization; (d) a system of rewards seen primarily as symbols of work achievement.

If we look further, some teacher aspects which Ornstein identified as not meeting professional criteria are not completely true. Aspect number (2) for instance. What had regulated under the Indonesian Minister of National Education No. 16 2007 on Qualifications and Competency Standards for Teachers shows that Ornstein is not true in this case. Next, aspect number (4). What has been done by Indonesian government by certifying existing teachers and requiring pre-service teacher certification shows that Ornstein view is wrong. Then, aspect number (10), an extra one basic salary allowance monthly for certified teacher shows that the government is serious to support teacher increasing their prestige and economic standing gradually. Specially aspect number (5), it's still debatable to say. Teachers work under govermen standard set. They are monitored by their administrators in terms of the consistency between their performance and the standards set before. But, in reality, there are many things that they have to make decisions out of the standard. Almost every day they meet conditions, which are out of the scenarios or standard set: they have to give special treatment for students who could not follow the learning process for example.

Until this point, we can conclude that teaching profession meets mostly characteristics of a profession, at least in the Indonesian context. But, it could be understood if there still many author who are not agree with this conclusion because they have their own practical background which could be different to one another. Demirkasimoğlu, (2010) state the meaning of the term and status of teaching profession is considered to be highly problematic and polarized in various spheres. Willems (2016) says "The recent development of a professional knowledge base for educators and the origin of a professional standard in several countries illustrates the emergence of this professional group. As a result, it is argued that educators' profession is still under-research and that educators are a poorly understood occupational group".

### **C. Teacher professionalism**

If teaching is a profession, then how could someone be judged as a professional teacher? There are many perspectives regarding this topic. Demirkasimoglu (2010) prefer to interpret it operationally



that teacher professionalism means meeting certain standards in education and it is related to proficiency. Another author prefers to approach teacher professionalism as a reflection of positive attitudes and identifies some terms as the best and higher standards for teachers (Phelp, 2006). While there also another author who believe that it's more useful to approach professionalism as an ideological construct that is used on teachers (Stevenson, 2007).

Phelp (2006): "Teachers must recognize that professionalism is determined by the beliefs and values that they have internalized." And then, he proposes *The Three Rs of Professionalism* which consist of: *responsibility*, *respect* and, *risk taking*. '*Responsibilities*' include duties beyond the classroom, such as keeping accurate records, communicating with families, and participating in school activities—all basic requirements of fulfilling the teaching role. He also states that teachers who assume responsibility for student learning have a sense of efficacy, a critical component of professionalism. '*Respect*' is the second attitude which teacher should demonstrate. Teachers who use respect as a behavioral norm desire to serve students actively, such as being available to meet with students and their families, seeking additional resources to help students, and challenging obstacles that students confront in schools. Characteristics which reflect respect attitude are '*caring*' and '*altruism*'. As an important emotional dimension in teaching, caring reflects respect and influences teachers' professionalism. Caring teachers are able to empathize with students and colleagues. The third is '*risk taking*'. Teachers who are committed to risk taking are not afraid to pose difficult questions or take unpopular stands, which invite administrators and other teachers to examine the causes of challenges faced by their schools. Rising difficult question also should be demonstrated on grappling, or struggling with intellectually challenging situations and content. Another manifestation of professionalism through risk taking is a commitment to continuous learning.

Agree with Phelp, O'Connor also state that teachers' work is emotionally engaging and personally demanding, but the caring nature of the teaching role is largely neglected in educational policy and teacher standards (O'Connor, 2008).

#### **D. Teachers competency standard and professionalism**

In the case of VET teacher, Education and Training Foundation - a non-business foundation funded by the Department of Business, Innovation and Skills, UK Minister for Skills and Equalities, Department of Education - state that teachers and trainers are 'dual professionals'; they are both subject and/or vocational specialists and experts in teaching and learning. They are committed to maintaining and developing their expertise in both aspects of their role to ensure the best outcomes for their learners. It formulate a professionalism standard for teachers and trainers which consist of: (1) Professional values and attributes which mostly related to personal ability to judge what works and does not work in his/her teaching and training; (2) Professional knowledge and understanding, which related to personal deep of knowledge and understanding in theory and practice; and (3) Professional

skills, which related to personal ability to develop expertise and skills to ensure the best outcomes for learners.

Spencer & Spencer (1993) define competency as ‘underlying characteristic of an individual that is causally related to criterion referenced effective and/or superior performance in a job or situation’. Page and Wilson in Vazirani (2010), after reviewing 337 citation on a manager competency study define competency as “the skills, abilities, and personal characteristics required by an “effective” or “good” manager’. Vazirani also quote Boyatzis definition of competency as ‘an underlying characteristic of a person which results in effective and/or superior performance in a job’. Then, Vazirani (2010) emphasize the point to note about the definition is the inclusion of directly observable and testable competencies, such as knowledge and skills, and the less assessable competencies related to personal characteristics or personal competencies.

Indonesian Law No. 14 2005 define ‘competency’ as “set of knowledge, skills, and behaviors that must be possessed, internalized, mastered, and actualized by teachers or lecturers in performing their professional tasks”. While standard competency, as stated in the article no 1 of Indonesian Minister of National Education Regulation No. 16 2007 on Qualifications and Competency Standards for Teachers, developed entirely from the four core of competency, namely: pedagogical, personality, social, and professional. The fourth competency aspects are integrated into teacher performance. The teacher competency standard, then differed based on their responsibility related to the level of education they teach, including: preschool teacher, elementary school teacher, and subject specific school teacher. Specially the standard for vocational teacher, it has not regulated it due to – I guess – lack of government task force understanding of the characteristic of vocational education, or the lack of national vocational references.

#### **E. Masterplan of Indonesian teacher professional development**

The most comprehensive reference talking about Indonesian policy on teacher professionalism development could be a teaching material of PLPG (Pendidikan dan Latihan Profesi Guru) – a 10 days training for in service teacher – which titled ‘*Kebijakan Pengembangan Profesi Guru (Teacher Professional Development Policy)*’, issued by the minister of education and culture, 2012. The content of the module covering: (1) general policy on the national teacher profession; (2) teacher competency development; (3) teacher performance assessment; (4) career development; (5) teacher protection and appreciation; and (6) professional ethics.

In short, there are two scenarios in certifying Indonesian teachers: (1) in-service certification, just like already explained in the background on this article; and (2) pre-service certification. Here, the 2<sup>nd</sup> scenario is more relevant to discuss, because it will be the only mechanism to enter this profession. It comes from the fresh bachelor degree, followed by one year of teacher professional education (PPG or ‘*Pendidikan Profesi Guru*’), and resulting certified teacher. Both concurrent and consecutive





models are allowed here, and consecutive model needs to undergo a matriculation before entering the PPG. Please refer to Yuyun (2016) for details.

After entering the world of work, all teachers – including certified teacher – will be monitored their current professionalism by: (1) teacher performance assessment (PKG, or ‘*Penilaian Kinerja Guru*’); (2) teacher competency test (UKG, or ‘*Uji Kompetensi Guru*’); and (3) continuous professionalism development (PKB, or ‘*Pengembangan Keprofesian Berkelanjutan*’). The three activities are interrelated one another. Teacher performance assessment is used as a mechanism in career development assessment, while teacher competency test is used for teacher development need mapping. If the weak competency aspects of each teacher are known, then the government can develop a coaching/training program to improve their weak aspects. For example: a group of teachers who are lacking in doing class action research will be given a training of class action research, ect.

## **II. METHODOLOGY**

This study is an in-depth analysis of a limited topic of a contemporary issue and policy in education. Methods of data collection using: documentation of laws and government regulations, web surveys and observations. Laws and government regulations, especially related to teacher standard competence and professionalism, are used as data sources

Laws and regulations document used are: (1) Act Number 20 2003 on the National Education System; (2) Act No. 14 2005 on Teachers and Lecturers; (3) Regulation of Indonesian Minister of National Education No. 16 2007 on Qualifications and Competency Standards for Teachers; (4) Government Regulation No. 74 2008 on Teachers.

## **III. RESULT AND DISCUSSION**

### **A. Urgently Need of Vocational Teacher Standard Competency Definition on Vocational Education Practice**

There are many steps could be identified from government policies in the teacher preparation and professional development: (1) bachelor in teacher education in universities; (2) teacher professional education (PPG); (3) teacher performance assessment (PKG); (4) annual teacher competency test (UKG); and (5) teacher professional development (PKB). The two first steps are education programs before they enter teaching world of work. While the three next steps are a set of monitoring, maintaining, and developing teachers competency and professionalism while they are doing their daily tasks.

In step-1, bachelor degree in teacher education, they will get at least 144 credits (KemRistekDikti, 2015) which consist of (DitjenDikti, 2012): (a) nationality, personality, sociality characters; (b) subject specific basic knowledges and sciences; (c) pedagogic skills and knowledges; (d) subject specific skills; and (e) ICT for educational used. Based on the same curriculum



development guidance, the starting point of the curriculum development is the graduate profile and learning outcome definitions which is a consensus of similar study programs.

In step-2, pre-service teacher professional education program, they will be fully trained to develop teaching materials and use it in a micro or peer teaching for one semester. In the second semester, they will be fully emerged in practical training program in the school partner. They fully emerged in the real school world of work under senior teacher supervision. Completing the two semesters, they will get a final competency test which consists of both practical teaching experiences in the school partner and their subject specific knowledge and/or practical skill.

Step-3, teacher performance assessment (PKG), is a mechanism by which performance of teachers who has already working as regular teacher are assessed. The assessment result used as their basis for their career development (career level increasement). The assesment focus on all professionalism aspect, consist of: pedagogical, personality, social, and professional aspects. Each aspects will be measured based on several relating indicators. Senior teachers and/or school principle are the one who act as assessor. This process should be reported to government local educational representation office.

Step-4, teacher competency test (UKG), is a mechanism to measure teachers professionalism indicators. The goal of the mechanism is for mapping which indicator are a teacher is great and which indicators are he/she needs more development. In another word, teacher competency test means an identification of teacher development need so that the government can design required program in the continuing professionalism development program. For example: teachers who lack of capabilities in conducting a class action research will be given class action research training, vocational teachers who lack in teaching CNC machining will be trained with CNC machining, etc.

Step-5, teacher continuing professional development, is a sustainable program to always prevent and increase teacher competency during playing their role in the education system. There are many activities which are developed by local educational government representatif in collaboration with school networks. By design, information collected in the teacher competency test (UKG) is a very important data in order to develop what program should be held, where the program will be held, and who are the participants of the program. Basically, each teacher will get the appropriate development program in accordance with his/her development need as mapped in the UKG process.

Here I identify each step's characteristic and how the program should be designed:

<b>Steps</b>	<b>Program</b>	<b>Program Design Reference</b>
1	Bachelor degree in teacher education	The program curriculum should refer to its learning outcome and graduate profiles.
2	Pre-service Teacher professional education	The program design has to refer its learning outcome and/or graduate profile definition. Ideally, both



	(PPG)	learning outcome and program graduate profile should refer to its standard competency and professionalism.
3	Teacher performance assessment (PKG)	Teacher performance criteria are derived from its standard competency and professionalism.
4	Teacher competency test (UKG)	The competency test development refers to the standard competency and professionalism.
5	Teacher continuing professional development (PKB)	The need of development activities identified from the UKG, and might also PKG.

From the table above, we can see that each steps in developing teacher professionalism, both pre-service and in-service teachers, teacher competency standar is needed as a referency in developing the program. This process began while they still in undergraduate teacher education study program. It means that the curriculum of undergraduate teacher education study program should be developed refer to the teacher competency standard. Likewise, the pre-service teacher professional education. Of course each steps will resulting a certain level of competency, means each steps are designed to increase teacher professionalism gradually, and this process is a never ending process until each individual teacher enter his/her retirement.

Relating to the missing definition of vocational teacher competency standard in the Regulation of Indonesian Minister of National Education, it could be concluded that the professionalism building of vocational teacher is going without well planning. I don't say that every thing, means every activity in the field of Indonesian vocational education system, is bad, even every thing goes well. But, without a well defined concept we deserve worried that it can lost its orientation due to any circumstance regarding social conditions, politics, national economy.

### **B. How Vocational Teacher Professionalism Concept Relate to Teacher Standard Competency**

While some expert define 'professional' as meeting certain standards in education and it is related to proficiency (Demirkasimoglu, 2010), but in fact there are many other aspects which show that those aspects are very important but could not (very difficult to) be formally defined in government standard. For example, we can say '*caring*' for example (O'Connor, 2008). Caring is defined as those emotions, actions and reflections that result from a teacher's desire to motivate, help or inspire their students. Can we, or ur government, measure how a teacher care with his/her student at school? Nope!

Or we can recall Phelp's statement: "*respect*". No doubt that we will answer that '*respect*' is very important teacher characteristic needed in teaching, learning, and educating process. But, can any



one, or our government standard, measure how respect teachers to their students? If a student looks slow in learning some competency, then his teacher give a special treatment and attention for him in order to help him so that he can perform like other students, does this 'respectful' teacher will be recorded and rewarded with something special? Nope!


In short, defining 'professional' as meeting existed standard is not enough for teachers. That's why teachers, even they have hold a professional educators certificate, still need continuous professionalism development. Not only in the aspects what have stated in government standard, but to build their personally as a professional teacher. Education is not merely about to deliver teaching materials which related with only student cognitive and skill need, but also a full responsibility of how effective the result does. Further, education is not merely about teaching but also educating. We can teach our students to care without caring them, we can teach them respect without respecting them. Teaching is a must, but educating is not less important even though it does not recorded by our government.

#### **IV. CONCLUSIONS**

- a. Teacher competency standard is the most important aspects of teacher professionalism so that it should be maintain and developed continuously. Its should be developed since they still in undergraduate program and should be gradually increase during they are doing their routine task.
- b. Teacher professionalism is not merely about meeting government standard set, but it also about building their professional identity as an educator. It should be build gradually even they have working for years. That's why, teacher performance assessment (PKG), annual teacher competency test (UKG), and teacher continuing professional development (PKB) are a very important step in developing teacher professionalism as mentioned earlier.
- c. Teacher professionalism concept and competency standard are very important in the teacher professionalism development because each program need it as a referent in designing the program.



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**EI-02-008**

## **IMPROVEMENT STUDENTS LEARNING ACTIVENESS AND ACHIEVEMENT THROUGH THE APPLICATION OF THE JIGSAW TYPE COOPERATIVE LEARNING MODEL**

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**ABSTRACT :** *The objectives of this research are to get successfulness in the improvement of: (1) the students learning activeness, and (2) the studens learning achievement through the application of the Jigsaw type Cooperative Learning model. This research used the Classroom Action Research method with two cycles. Each cycle consisted of four phases, namely: planning, implementation, observation, and reflection. The subjects of research were the students in Grade X class Machinery 2 of Surakarta PGRI 1 Vocational High School, the object of learning is Basic Welding Theory. The data of students learning activeness collected by observation sheet and the data of studens learning achievement collected by written test. The instrumens of research data collection validated by construct validity and content validity. The result of research shows that the application of the Jigsaw type Cooperative Learning Model can improve the students' learning activeness and students' learning achievement. Prior to the treatment, only one indicator of learning activeness fulfill the target. Following the treatment, 3 indicators fulfill the target in Cycle I, and all of the indicators fulfill the target in Cycle 2. In the pre-cycle which uses the lecturing method, the completeness of the learning achievement is 41%. Following the treatment, it becomes 68% in Cycle I and 82% in Cycle II respectively.*

**Keywords:** Jigsaw, learning activeness, learning achievement.

### **I. INTRODUCTION**

Nowadays put in place an ASEAN Free Trade Zone since the beginning of the year 2015. These conditions demand the preparation of human resources at different level are able to compete in regional and international scope. Preparation of human resources intermediate level various areas of expertise conducted by Vocational high school (SMK), as provided for in the legislation of the system of national education no. 20 in 2003. To achieve these conditions, study at SMK must be conditioned so that based on the activity of students. By means of active student learning, it makes possibility that students become active in learning, thinking more logically and insight more widespread so that mastery of subject matter knowledge, attitudes or skills get better.

SMK PGRI 1 Surakarta is one of vocational high schools technology and industry who are committed to build human resources that are competent in their jobs. Efforts are being made to meet that commitment is to do a repair of the quality of learning. Based on the initial observation in school improvement efforts, apparently learning that do not yet optimal. The teacher is teaching well, but the learning model used less precisely. Teachers tend to use the lecture method in the process of learning, so that students are less active, they tend to be quiet and passive.

Already underway good learning but less attractive and less meaningful so that the student's memory to the materials given by the teacher are easily forgotten. This is evident when the next

meeting of the teacher asking the material taught weeks ago majority students forget or can't answer. This means that the material provided by teachers are not stored for long periods of time on the students mind. This condition causes the student learning achievement is less satisfactory. Their test results are less satisfactory, the students score who finished just under 50% of the total students. The condition is the basis of the need for learning improvement done by applying Cooperative learning, Jigsaw-type Model within the framework of the Class Action Research (PTK). This model was chosen because it is expected to spur student achievement and increase the liveliness of student learning.

The learning achievements is the ability of a student after he accepts their learning experience. Howard Kingsley in Nana Sudjana (2006) split the three kinds of learning achievements, namely: (1) skills and habits, (2) knowledge and understanding, and (3) attitudes and idealls. Each types of learning can be filled with material that has been defined in the curriculum. Gagne in Nana Sudjana (2006) split the five categories of learning achievements, namely (1) verbal information, (2) intellectual skills, (3) cognitive strategies, (4) attitude, and (5) motoris skills. According to Daryanto and Rahardjo (2012), factors affecting learning achievement was divided into two, namely, internal and external factor.

About how to learn actively, Sagala (2006:201) perceive it as later learning that leads to optimize intellectual-emotional involvement of students in the learning process, with the physical involvement of the students if necessary. Thorndike (Riyanto, 2012) puts forward the liveliness of student learning in learning with the law "*law of exercise*" stated that learning requires the presence of the exercises. All knowledge must be gained by observation itself, his own experiences, his own investigation, with the self-employed with self-created, neither spiritually nor technique.

In their book, Hanafiah and Suhana (2009:24) Dierich cited Hamalik stated, learning activities are divided into eight groups, namely: (1) *visual activities*, (2) *Oral activities*, (3) *listening activities*, (4) *writing activities*, (5) *drawing activities*, (6) *motor activities*, (7) *mental activities*, and (8) *emotional activities*.

Active learning according to Kachie in Daryanto and Rahardjo (2012) mentioned the seven dimensions of learning in the learning way become active students as follows: (1) student participation in determining the purpose of teaching and learning activities, (2) an emphasis on the affective aspect in teaching, (3) students participation in carrying out activities of teaching and learning, (4) the acceptance of the teacher against deeds and contributions of students who are less relevant or wrong, (5) the close of class relationship as a group (6) an opportunity is given to the students to take important decisions in the classroom activity, and (7) the amount of time that is used to handle personal problems students, whether related or not related to the lesson. While Dave Meier (Rusman, 2012) argues that learning must be done with physical activity, i.e. moving when learning, and utilize



the senses the students as much as possible, and making the whole body/mind is involved in the learning process.

The word *Jigsaw* in the cooperative learning model type *Jigsaw* means the chainsaw. This cooperative learning Jigsaw type takes the workings of a chainsaw (zig-zag), that is doing an activity with learning how to cooperate with other students to achieve the goal. According to Rusman, (2012), cooperative learning, Jigsaw-type is a cooperative learning model that operates on group work students in the form of a small group.

According to Rachmadi (Daryanto and Rahardjo, 2012) Jigsaw learning model advanced by some experts, among others, Slavin, Lazarowitz or Sharan and developed by Aronson and team. The cooperative learning steps of Jigsaw types are as follows:

- a) The teacher divided the class into a few groups, with each group consisting of 4-6 students with different ability levels: high, medium, and low. This group is called the origin group.
- b) Then formed a group of experts based on the origin group. In this group of students was given the task of studying one of the learning materials that later such materials explained to friends in the origin group.
- c) Teachers facilitate good group discussion on the origin group or expert group.
- d) After the students discuss in the expert or origin group then carried out presentations of each group or do the draw for one of the groups to present the results of the group discussions.
- e) Teachers give to students individually quiz.

The model of this cooperative learning Jigsaw type has advantages as follows: (a) the higher of sense of self-worth of students, (b) improve attendance, (c) acceptance of individual differences is greater, (d) apathy is reduced, (e) understanding of the material better, (f) increasing the motivation to learn, (g) the teaching learning process students positive interdependence, (h) each student has the right to become experts in the group.

The model of this cooperative learning Jigsaw type also have drawbacks, namely: (a) if the number of members of the group are less likely to pose a problem, for example if there is a just rides along and shall complete the assignments and passive in the discussion, (b) requires a longer time when spaces have not been conditioned properly, so it needs time to change positions that can give rise to a cozy atmosphere.

Some relevant researchs can enhance either the liveliness of student learning or learning achievements of students conducted by the following:





- a) Candra Damayanti in 2009 about *“Implementasi Model Pembelajaran Kooperatif Tipe Jigsaw Dalam Rangka Meningkatkan Penguasaan Konsep Ekosistem Siswa Kelas X Di SMA Negeri 2 Karanganyar”*.
- b) Nur Azizah (2013) about *“Pengaruh metode pembelajaran Jigsaw terhadap hasil belajar mata pelajaran dasar kompetensi kejuruan di SMK Wongsorejo Gombong”*.
- c) Research conducted by Francis Hull Adams (2013) about *“Using Jigsaw Technique As An Effective Way Of Promoting Cooperative Learning Among Primary Six Pupils In Fijai”*. The results of the study that the use of the learning model Jigsaw students can naturally develop an interest in working with their peers and learn from each other and learning the better. The use of model type Jigsaw also most of the pupils were able to take an active part in the lessons by answering questions during and after the lesson.
- d) Research conducted by Sengul and Katranci in 2012 about *“Teaching the Subject” Sets “with the Dissociation and Re-Association (Jigsaw)”*. The results of the study concluded that the application of the cooperative learning model type Jigsaw students noted, enjoy the cooperation with their friends, understand the material better.

## **II. RESEARCH METHODS**

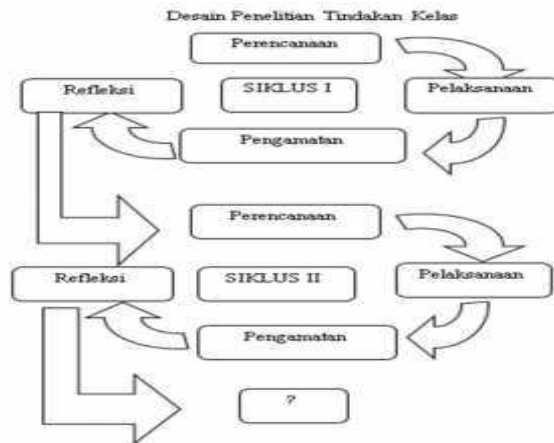
This research was done using the research method of action class. The place of implemetation is at SMK PGRI 1 Surakarta. Students as research subjects is class X M2 year 2014/2015 about 22 students on learning Basic Welding. Study carried out by as much as 2 spiral model cycle. Each cycle consists of the stages of the Planning Act, the implementation of the action, observation, and reflection.

The collection of data about student activity done with sheets of observation, whereas data about student learning achievements are compiled using a written test. The validity test of the instrument may be performed using the student the validity of invalid constructs and validity test of the instrument test use Validation of content.

Data analysis was done using the liveliness of student learning qualitative descriptive method, while the data analysis of students achievements using quantitative comparative analysis that is comparing the test score gains when pre cycle, cycle first and second cycle.

The Class Action Research design which is used can be seen more detail in Figure 1 below





**Figure 1.** Spiral model of class action Research (Arikunto, 2009:16)

### III. RESEARCH RESULTS and DISCUSSION

Based on the data on each cycle during the process of research, can be explained as follows:

#### A. Pre-cycle

The study of prasiklus by regular lectures method of are conducted by teachers, retrieved the observations that many students are less attentive to the teachers, the student learning activity is low. The average gained liveliness student learning by 40%. Students look bored and less ebullient by the time the learning process takes place.

The learning achievements of students on this prasiklus that value meets the KKM is only 41%. The learning achievements of students in prasiklus is still far from a success indicators have been determined by the value of the KKM (Passing grade) of 75. This can make students less active in the learning process so that an understanding of the subject matter is low.

#### B. Cycle 1

The liveliness of student learning at cycle 1 learning model by applying a cooperative Jigsaw type is increases better. The average percentage of active students of 61%.

The learning achievements of students in cycle 1 that reaches KKM is 68% of students. This figure already raised but it has not reached the expected target, i.e. 80% of students obtaining a value that meets the KKM. This is because the application process cooperative learning Jigsaw type has not been fullest. Students who are active are still limited in number, so that an understanding of the material not the maximum. Less active students ask teachers about the material presented.

#### C. Cycle 2

The learning cycle 2 was done in order to repair against the shortcomings which occurred in cycle 1. The teacher repeatedly conveyed to maximize learning by means of utilizing existing equipment, ask a less familiar material. The teacher encourages students to be active in the learning process. Maximalized the learning process with the model of cooperative learning Jigsaw, this type

obtain results as the target. The average active student learning at cycle 2 increased to 80% previously only 61%.

Student learning achievements are already well, that experience increased 82% of students being reached (KKM). Active learning students can rise then followed by learning achievement of students which also rises. Test scores of students to be good and more than 80% of students gained grades meet the KKM. So the application of learning model Jigsaw type proved to be better and can increase the liveliness of students or student learning achievement than learning methods lectures. More details can be seen on the graph of Figure 2 and Figure 3 below:

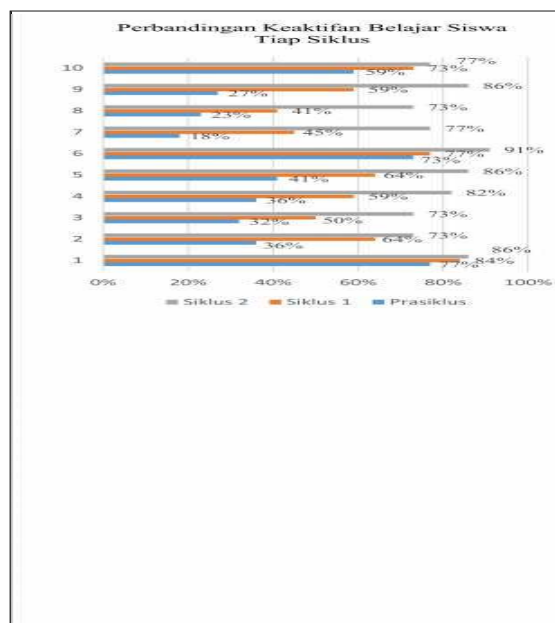


Figure 2. A Comparison Of Student Learning Activity Each Cycle



Figure 3. A Comparison Of Student Learning Achievement Of Each Cycle

#### Indicators of student learning

1. Paying attention to the teacher when learning takes place.
2. Ask questions to the teacher about the material presented.
3. Give opinion in problem solving towards friends' explanation.
4. Listen to feedback or opinions about the subject matter provided by the teacher.
5. Listen to friends' opinions in the group discussion in a group work.
6. Noted learning materials given by the teacher.
7. Drawing upon the proposal or presentation in front of the class.
8. Choose the tool to use when discussion groups or presenting in front of the class.
9. Solve the problem given by the teacher.
10. Be quiet, not crowded while learning.


#### **IV. CONCLUSIONS**

Based on data analysis Investigation research the discussion above, then the results of this research can be summed up as follows:


1. The application of the Cooperative Learning Model Jigsaw type successfully increase the liveliness of student learning.
2. The application of Cooperative learning, Jigsaw-type Model successfully enhance learning achievements of students.

#### **V. SUGGESTIONS**

Based on the process and the results of this research, recommended things as follows:

1. If you want the liveliness of student learning and achievement are increasing student learning, Cooperative learning, Jigsaw-type Model is one of good learning model to implement.
  2. To be able to implement Cooperative Learning Model with learning Jigsaw type required the willingness and commitment of teachers to implement them in earnest.
  3. On the application of Cooperative Learning Model Jigsaw type teachers should pay attention to students when they do discussion group (Group of experts), to ensure the absence of one of the students who are dominant in the group.
  4. The application of Cooperative learning, Jigsaw-type Models can work well when supported by adequate learning infrastructure, such as: textbook, LCD projectors and others.
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EI-02-009

## DRAWING WITH CAD INTERACTIVE VIDEO ANIMATION LEARNING MEDIA FOR BUILDING ENGINEERING VOCATIONAL HIGH SCHOOL

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**ABSTRACT :** This study was supposed to design an interactive video animation learning media as a tool to support learning process and maximize student learning outcomes. This study was based on Research and Development (R&D). The prototype was validated by learning media, instructional, and substance experts. The research was implemented on SMK Negeri 4 Sukoharjo architecture engineering programs class X students. Involved 10 students on small-scale and 24 students on large-scale test. The results were: (1) validation by learning media expert 92% (very feasible), instructional expert 66% (feasible), and substance expert 93% (very feasible). (2) The average large-scale test showed the learning media with the percentage of 74.5% (feasible). (3) The average mark of students prior to using the media was 74.17, while after the use of learning media was 77.42. The results showed the student learning outcomes using video animation better than without the use of media. Based on the results of the validation test of learning media, multimedia and substance experts, as well as small-scale test and large-scale test, it can be concluded that interactive video animation learning media feasible as a tool to support the learning process of Drawing with CAD for Building Engineering Vocational High School Students.

**Keywords:** Interactive Video Animation Learning Media, Drawing with CAD.

### I. INTRODUCTION

Drawing with CAD (Computer Aided Design) is one of competence standard in group of productive subject matters Class X Vocational High School (Sekolah Menengah Kejuruan) hereinafter referred to as SMK, Architecture Engineering Program (Teknik Gambar Bangunan) hereinafter referred to as TGB. Drawing with CAD (DwC) is a prerequisite for the group of vocational competences subject matters. In DwC, students should master Autocad software as a tool for draw building design.

According to the pilot study in DwC subject matter Class X TGB SMK Negeri 4 Sukoharjo, can be revealed that the learning media used by the teacher is only with PowerPoint and even often without learning media (only with white board). This causes the students are faced troubles if they want to review the lesson because there is no media that help students remember a complex material that has been submitted by teachers from start to finish.

Besides that, the prior learning media still elusive by students that causes the low mastery learning students. This can be evidenced by the basic competence test result of the TGB Class A is 65,7% students (from 35 students) below the minimum completeness criteria (Kriteria Ketuntasan Minimal) hereinafter referred to as KKM. Only 12 students who meet the KKM.

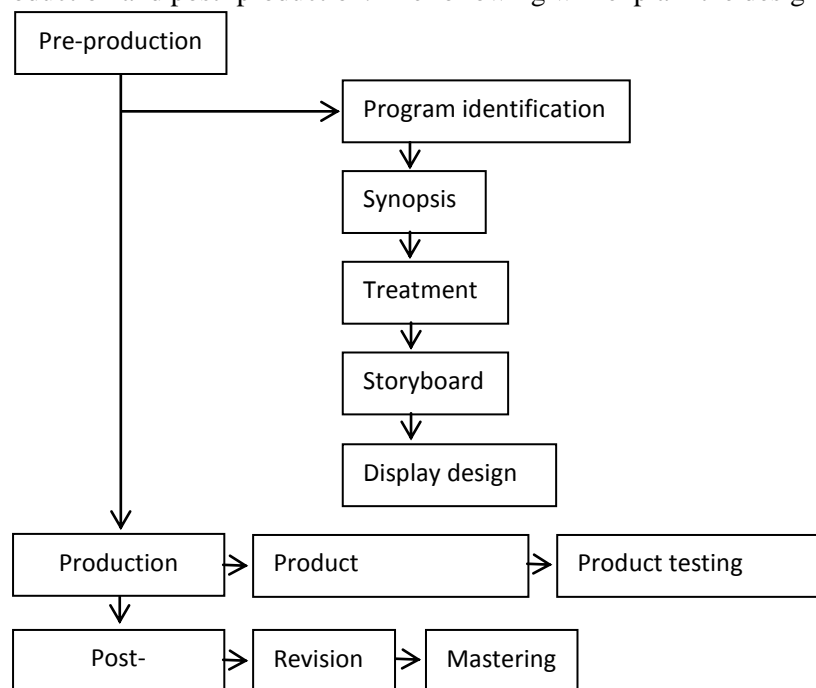
Based on this finding, need a media that can facilitate student understanding, describe a complete explanation of the subject, and can improve the student mastery. Therefore, it was designed

an interactive learning media to support the student learning. This media was designed using Adobe Flash that can display attractive text, images, videos, and animations simultaneously.

Media comes from the Latin *medius*, which literally means middle, intermediate or introduction . In the Arabic language media is an intermediary or an introductory message from the sender to the receiver (Arsyad, 2005:3). Stage production flow according Riyana in Atmawijaya (2011) is divided into three parts: pre - production , production and post- production. Wahono (2010) said in the developing of media there are three aspects of the assessment are: software engineering, design of learning, and visual communication. Adobe Flash is used for images, animation, and sound processing. Further, the application can also be used to to load the animation, movie, game, creation of navigation on the website, animated buttons, interactive menus, and web site development of other web applications. Jihad and Haris (2013) said that the achievement of learning outcomes forms of behavior changes that tend to settle on the cognitive, affective, and psychomotor of the learning process is carried out within a specified time. Based on the background and theory have been described, this study was supposed to design an interactive video animation learning media as a tool to support learning process and maximize Drawing with CAD student learning outcomes.

## II. RESEARCH METHODS

Research and testing carried out in SMK Negeri 4 Sukoharjo Class X TGB April 2015 – January 2016. This study is based on Research and Development (R&D). Research and Development is a method to produce a certain product, and test the effectiveness of these products (Sugiyono , 2013 : 407). Designing interactive learning media is divided into three (3) main activities, namely the pre - production, production and post- production. The following will explain the design flow:



**Fig. 1.** Development Flowchart  
(Riyana in Atmawijaya, 2011)

The prototype was validated by learning media, instructional, and substance experts. The research was implemented on SMK Negeri 4 Sukoharjo TGB class X students. Involved 10 students on small-scale and 24 students on large-scale test. Data collection techniques in this study include questionnaire, observation, test, and document analysis. The expert validation test, observation and questionnaires on a test scale small and large scale test using Likert scale . T -test used to comparing test result before and after using the media. The hypothesis  $H_o = \mu_1 \leq \mu_2$  (learning outcomes of students use learning media video animation is less than or equal to the learning outcomes without using the media), while  $H_a = \mu_1 > \mu_2$  (student learning outcomes of media use instructional video animation better than learning results without using the media ).

### III. Results and Discussion

Designing interactive learning media was divided into three (3) main activities:

- 1) Pre-production, this phase consists of the program identification, synopsis, treatment, and storyboard. Program identification was considered appropriate to the learning process, and then synopsis, treatment, storyboard made based on this.
- 2) Production,
  - a) Product development, since the materials in the pre-production stage is collected. The developing processes using the program Adobe Flash CS6 and the recording of tutorial video using Camtasia Studio Version 8. Video animation creation phase includes the display of : the screen flow map , the subject matter descriptions and objectives, the home display and title, materials, syllabus, training menu, profile, user guide, and exit menu. After the design process of interactive learning media video animation is completed, the next phase was the product testing .



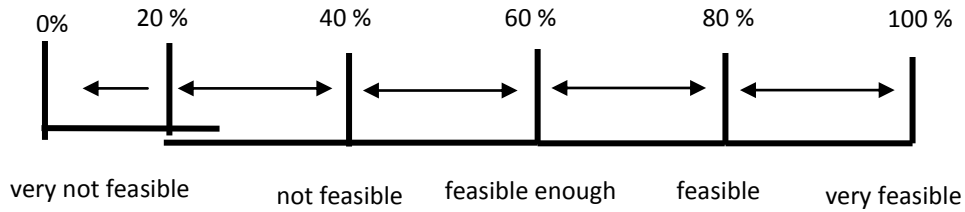
**Fig. 2** Display of Home Menu

- b) Product testing, interactive learning media video animation tested through product validation phase of the experts, small-scale and large-scale test.
- 3) Post-production, after the video animation products tested and revised by experts, small scale, and large-scale test, then enters the packaging stage . The end product of this media was in a CD or DVD.

The prototype was validated by learning media, instructional, and substance experts. The validation by learning media expert 92% (very feasible), instructional expert 66% (feasible), and substance expert 93% (very feasible). The average ratings of the three experts is 83.66 %, based on



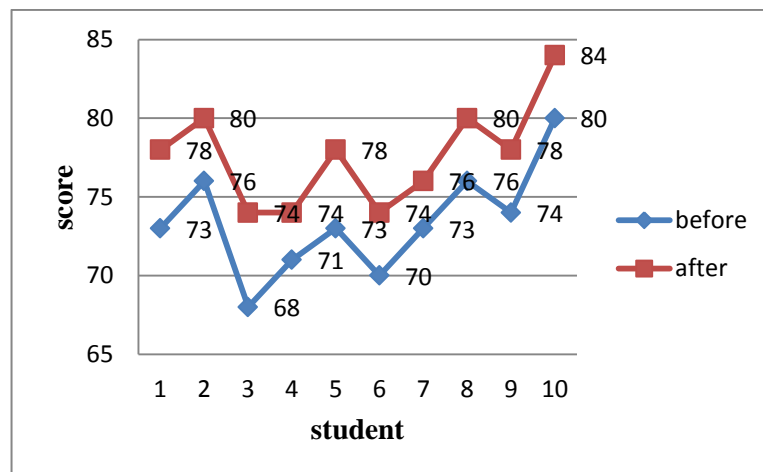
picture 2, the feasibility category of this media is very feasible. Thus the media can be expanded into a small -scale and large-scale test.



**Fig.2.**scale of expert interpretation  
(Source: Riduwan, 2012:15)

Small scale test was used to determine the usefulness of the media on the learning process, to find out the deficiencies of the media, to obtain inputs to enhance media before it was tested in the large -scale.Small-scale used the 10 respondents from class X TGB A SMK Negeri 4 Sukoharjo. This small-scale test phase was obtained by observations, student feedback on media and tests to determine the learning outcomes of the students before and after using instructional media. The results of analysis of small-scale observations show a scale percentage of 76 % that means learning media in a category feasible.

Based on the analysis of data on the response statement of 10 students obtained an average student chooses to agree with a score of 436 on the positive statement while a negative statement lies in the area for less agree with the value 162. Besides the students comment regarding instructional media, the study also tested the respondents to find out influential media on student learning outcomes between before and after using instructional media. Results of the tests before and after using the test will be described using the graph as follows :



**Fig. 3.** Student learning outcomes on small scale test before and after using the media

From the data, it obtained an average score of student learning outcomes before use media that is 73.4 while the score of student learning outcomes after using media that is 77.6. It is also proved by using t -test, from the t-test is generated that t -15.217 fell on the area acceptance of Ha or rejection of

Ho, so it can be concluded that there was significant difference test scores after using instructional media and that have not been using the media, where learning to use the media better than without the use of media in the learning outcomes. Based on the observations, student feedback, and the test can be concluded that the media can be forwarded into the next testing phase, namely large-scale test.

The next stage is the large-scale test. The test is used to determine the usefulness of interactive learning media video animation as a toolkit to support learning process. Large-scale test conducted on the entire class X TGB A SMK Negeri 4 Sukoharjo with the number of 24 students. Students who have followed the small scale test is not involved in the Large-scale test. Same with the small scale test, the large-scale data obtained by observation, student comments, and tests. The results of the analysis of large-scale test of the observations show the scale of percentage of 74.5% that means learning media in a feasible category. From the analysis of data on the response statement of 24 students obtained an average student chooses absolutely agree with a score of 1113 on a positive statement while a negative statement lies in the area for less agree with the value 352. In addition to the testing observation and feedback of students regarding instructional media video animation, the study tested the respondents to find out influential media on student learning outcomes between before and after using instructional media. Results of tests before and after using the test will describe using the graph as follows:

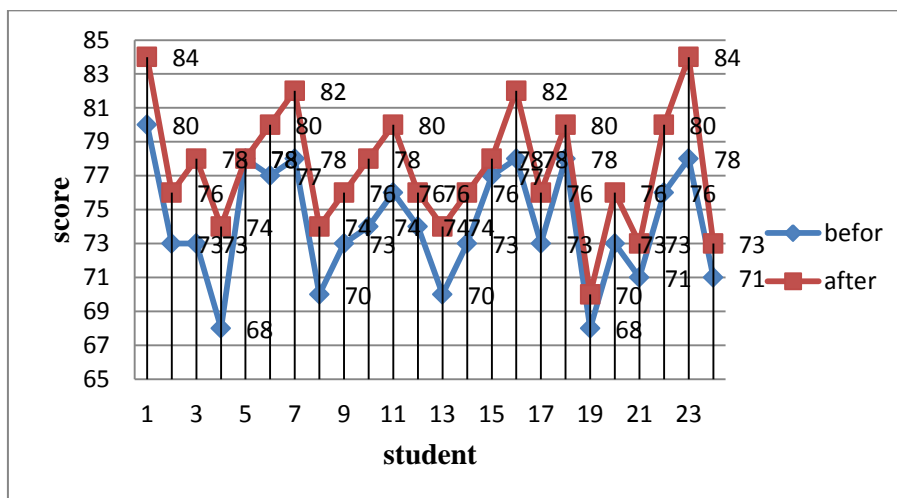


Fig. 4. Student learning outcomes on large scale test before and after using the media

It obtained an average score of student learning outcomes before using media that is 74.17 while the student learning outcomes after using media that is 77.42. It is also proved by using t-test, from the t-test is generated that  $t = -11.484$  falls on acceptance the  $H_a$  or rejection of  $H_0$ , so it can be concluded that there was significant difference test scores after using instructional media and tests before using the media.

Based on the results of the testing phase of the validation test of the media experts, the small scale and large scale test, it can be concluded that interactive learning media video animation as a toolkit to support learning process Drawing with CAD class X TGB A SMK Negeri 4 Sukoharjo.



#### IV. CONCLUSION

The results showed the student learning outcomes using video animation better than without the use of media. Based on the results of the validation test of learning media, multimedia and substance experts, as well as small-scale test and large-scale test, it can be concluded that interactive video animation learning media feasible as a tool to support the learning process of Drawing with CAD for Building Engineering Vocational High School Students.

#### Recommendations

The video tutorial have been developed still only on Basic Competence 1, 2 and 3. For further research is necessary to develop the whole of Basic Competences in Drawing with CAD subject matter. This video tutorial is just as media assistant for teachers, so necessary for incorporation and inovation of other methods in teaching and learning.

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**EI-02-081**

## **THE USE OF TECHNOLOGY IN DISTANCE LEARNING**

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**ABSTRACT :** *Distance learning, or commonly referred to as distance learning is learning that can be done without requiring educators and learners in one room. Distance learning is booming now in the society because of the need for people who can not attend formal education at school / college due to constraints of time and distance. This paper will discuss the various technologies that can be used in distance learning as well as review advantages and disadvantages and also any tools that can be used to support learning distance learning. The expected result is to provide broaden insight about technology associated with distance learning.*

**Keyword:** learning, distance learning, technology

### **I. INTRODUCE**

Basically the education is not something static and fixed. Education will always change rapidly. The need for education is growing. At the beginning, education usually perform in the classroom and need to meet between teacher and student face to face. This kind of education is commonly referred to as traditional education. Because of many reasons, not all of people can enroll this traditional class which requires attendance at a place / location and at a specified time. The reason of the job, marriage, distance, cost and time makes it difficult to follow this traditional learning [6]. Distance learning comes to be a solution for people who can not follow traditional learning. Distance learning is method of learning where teachers and students are in separate locations [5].

In another definition, distance learning is method of learning that connects or link between teachers and learners who are in several different locations using the technology [4]. Distance learning will inevitably be associated with technological terms. Difficulties in bridging learning in which teachers and students are not in place and the same time led to the need for this technology. So, discussing the issues associated with existing technologies in distance learning is important.

#### ***Distance learning***

Distance education is a relatively new terminology which one of the new formats of education along with new teaching/instructional media.

Advantages and disadvantages of distance learning [8]:

Advantages:

1. not restricted by time
2. more money is saved
3. Learners can choose the desired topic
4. Duration of learning depends on the ability of the learner



5. Learning material is more updates
6. more interactive

Disadvantages distance learning:

1. High distract in learning process
2. Difficulty getting an explanation from the teacher due to the distance and time apart
3. it can occur misperceptions between teachers and learners
4. Changing the paradigm of traditional learning into distance learning is not easy
5. Price of device for distance learning is still expensive. It Depends on what media is used
6. The interaction of teachers and learners is automatically not as much as in traditional learning
7. Learners tend to procrastinate in learning material because there is no control from the instructor, as it was done in the traditional learning
8. Typically learners in distance learning are the people who have busy at work and households that do not have time to follow the lessons in class. As a result, students have more responsibility than ordinary students in traditional learning
9. The age of students of distance learning tend to be older than the age of the students in traditional learning
10. Less control
11. Students who do not have a computer will feel uncomfortable

## **II. TECHNOLOGY USING IN *DISTANCE LEARNING*.**

There are so many kinds of media technologies used in distance learning. Below are some of the kinds of media technology that can be used in distance learning but can also be used for traditional learning [7], namely:

### **1. Web-based learning**

Utilization of web technology is currently growing rapidly. Almost all people whether educated or not know how to use web technology. The use of this website can be used for distance learning.

strengths: learning content using the web can be widespread and have users on a large scale. Content may not be in the student's computer but stored and accessed through distributed technologies. Content can also be integrated with a learning management system (LMS), use a chat facility and provide audio facilities for teaching and feedback for learners.

weaknesses: highly dependent on technology and internet connection. It will also affect the bandwidth limitations quickly whether or not the learning process using the web. For example: to access the instructional access streaming video on the web will be very slow when an internet connection is slow.

### **2. Audio Conference**



Audio conference which is commonly called the conference call is the term used for phone calls that connect three or more phone lines at the same time.

strengths: when students have difficulties in learning process, they can use audio conferencing facilities with some friends in a short time.

weaknesses: because it uses the phone line, then the cost could be expensive if the participants use different providers and they are in distant regions. In addition, it does not support the visual.

### 3. Computer-based instruction

The use of computers is already very common once used to assist distance learning. Using the use of computers, the students who have distant locations still be able to follow the learning by utilizing this technology.

strengths: using the CBI will not depend on Internet bandwidth. Allows the use of full-motion video and high-resolution graphics and the audio comes enable learners to more easily in receiving lessons. Students can also control the speed of instruction and receive immediate feedback to reinforce learning outcomes.

weaknesses: learners can not interact with the instructor directly to ask questions. So the instructors facilities are not provided. Development costs may be high in terms of the level of development of interactive, graphic design and visual and others.

### 4. Correspondence Print

Media Print this correspondence is the most widely used in distance learning.

strengths: Contact this print is a media that does not depend on technology to provide or view the material. Here is only required static image.

weaknesses: cost money to write, packing, and delivering printed materials to get to address learners. If there is little change in the content then it will be very complicated because it had to make reprints from scratch again.

### 5. Instructional television

A television program that is designed for the benefit of a lesson. For example, interactive program SMU (Solution face the National Examination) broadcast by TVRI or open university lecture program ever aired by TPI

strengths: messages received by learners more evenly, very good in explaining a process, overcome the limitations of space and time, gives a deep impression on the learner.

Weaknesses: requires the availability of satellite broadcast infrastructure facilities that require no small cost is added to the cost of maintenance. Special training for staff who manage the studio and broadcasting equipment is also needed which of course cost money, too.

### 6. Recording Audio (Tape, CD ROM)

strengths: costs incurred cost

weaknesses: lack of facilities because only rely graphic audio only.



#### 7. Video recording

strengths: very visual and lots of animation and movement

Weaknesses: production and distribution costs is great, there is no facility for interaction between teachers and learners.

#### 8. Video teleconference

strengths: allows the live learning supported by pictures and sounds so like learning in the regular classroom and feel alive.

weaknesses: expensive infrastructure and require complex equipment. Requires the availability of bandwidth.

### III. THE FUTURE

What about the fact in the future? What will happen is as follows:

1. In the future, education will be very different than in most schools today. schools might be open all day and all year, with groups of students rotating in and out of session. Following the trend toward multi-age grouping, classrooms might include students of different ages. The learning is not restricted 1 credits 50 minutes as in traditional learning but it can be longer or may even be shorter. Distance learning will be increasingly used in the future [1].
2. There will be many new technological tools for education in the future. For example: the use of glass technology such as Google Glass that has a small screen in front of one eye as usual goggles but can connect one to the Internet via cloud technology. Through the use of voice commands, users can access information, create pictures and videos and take advantage of applications [2]. Google Glass is very helpful for distance learning [10].

### IV. CONCLUSION

Distance learning stands for bridging the need of people who can not attend classroom in the traditional learning. The drawback of distance learning is that the location of teachers and learners are separated. Technology is the answer to address this problem. There are many technologies used in distance learning: the use of the web, computers, audio conferencing, video conferencing, correspondence print, television, audio recordings and video recordings. Application tool that can be used for distance learning are: videos and podcasts, presentation tools, collaboration and brainstorming tools, blogs, wikis, social media and messenger. In the future, distance learning will be increasingly booming and more new devices will be used for distance learning. Glass technology such is google glass is one of new devices which will be used in the future.



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EI-02-082

## IMPROVEMENT OF LEARNING QUALITY OF ELECTRONIC CONTROL LAB WORKS USING LESSON STUDY

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**ABSTRACT :** *The purposes of this study are: (1) to improve learning quality, (2) to enhance students' confidence, students' ability to deliver their own opinions, students' analytical capability and also their study interest and motivation so that the overall students' competence also increased on Electronic Control Course (Lab Works) at Electrical Engineering Education Department, Yogyakarta State University. Lesson Study is a collaborative learning study which was chosen as a way to achieve enhancement of students' competence. Problem-based Learning (PBM) approach and Cooperative-Learning method were implemented in lesson study. Learning tools used were weekly course planning, learning media, students' worksheets, observation sheets, and evaluation sheets. The results show that: (1) Cooperative Learning method is sufficiently effective to utilize on Electronic Control Course since this course pushes students to work together due to limited equipments and tools. (2) PBM approach is highly suitable to implement on Electronic Control Course, thus students are able to develop logical thinking in order to solve control-system circuit. (3) In the nutshell, lesson study was carried out smoothly but the time given was insufficient. (4) It is possible to advance cooperative character, critical thinking, the ability to speak, confidence and positive competitiveness. In addition, comfortable class environment and fun learning are also fulfilled.*

**Keywords:** lesson study, cooperative learning, problem-based learning

### I. INTRODUCTION

One of main purposes of Electronic Control Lab Works is for students to be able to design system circuits and test ones using electronic hardware. Nevertheless, there were several obstacles faced in conducting this course.

To begin with, ratio of sets of lab modul and the number of students is too low, 1:10. Secondly, students' motivation in doing the experiments was diverse. Lastly, the first and the second inhibition mentioned requires the lecturer to be creative in designing learning strategy and learning method. Those various learnings have to be sustained, thus classes become more alive and interesting.

In order to seal with the obstacles, *lesson study* (LS) was chosen and implemented in Electronic Control Lab Works. Lesson Study is a way of collaborative learning involving: sharing among lecturers, setting the plans, and collective evaluating. According to Lesson Study Team of Faculty of Mathematics and Natural Sciences, Yogyakarta State University, there are two essential reasons to choose lesson study (2007:7-8).

First, LS in an effective way to bring the learning quality up because: (1) the development of LS conducted relies on professional knowledge sharing based on practice and learning outcome carried out by lecturers, (2) the main focus of LS is to encourage students to have high quality of learning, (3) learning objectives become the focus in class, (4) Based on real experiences in class, LS is able to be a base of learning development, and (5) LS situates



the lecturers as learning researcher.

Second, the well-designed LS produces professional and innovative lecturers. By implementing LS, lecturers are able to (1) determine student-oriented learning objectives, (2) study and improve the beneficial learning for students, (3) deepen the knowledge about learning materials delivered by themselves, (4) determine future objectives required to be mastered by students, (5) plan collaborative learning, (6) precisely study the learning process and students' attitudes, (7) develop reliable learning knowledge, and (8) carry out learning reflection based on students' development and colleagues' suggestions.

Specifically, the implementation of LS was focus on utilization of cooperative learning approach. The decision to select this approach is based on an assumption that unconfident feeling, low analytic capability, insufficient speaking ability, and less-motivated students are potentially enhanced by implementing Cooperative Learning.

LS implemented using cooperative learning approach has several goals as following:

1. Improving the learning quality made by lecturers in Electronic Control Course - Lab Works
2. Improving the students' confidence, analytic capability, speaking ability and their motivation so that learning quality is escalated.

## **II. STUDY METHOD**

### **A. Time and Place of Study**

Lesson Study was conducted in Basic Electronic Lab, Department of Electrical Engineering Education, Yogyakarta State University for two weeks on Mondays of november in second semester of academic year 2015/2016, consist of two cycles in which each had Plan, Do and See. Subjects chosen for this study are pupils taking Electronic Control Course - Lab Works which is a credit subject under Study Program of Mechatronics Engineering Education, Department of Electrical Engineering Education, Faculty of Engineering.

### **B. Improved Character Aspects**

According to cooperative learning, improved character aspects in this research are: (1) Group members positively depends on each others, (2) individual and collective responsibility, (3) class meetings, (4) internal member communication, (5) diversity of grouping

### **C. Developed Learning Model**

Cooperative learning approach was implemented in a less-active class. This approach aims to prepare students to think critically, to be able to deliver their thoughts, and to possess proper confidence. Moreover, convenient class environment and interesting learning kept on maintained. The implementation of this study involved RPP, learning media, students' worksheets, observation sheets and assessment sheets of lab works.



### III. RESULT AND DISCUSSION

#### A. Implementation of Lesson Study

##### 1. Implementation in Cycle I

The study was started with implementation of Cooperative Learning (CL) in either pairs or groups using Problem-based Learning (PBL) approach in which industrial control applications were introduced. The first cycle was conducted in 2x50 minutes class by a model lecturer who was act as both a teacher and a facilitator in learning. A moderator helped the model lecturer managing excecution of learning process and observing one, and was assisted by a technician to make a documentation of the ongoing class.

The implementation was done using CL, twenty students were divided into four groups which have five members each.

##### a. *Planning*

The first step called “Planning” was conducted in the Cycle I on November 18<sup>th</sup> 2015. It was begun with setting up the learning plans based on current data of students’ condition reported by the model lecturer. The learning plans were produced focusing on the importance of team working. According to the plans, the completion of the lesson study for next step which is called Doing needed some tools, namely learning media, work sheets, observation sheets, and assesment sheets.

##### b. *Doing*

The second step in the Cycle I dubbed “Doing” took place on November 20<sup>th</sup> 2015. The model lecturter opened the course by saying greetings, checking students’ readiness, apperceptioning, explaining course objectives and elaborating details of works at the day plus making a connection between today’s work to previous work.

Problems were listed on a power point slide, therefore students understand ones clearly. The lecturer elaborated control problems to help students to understand better. Each group of students built control circuit using available trainers (moduls).Once they finished, they reported it to the lecturer and the lecturer checked the circuit afterwards. In case incorrectness founded, the related group was asked to correct that. Having no more flaws, the circuit is permitted to connect to power supply and measurement was taken. The students made the precise analysis of built circuit along with its performance.

The model lecturer observed the works to the end of the course. The lecturer closed the learning with making a summary of entire lab works at the day, explaining the outcome of control circuit made, mentioning the evaluation of student’s mistakes during working on the tasks and the class was end up with further assignments.

##### c. *Seeing*

The last step is named “Seeing” which was completed right after “Doing” had done, on November 20<sup>th</sup> 2015. The Lesson Study team discussed the whole excecution of “Doing”. Based on



observation, “Doing” has several drawbacks:

- 1) Time management allocated by model lecturer was not well-organized, thus several jobs in “Planning” were not accomplished.
- 2) There were a few students who did not attend the class on time and did not wear stipulated outfit (wearpack).
- 3) Team working was not fully solid yet, there were some of team members who participated less than others

According to the discussion conducted by Lesson Study team, it was needed to enhance and re-plan the learning in order to gain more advance one in Cycle II, so that the objectives of LS are achieved.

## 2. Implementation in Cycle II

The study was started with implementation of Cooperative Learning (CL) in either pairs or groups using Problem Based Learning approach in which industrial control applications were used. The Cycle II was conducted in 2x50 minutes class by the model lecturer who was act as both teacher and facilitator in learning. A moderator helped the model lecturer managing execution of learning process and observing one, and was assisted by a technician to make a documentation of the ongoing course. An observer was invited solely to observe the learning process.

The subjects of Cycle II are different from those of Cycle I. The implementation was done with CL, twenty students were divided into four groups which have five members each.

### a. Planning

The first step was conducted in the first cycle on November 23<sup>th</sup> 2015. It was begun with setting up the learning plans based on up-dated data of students’ condition reported by model lecturer. The learning plans were produced focusing on importance of team working. According to the plans, the completion of the lesson study for next step needed tools, namely learning media, work sheets, observation sheets, and assesment sheets.

### b. Doing

The second step took place on November 24<sup>th</sup> 2015. The model lectutrer opened the course by saying greetings, checking students’ readiness, apperceptioning, explaining course objectives and elaborating details of works at the day plus making a connection between today’s works to previous works.

Problems were listed on a power point slide, therefore students understand ones clearly. The lecturer elaborated control problems to help students to understand better. Each group of students built control circuit using available trainers (moduls). Once they finished, they reported it to the lecturer and the lecturer checked the circuit afterwards. In case incorrectness founded, the related group was asked to correct that. Having no more flaws, the circuit is permitted to connect to power supply and



measurement was taken. The students carefully made the analysis of built circuit along with its performance.

The model lecturer observed the works until the end of the course. The lecturer closed the learning with making a summary of entire lab works at the day, explaining outcome of control circuit made, briefly discussing the evaluation of student's mistakes during working on the tasks and the class was closed with further assignments.

c. Seeing

The last step was completed right after "Doing" had done, on November 24<sup>th</sup> 2015. The Lesson Study team discussed the whole execution of "Doing". Based on observation, "Doing" has several drawbacks:

1. Time management allocated by model lecturer was improved and became well organized, thus all jobs in "Planning" were accomplished.
2. There were a few students who did not wear stipulated outfit (wearpack).
3. Team working was not fully solid yet, there were some of team members who participated less than others caused by the fact that there were too many students using the same trainer (too crowded group)

According to the discussion conducted by Lesson Study team, to conclude, LS had been carried out well and were able to achieve the objectives.

**B. Barriers on Implementation of Lesson Study**

There were some barriers encountered on the implementation of LS on sites as following:

1. The length of time given, which was one month, was considered less sufficient to come up with optimum result of LS implementation. One of main reasons is, the beginning of LS was started on the second half of semester, thus the effective period in delivering and acquiring knowledge had passed and LS could not be conducted on the same groups of students.
2. Limited lab equipment, tools and trainers highly disturbed students' level of achievement even though it had been anticipated by the model lecturer with giving more support to students.

**IV. CONCLUSIONS AND RECOMMENDATIONS**

**A. Conclusions**

Based on Lesson Study completed, we can conclude that:

1. Cooperative Learning method is considered sufficiently effective to implement in Electronic Control Lab Works since this course requires students immensely involved due to limited lab facilities.
2. Problem-based Learning approach is highly suitable to implement in in Electronic Control Lab Works as it allows students to develop their thinking logic in solving problems related to control



circuit.

3. In general, the implementation of LS is successful yet several obstacles were present regarding limited time given.
4. Team working, critical thinking, speaking ability, confidence and competitive attitude were developed. Moreover, convenient class environment and interesting learning were achieved.

## **B. Recommendations**

1. Well-allocated time is required, therefore the implementation of LS will become more successful.
2. Cooperative learning with Problem-based Learning approach might be implemented for other courses which have the similar characteristics and objectives because this method is sufficiently effective to grow students' character and logical thinking in solving problems related to electronics and also incline the cooperation among students.
3. Workshop as further action is needed.

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## DESIGN AND IMPLEMENTATION OF HYBRID E-LEARNING MODEL WITH INTEGRATED PEDAGOGIC ASPECT

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**ABSTRACT** : *This research aimed to yield design and implementation of hybrid e-learning model with integrated pedagogic aspect, to find out the student learning performance viewed from student activity and response during learning with hybrid e-learning model. The design of teaching material of hybrid e-learning model was organized in four steps: planning, designing, development and evaluation. The implementation of hybrid e-learning model included 3 stages: 1) initial class face-to-face meeting, 2) synchronous and asynchronous learning process, 3) final class face-to-face meeting. The comparison proportion of the implementation of combined e-learning technology and face-to-face meeting in the classroom in hybrid e-learning model was 50/50. Two hundreds and five students were used as the sample for trial subject. The research was taken place in SMKN 2 Surakarta, SMK Muhammadiyah 3 Surakarta, SMKN 5 Surakarta, and SMK AdiSumarmoColomaduKaranganyar. The result of research showed that the average result of teacher evaluation on student learning activity and response with the implementation of hybrid e-learning model in the three trial groups belonged to “very good category”. The implementation of hybrid e-learning model with integrated pedagogic aspects evidently could improve the student learning outcome effectively, could generate learning enthusiasm, and could grow the innovative, creative and constructive thinking ability of students.*

**Keywords:** Design and implementation, Hybrid e-learning model, Pedagogic aspect integration.

### I. INTRODUCTION

*Hybrid e-learning* model is the one combining conventional (face to face) meeting in the classroom and e-learning environmental management aiming to give most effective and efficient learning experience. The implementation of hybrid e-learning model requires integrated pedagogic aspect as the attempt of achieving the effective learning. The effective learning is required in the attempt of improving a meaningful learning, conception speed, creativity, and optimum student learning outcome. The hybrid e-learning model is design specifically for the learning combining live classroom method through face-to-face contact in the classroom and online learning, so that the students' study progress is still under the teacher's control. In addition, the implementation of hybrid e-learning model can be organized both directly and indirectly, either with or without complete visualization (multimedia). A profile of hybrid e-learning model will significantly improve student conception, creativity, and learning outcome only when its implementation, it integrates three pedagogic aspects. The integration of three pedagogic aspects into teaching material design employed instructional, constructivist, and social constructivist approaches. This integration aims to achieve an effective learning principle and to create the active and creative students in building four pillars: (1) openness, (2) peering, (3) sharing, and (4) actuating globally. To achieve those objectives, a flexible, creative, simple, understandable, and attractive LMS (Learning Management System) program is



required referring to the standard quality of hybrid e-learning model organization. The problems of research were (1) what is the design of hybrid e-learning model-based teaching material like?; (2) what is the implementation of hybrid e-learning model-based teaching material like?; and (3) how is the student activity and response during learning with hybrid e-learning model?

## **II. THEORETICAL STUDY**

### **a. Hybrid E-learning Concept**

The characteristic of learning environment in hybrid e-learning model requires the learners to use new approaches in order achieve their goals and online learning requirement. Miller and Miler (2000: 156-177) suggested three characteristics of learning environment with hybrid e-learning model significantly different from the traditional one as follows:

Firstly, associative structure, nonlinear and hierarchic; secondly, improved multimedia ability; and thirdly, a variety of synchronous and asynchronous communication opportunities. The problem frequently occurring is the learner (student) control in learning and the learner's inadequate ability of combining the unstructured information.

A study on the role of learning strategic in internet-based learning has been conducted by previous researchers finding that online learning strategy is one factor impacting to the student learning achievement (Shih, Ingebritsen, Pleasants, Flickinger & Brown, 1998). Wallace, Kupperman, Krajcik, & Soloway (2000: 75-104) argued that "looking for information online is a complex and difficult process to the students. Developing the student conception on content through internet use is the challenge to students and teachers".

Tsai & Tsai (2003: 43-50) suggested that "self effectiveness and meta-cognitive strategy play important parts in the students' successfully online learning". Ligario (2001: 103-125) stated that "a variety of communication styles integrated into online learning activity is considered as effective only when the students are aware of technology and communication". Salovaara (2005: 39-52) said that "the student's high cognitive strategy can facilitate and construct knowledge". Such the statement was continued by Kramarski & Gutman (2006: 24-3) suggesting that the student cognitive strategy is taken to improve the student's meta-cognitive strategy development. Mehlenbacher, Miller, Covington, & Larsen (2000: 166-184) stated that incapability of transferring learning strategy directly from traditional environment into the online one can provide different learning performance of students.

The opinions above indicates that online learning outcome is affected simultaneously by cognitive, affective, and behavior variables. New learning strategy component and skill are required to improve the student learning outcome effectively and efficiently. The implication is that the application of hybrid e-learning model in learning process requires reflection skill, skill planning, learning ability, inquiry ability, skill application, and self-evaluation ability.





## **b. The integration of pedagogic aspect into Hybrid E-Learning**

Pedagogy is the art or science of teaching. Bruner and Hasibuan (2006: 4) suggested that there are four learning model: *Learning by being shown*; *Learning by being told*; *Learning by constructing meaning and*; *Learning by joining knowledge – generating community*. From those four models, Bjorker et al in Hasibuan (2006: 3) proposed an integrated pedagogic approach model consisting of *instructional*, *constructivist*, and *social constructivist* aspects. The integration of pedagogic aspects into hybrid E-Learning model is desirable to the students' understanding and systematic approach that can affect the improvement of learning quality. The pedagogic aspect integrated into learning strategy particularly in hybrid e-learning model can: (1) explore and identify the effective learning strategy to learn online, (2) identify the important element that should be considered as the factor when understanding and explaining the student learning achievement, (4) develop model and method to evaluate and to diagnose the online learning strategy in the student, (5) develop a method to help the students acquire new learning strategy.

## **c. Conceptual Foundation of Hybrid E-Learning Model**

The conceptual foundation of hybrid-E-learning model derives from Piaget's learning cycle model and Kolb's learning experience cycle model. Piaget's student-oriented learning cycle is the inductive application of information processing model from teaching-learning activity.

Karplus (1977) and Lawson (1995) suggested that there are three learning cycles: exploration, concept finding, and concept application. The exploration stage concentrates on "what did you do?", the concept finding stage on "What did you find out", and the third one is implementation.

Kolb (1984) stated that learning experience cycle:

*represents learning as a process in a cycle of four stages, namely, concrete experience, reflective observation, abstract conceptualization and active experimentation. The concrete experience stage focuses on "doing". Reflective observation stage is about the "understanding the doing". The abstract conceptualization stage focuses on "understanding" part while the active experimentation stage is about "doing the understanding".*

Considering the argument above, it can be concluded that learning experience cycle requires representative transformation experience. The hybrid e-learning model gives the characteristics of learning the opportunity to have independent, sustainable, and long-life developing learning process, so that learning becomes more effective, efficient and interesting.

Kerres & De Witt (2003: 101-113) suggested 3C framework to the teachers who want to design hybrid e-learning: content (learning material content), communication (communication between students and teachers, and between the students), and construction (creating the learners' mental condition to help map their position into learning). The relationship between those three aspects plays an important role in the successful hybrid e-learning application. Communication



process in the form sharing, the process of interaction between students and teachers or between students can provide a new learning experience. Involvement, participation, peering in constructing knowledge can create active and creative students.

More broadly, Martyn (2003) explained several important aspects in hybrid model learning in which a successful hybrid e-learning environment consists of fully face-to-face initial meeting, weekly online assignment accompanied with online communication (consultation), e-mail, and is concluded with a final exam constituting face-to-face meeting or written exam in the classroom aided by the supervision. Thus, the learners will have more opportunities of self-development and being responsible to themselves (Hooper, 1992: 21-38; Saunders & Klemming, 2003: 74-86), improving social competency, improving the students' self-confidence (Byers, 2001: 359-374), improving skill, exploring information and gaining achievement (Kendall, 2001: 325-346). In addition, the teachers also appreciate more the difference of style and learning rapidity the students have (Piskurich, 2004) and encouraging communication, either between the students or between the students and the teachers. The learning using hybrid e-learning model combines the following aspects: online learning, face-to-face activity structure, and real practice. Graham (2006) classifies three combinations of hybrid-e learning: (1) hybride-learning yaitu: (1) combination of instructional model, (2) combination of instructional method, (3) combination of online and face-to-face learning.

The finding of Dziuban, Hartman & Moskal's (2004: 5) study suggested: "...blended courses have the potential to increase student learning outcomes while lowering attrition rates in comparison with equivalent fully online courses".

Furthermore, Dziuban, Hartman & Moskal (2004: 3) also mentioned that:

*Blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities.*

Considering the finding of study above, it can be concluded that participation in hybrid learning model requires the students to motivate themselves, and to have effective time management skill, and to interact within the classroom meeting. The combination of pedagogic method attempts to encourage more the active learning environment for the students have potential learning than the traditional one.

Allen, Seaman, & Garrett (2007) stated that there is a difference between online learning and hybrid learning models; in online program at least 80% of content is delivered online while in the hybrid one, 30-79% of content is delivered online. Ranganathan, Negash, and Wilcox (2007: 181) had recommended the proportion format of hybrid, 50% online and 50% face to face. This feature gets more attention from the three stakeholders. Moreover, the students are more able to manage situation and institution, in addition to dealing with the problems related to facility. The future research is



expected to pay more attention to any interests through evaluating this hybrid class proportion. Considering three e-learning models in the learning above, to get a better and optimum learning outcome in Vocational Middle School, an integration of hybrid is required, called hybrid e-learning. Lating (2006) stated that hybrid e-learning is the most effective learning strategy to combine the teaching at school and the access to multimedia learning through internet, either at home or at school. Koohang, Riley, Smith, Schreurs (2009: 94) stated that constructivist theory in e-learning based learning model encompasses three categorical elements of constructivism: 1) learning activity design, 2) learning assessment, and 3) instructor role. Learning activity design includes collaboration, cooperation, perspective, sample of real world, self-reflection, some idea representations, and social negotiation. The elements of learning assessment consist of instructor assessment, collaborative assessment, and self-assessment.

Martyn (2003) explained several important aspects in hybrid model learning in which a successful hybrid e-learning environment consists of fully face-to-face initial meeting, weekly online assignment accompanied with online communication (consultation), e-mail, and is concluded with a final exam constituting face-to-face meeting or written exam in the classroom aided by the supervision.

Several opinions above indicate that consideration to determine the composition (50/50 or 75/25 or 25/75) is dependent on the analysis of competencies to be achieved, subject objective, learning characteristic, face-to-face interaction, online or combined learning delivery strategy, characteristic, learner location, teacher characteristic and ability, and available resource. The learning with hybrid model aimed to facilitate the learning process by providing a variety of learning sources by paying attention to the characteristics of learner during learning. The learning with hybrid e-learning model can be applied by combining three learning methods: face-to-face learning, online collaborative learning, and independent learning.

The implementation of hybrid e-learning model needs an evaluation system. The evaluation system that can be applied to the model includes: (1) student presentation in group is prepared by the teacher in certain form, 2) portfolio and group work is assessed by teacher; peer activity, 3) review, critique and feedback by peer participation, 4) student participation in discussion forum. The combination of learning method in hybrid e-learning is a futuristic learning strategy very important to facilitating the more effective, efficient, and interesting learning for the students. The weaknesses of online system teaching can be dealt with by face-to-face teaching, and vice versa. The application of hybrid e-learning combining face-to-face system teaching, online asynchronous collaboration, and self-paced asynchronous can be implemented well and is felt positively by the students. Generally, e-learning is asynchronous in nature; in this case teacher and student do not meet at the same time. Ranganathan, Negash and Wilcox (2007) divided e-learning into four types: (1) e-learning without



presence and without communication, (2) e-learning without presence but with communication, (3) e-learning combined with occasional presence, and 4) e-learning used as an instrument of teaching in the classroom.

### **III. METHOD**

The research method employed was research and development (R & D) one. The development of hybrid e-learning-based teaching material was conducted in four stages: planning, designing, development and evaluation. In planning and designing stages, ongoing evaluation was conducted to yield original product. The first-stage trial was the development of original product that would be revised based on validation result from two persons: media and material experts (Alpha test). The second stage was Beta test involving 11 students and teacher as subject of trial. To find out its feasibility, the original product was trialed with clients through Beta test. Beta test is the trial on original product carried out using one to one trial with three students and small-group trial with 8 students. The small group trial was conducted as significance test on the feasibility of finished product before implemented. The third stage was implementation in which summative evaluation was conducted with larger trial subject. In summative evaluation stage, classroom is divided randomly into two groups: experiment and control group. The validation test was conducted to obtain the internal and external effectiveness of finished product. Two hundreds and five students were used as the sample for trial subject. The sample of research consisted of students of electronic engineering major in Audio Video Engineering (T.A.V) Skill in 4 Vocational Middle School (SMK): (1) SMK N 2 Surakarta, (2) SMK Muhammadiyah 3 Surakarta, (3) SMK N 5 Surakarta, (4) SMK AdiSumarmoColomadu. Techniques of collecting data used in this research were interview, observation, documentation, focus group discussion (FGD), evaluation, and test.

### **IV. DISCUSSION**

#### **A. Description of hybrid e-learning model-based teaching material design**

The design of hybrid e-learning model-based teaching material can be described as follows:

##### **1. Planning stage**

Planning stage is preliminary study as the initial stage of planning the teaching material to be developed in the following activities:

- a) Collecting supporting resource including the activities of: (1) conducting library study and preliminary study in the form of field survey related to the e-learning implementation having been conducted at school, (2) evaluating e-learning-based learning evaluation having been conducted at school, (3) conducting pre-survey in the form of collecting data (resource) supporting the implementation of e-learning including: student preparedness, teacher, ICT network infrastructure that has been constructed in school to support learning implementation.



- b) Conducting need Analysis based on supporting resource; this measure is intended to find out the extent to which the model development is important to do; it includes the following activities: (1) determining the topic scope corresponding to learning objective and standard competency, (2) identifying the student characteristic to attend learning online, (3) determining the limits of Basic Competency corresponding to the syllabus completed with comprehension test, (4) developing learning set in the form of syllabus and learning implementation plan (RPP) completed with supporting resource, and (5) conducting interview and brainstorming with the students to design the teaching material.

## **2. Design Stage**

Design stage consists of a series of activities: (1) developing original idea or content; (2) analyzing the design task and concept, (2) describing the preliminary program; (4) developing flowchart and storyboard as the guide of navigation followed during developing hybrid e-learning including: front page containing theme, general instruction, and class category, standard competency (SK) page, learning material page containing several basic competencies (KD), and material presentation, comprehension test, and task; and (5) preparing script or texts needed by basic competency (instruction, direction, content, material, task, and comprehension test), preparing audio and video URL.

## **3. Development**

Development consists of three parts: (1) preparing product part; (2) assembling product parts; and (3) validating the original product in the form of Alpha and Beta tests. The preparation of product part is preparing the components of original product assembly consisting of: (1) Learning Management System (LMS) selection; (2) graphic/figure preparation; (3) text/script preparation; (4) audio-video URL preparation and other supporting component. The components of original product is packaged by assembling the components of product that have been prepared in design stage like text/script on instruction, direction, presentation material content, task, comprehension test, and other supporting materials such as power point software, macromedia flash software, graphic/figure/photograph, and URL address to be linked to audio and video. During preparing and assembling the original product of HEL, ongoing evaluation was conducted informally with the teachers and the students as clients. The organized learning component was uploaded into efront ELMS portal.

## **4. Evaluation Stage**

Evaluation stage is an integral part of product testing result. Evaluation stage was conducted after the original product development stage has been completed. Original product evaluation is a series of activities in product trial conducted until the finished product. Evaluation stage is divided into four sections: (1) product validation; (2) individual group trial; (3) small group trial; (4) large-scale trial, which can be implementation stage. This stage can also be divided into formative and summative

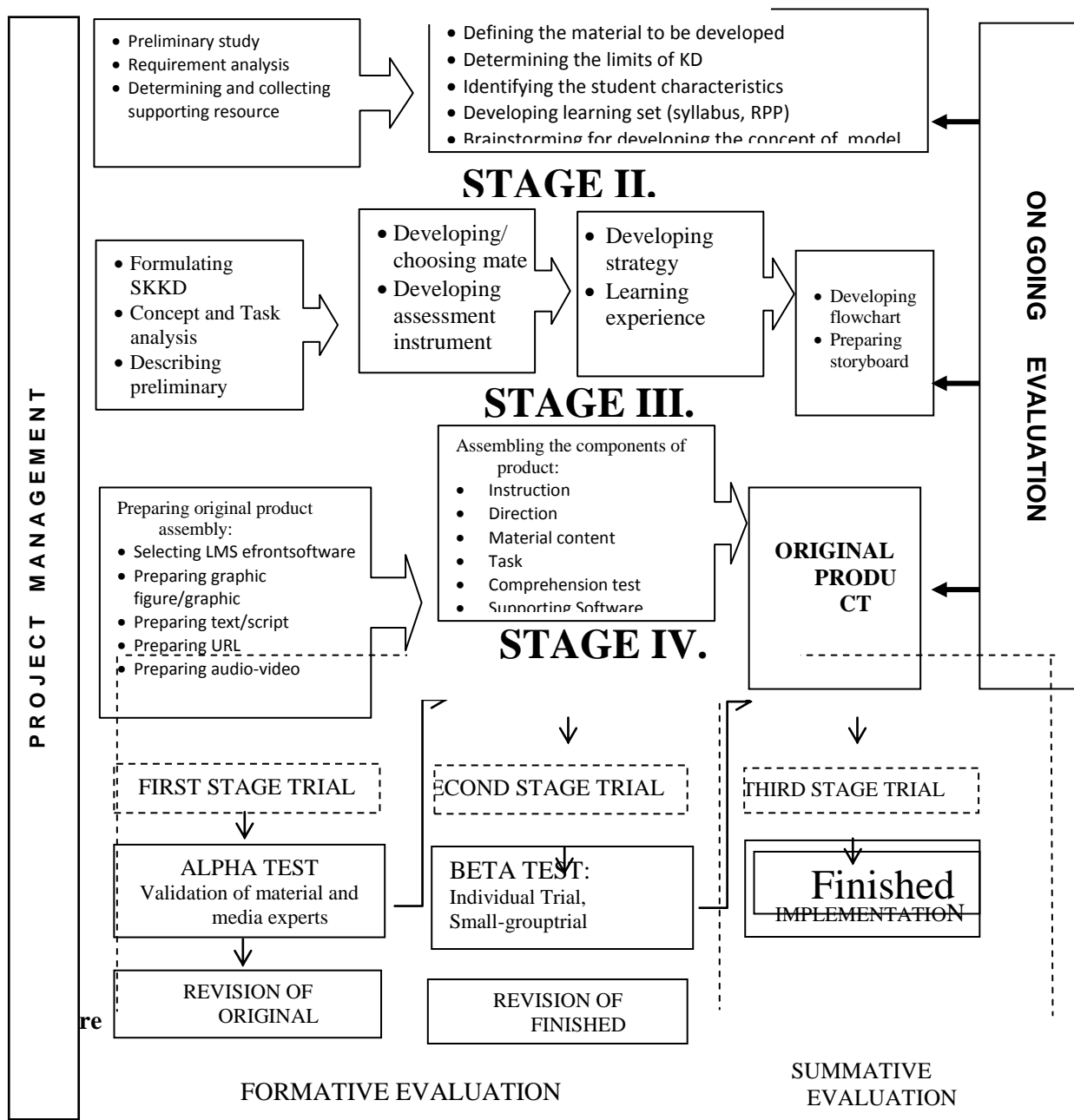


evaluations. Formative evaluation includes product validation activity (alpha test), individual group trial, and small-group trial (Beta test). The beta test activity is the part of individual group and small-group trials, the assessment of which is made by teacher and student. In this section the revision is made to yield a finished product. To confirm the result of revision, the revised product is given back to the expert to be reviewed for its feasibility before the field trial.

Summative evaluation is the part of large-scale trial activity. This trial becomes a part of finished product implementation. This summative evaluation aimed to find out the effectiveness of finished product. Summative evaluation is the activity of assessing the effectiveness of finished product implementation in real learning during the large-scale field trial. In this section, an observation was conducted on student activity and response to the implementation of hybrid e-learning model viewed from 10 indicators of observation: (1) interaction between student and teacher, (2) collaboration between students; (3) active participation in learning; (4) giving feedback between teacher and student or between students; (5) Quickly and correctly task completion time; (6) attempt of expressing opinion; (7) independently task completion; (8) attempt of competing, (9) attention to talent and skill; and (10) positive or negative response. The effectiveness of HEL media product was obtained from pretest and posttest. The product was stated as effective when the student reaction and attitude to media shows 'good' value on the average, and the student's cognitive learning outcome was based on minimum passing standard. The product was said as efficient when the users can complete their learning quickly and correctly.

Student evaluation includes the following aspects: (1) Learning objective clarity; (2) program manual instruction clarity; (3) material elaboration clarity; (4) text and writing readability; (5) exemplification, exercise, (6) evaluation on material concept comprehension; (7) clarity of instruction to work on test, the balance of material and problem (question); (8) feedback on student answer/learning outcome, language clarity used; (9) figure appearance, animation appearance; (10) freedom of selecting menu, improving learning interest. Teacher evaluation includes: (1) subject matter, introduction, (2) auxiliary information; (3) teacher attitude/motivation consideration; (4) the relation of teacher to program (interface); (5) navigation (page switching technique); (6) pedagogy; (7) participation; (8) invisible feature; (9) program robustness; (10) follow up activity; (11) evaluation problem. The design of Hybrid e-learning model-based teaching material was conducted as follows:

## STAGE I.



### B. Design of Hybrid E-learning-based Teaching Material

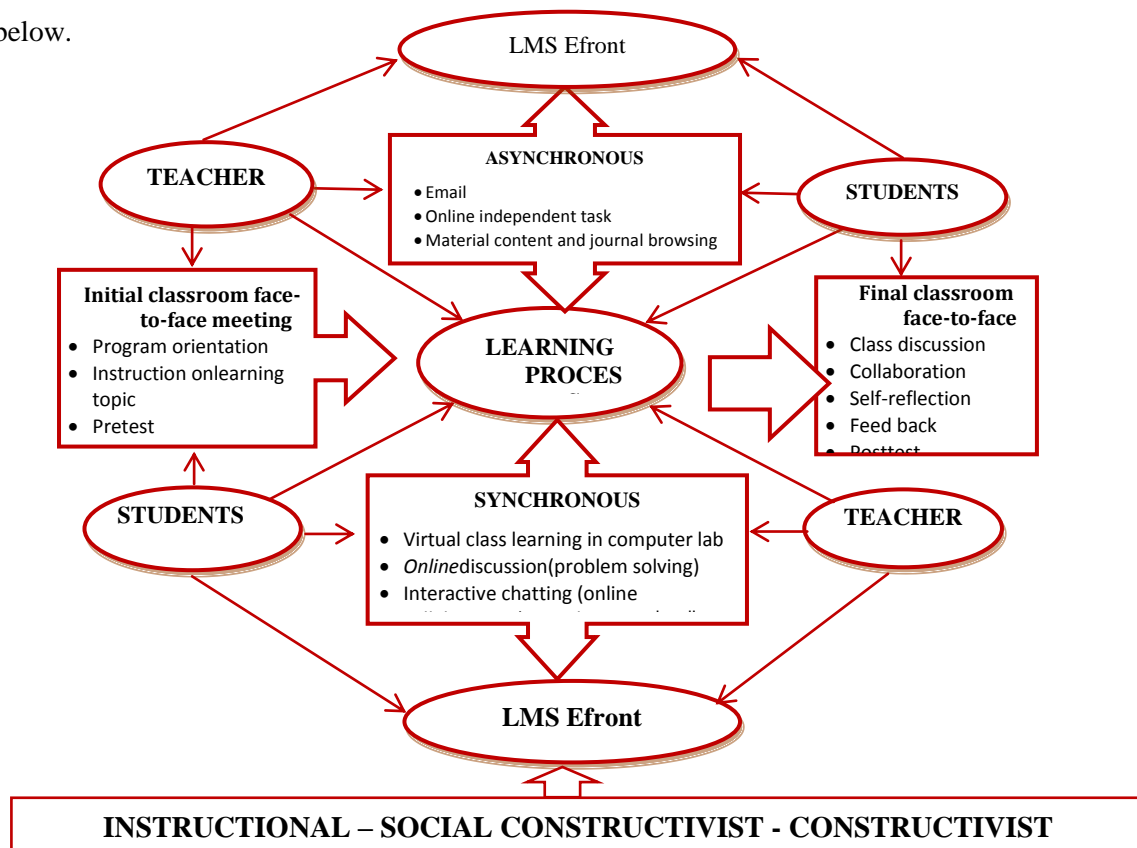
#### 1. The implementation of hybrid e-learning with integrated pedagogic aspects

The implementation of hybrid e-learning-based teaching material with integrated pedagogic aspect was conducted with the proportion of 50% face-to-face and 50% online or 50.50. This proportion is very effective and has power in improving learning process. The implementation of hybrid e-learning model is divided into three phases: 1) initial class face-to-face meeting, 2) synchronous and asynchronous learning process, 3) final class face-to-face meeting.

The orientation of initial class face-to-face meeting includes such activities as introducing the learning topic to the students, introducing the learning management system (LMS) software used to hybrid e-learning model, as well as conducting the student pretest.

Synchronous and asynchronous learning process phase is the learning process conducted synchronously and asynchronously. The process of interaction between teacher and students or between students is the one related to the content of learning material, linking teaching to learning management system portal, in this case, LMS efront. Asynchronously online communication was conducted including: e-mail, online independent task, material content and journal browsing. Synchronously only communication is carried out in virtual class that can be conducted in computer laboratory encompassing interactive chatting activity (online collaboration), simulation, online discussion about problem solving, and quiz online.

Final classroom face-to-face phase is the closing part of hybrid e-learning model carried out in face-to-face way in the classroom. This final face-to-face class is also called live classroom consisting of such activities as classroom discussion, learning process collaboration, reflection, feedback, and then ended with program evaluation activity through posttest. The advantages of this final face-to-face activity are: 1) giving the students the opportunity of exploring, 2) constructing knowledge according to student learning experience during learning process, and 3) providing positive experience to student and teacher or instructor. The hybrid e-learning with integrated pedagogic aspects is represented below.





**Figure 2. Hybrid e-learning with integrated pedagogic aspects**

Syntax of the implementation of Hybrid e-learning with integrated pedagogic aspects is presented in the table below.

**Table 1.** Syntax of the implementation of Hybrid e-learning with integrated pedagogic aspects

Syntax of the implementation of Hybrid e-learning with integrated pedagogic aspects						
INTEGRATED PEDAGOGIC ASPECT	ACTIVITY					
	Face-to-face meeting in classroom	Synchronous learning process	Asynchronous learning process	TEACHER	STUDENT	Learning Set
	RATIO 50%	RATIO 50%				
Instructional	<ol style="list-style-type: none"> <li>1. Program introduction</li> <li>2. Learning Technique</li> <li>3. Program map learning</li> <li>4. Instruction of learning topic</li> </ol>	<ol style="list-style-type: none"> <li>1. Instruction of learning topicusing Audio-Video Conference <i>online</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Learning scenario (learning map)</li> <li>2. Independent learning material</li> </ol>	<ol style="list-style-type: none"> <li>1. Presenting</li> <li>2. Explaining</li> <li>3. Describing</li> <li>4. Facilitating</li> <li>5. Material enrichment for practicing (drill and practice)</li> <li>6. Reinforcing</li> </ol>	<ol style="list-style-type: none"> <li>1. Reading</li> <li>2. Listening,</li> <li>3. Interpreting</li> <li>4. Responding,</li> <li>5. Questioning</li> <li>6. Exploring</li> <li>7. Reflecting</li> <li>8. Paying attention</li> <li>9. Imitating</li> <li>10. Confirming</li> </ol>	<ol style="list-style-type: none"> <li>1. Online Web</li> <li>2. Text, figure, audio, video, multimedia, animation.</li> <li>3. LMS Guide</li> <li>4. Link to material topic</li> <li>5. Document, <i>website</i>, and <i>e-journal</i></li> </ol>
Social Constructivist	<ol style="list-style-type: none"> <li>1. Class discussion</li> <li>2. Feed back</li> <li>3. collaboration</li> </ol>	<ol style="list-style-type: none"> <li>1. Interactive Chatting</li> <li>2. Online Discussion forum (<i>Problem solving</i>)</li> <li>3. <i>Onli</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Chatting.</li> <li>2. Online task</li> <li>3. <i>e-mail message boards</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Responding</li> <li>2. Questioning</li> <li>3. Observing</li> <li>4. Monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Constructing</li> <li>2. Analyzing</li> <li>3. Debating</li> <li>4. Interacting/cooperating</li> <li>5. Exploring</li> <li>6. Justifying</li> <li>7. Questioning</li> <li>8. Responding</li> <li>9. Improving</li> </ol>	<ol style="list-style-type: none"> <li>1. Online Web</li> <li>2. Text, figure, audio, video animation, multimedia.</li> <li>4. E-Jurnal</li> <li>5. E-Library</li> <li>6. Blog</li> </ol>

		<i>negroup collaboration</i>			10 Sharing	
Constructivist (Individual Learning)	1.Exploration 2.Self-reflection	1. Exercise 2. Experiment/Simulation	1. Online independent task. 2. <i>e-mail message boards</i>	1. Responding 2. Monitoring 3. Feedback 4.Confirming	1. Improving 2. Observing 3. Imitating 4. Downloading material, jurnal 5. Uploadingtask 6. Browsing literature 7. Writing personal blog	1. Online Web 2. Text, figure, audio, video, multimedia, animation . 3. E-portofolio 4. Blog 5. Link jurnal 6. E-Library
Evaluation	1.Pre test 2.Post test	1. Online Quiz  (comprehension testest) 2. <i>Assesment</i>	Reportingvalue	1. Evaluating 2. Analyzing 3. Reportingthe result	1. Respo nding 2. Impro ving	1. Online Web 2. Online announcement boards

2. Student activity and response to the learning with hybrid e-learning model

A matrix table below represents 10 indicators as the guideline of observation on student activity and response during the learning with hybrid e-learning:

**Table 2.** Matrix of 10 indicators of learning with hybrid e-learning observation

No	Indicator	Initial classroom face-to-face meeting	E-mail	Chat	Quiz <i>online</i>	Online discussion	Final classroom face-to-face meeting
1	Interaction between student	✓	✓			✓	✓

	andteacher						
2	Collaboration between students	✓	✓			✓	✓
3	Active participation in implementing the learning activity	✓		✓	✓	✓	✓
4	Giving feedback to teacher or student	✓		✓	✓	✓	✓
5	Time to complete the task quickly and correctly		✓	✓	✓	✓	
6	Attempting to express opinion			✓		✓	✓
7	Independently task completion		✓	✓		✓	✓
8	Attempt of competing				✓	✓	✓
9	Attention to talent and skill					✓	✓
10	Positive / negative response					✓	✓

The matrix of 10 indicators is then used in the aspects of observation guidelines to evaluate the student activity during learning implementation with hybrid e-learning. Data summary of student activity and response to learning with hybrid e-learning model during field trial is illustrated in table 3 below:

**Table 3.** Data Summary of Student Activity and Response to Learning with Hybrid E-learning model

No	INDICATOR	SMKN 2	SMK Muh.3	SMKN 5	Mean (%)	Category
		Percentage (%)	Percentage (%)	Percentage (%)		
1	Interaction between student and teacher	88.24	87.1	94.12	89.82	Very good
2	Collaboration between students	100	87.1	88.24	91.78	Very good
3	Active participation in implementing the learning activity	91.18	96.77	97.06	95.00	Very good
4	Asking feedback to teacher and friends	94.12	83.87	85.29	87.76	Very good
5	Completing the task quickly and correctly	76.47	74.19	82.35	77.67	Very good
6	Attempting to express opinion	82.35	80.65	76.47	79.82	Very good
7	Completing the task independently	100	96.77	97.06	97.94	Very good
8	Competing with friends	85.29	80.65	91.18	85.71	Very good
9	Having talent and skill in learning activity	79.41	77.42	85.29	80.71	Very good
10	Positive response (happy, laughing, clapping)	88.24	80.65	79.41	82.77	Very good
11	Negative response (sleepy, unaware, musing)	11.76	19.35	20.59	17.23	Very low

From the activities of 34 students of grade Xb of SMKN 2 Surakarta during the learning with hybrid e-learning model, it can be seen that the student activity tends to be “very good” or 76.47% - 100% including the following indicators: (1) Interaction between student and teacher, (2) Collaborating between students, (3) Participating actively in implementing the learning activity, (4) Asking for feedback to teacher and friends, (5) Attempting to express opinion, (6) Completing the task quickly and correctly, (7) Completing the task independently, (8) Competing with friends, (9) Having talent and skill in learning activity. During the trial, there are 30 or 88.24% students giving positive response, while the rest of 4 or 11.76% students give negative response.



From the activities of 31 students of SMK Muhammadiyah 3 Surakarta, it can be seen that the student activity tends to be “very good” or 77.42% - 96.77% including the following activities: (1) Interaction between student and teacher, (2) Collaborating between students, (3) Participating actively in implementing the learning activity, (4) Asking for feedback to teacher and friend, (5) Attempting to express opinion, (6) Completing the task independently, (7) Competing with friends; (8) Having talent and skill in learning activity, while the indicator of completing the task quickly and correctly belonged to “good” category or 74.19%. during trial, 25 or 80.65% students respond positively, while the rest of 6 or 19,35% students respond negatively.

From the activities of 34 students of SMKN 5 Surakarta, it can be seen that the student activity tends to be “very good” or 76.472% - 97.06% including the following indicators: (1) Interaction between student and teacher, (2) Collaborating between students, (3) Participating actively in implementing the learning activity, (4) Asking for feedback to teacher and friends, (5) Completing the task quickly and correctly, (6) Attempting to express opinion, (7) Completing the task independently, (8) Competing with friends, (9) Having talent and skill in learning activity. During the trial, 27 or 79.41% students give positive response, while the rest of 7 or 20.59% students give negative response.

The average result of teacher evaluation on the activity of students learning with hybrid e-learning model throughout trial belonging to “very category” includes (1) Interaction between student and teacher with the mean of 89.82%, (2) Collaborating between students with the mean of 91.78%, (3) Participating actively in implementing the learning activity with the mean of 95%, (4) Asking for feedback to teacher and friends with the mean of 87.67%, (5) Completing the task quickly and correctly with the mean of 77.67%, (6) Attempting to express opinion, (7) Completing the task independently, (8) Competing with friends with the mean of 85.71%, (9) Having talent and skill in learning activity with the mean of 80.71%. 82.77% of students have positive response and behavior to the process of learning with hybrid e-learning reach or belonging to “very good” category, and 17.23% of students give negative response or belonging to “very low category”.


The implementation of hybrid e-learning model is the combination of e-learning and face-to-face learning that can improve the innovative, creative and constructive thinking ability of students. The hybrid e-learning with integrated pedagogic aspect gives more advantage of overlapping particularly in maximize the in-depth learning among the students. The important aspect of hybrid e-learning model with integrated pedagogic aspects is creating flexibility in providing material, activity, and assessment that can accommodate the different learning styles of students. It enables more the students to explore knowledge in learning perspective reflecting on the learning situation and experience owned. The hybrid e-learning model could build a proactive and independent learning experience and encourage the student skill of thinking complexly. Hybrid e-learning model with integrated pedagogic aspect is designed to create space for the students to grow active learning



creativity and activity rather than to be the passive receiver of information. The utilization of LMS efront technology in hybrid e-learning model can facilitate the student's and teacher's interactivity in learning process. Learning facility in LMS efront media content could improve the student interactivity in learning. The higher the interactivity level, the higher is the student involvement in the content of material presented. The findings of research show that the students effectively participate actively and collaborate massively with peer in sharing interactive experience in learning transfer. The summary of comments taken from the result of interview on the implementation of hybrid e-learning with integrated pedagogic aspect is presented below: (1) learning with the hybrid e-learning model with integrated pedagogic aspects can grow the students' enthusiasm, thinking creativity and independency; (2) It can explore the students' ability of finding self-concept in learning, thereby relieves the teacher's duty; (3) The students feel comfortable, happy, more satisfied and self-confident in learning; (4) It practices the students to express opinion more skillfully; (5) The application of hybrid e-learning model broadly requires adequate infrastructure; (6) The application of hybrid e-learning model is very effective and efficient; (7) The students can collaborate and share knowledge online with peer, (8) The elaboration of material is more clear and detailed, because it is equipped with animation and simulation, (9) It results in new very interactive circumstance in learning, (10) The student can discuss online either asynchronously or synchronously, (11) The report on the result of student cognitive learning in e-learning portal announcement board can increase the student's learning spirit.

## **V. CONCLUSION**

The integration of pedagogic aspects into the implementation of hybrid e-learning model has internal and external effectiveness in improving the student learning outcome. The average result of teacher evaluation on student learning activity and response with the implementation of hybrid e-learning model in the three trial groups belonged to "very good category". The implementation of hybrid e-learning model with integrated pedagogic aspects evidently could improve the student learning outcome effectively, could generate learning enthusiasm, and could grow the innovative, creative and constructive thinking ability of students. The important aspects raising during the implementation of hybrid e-learning model with integrated pedagogic aspects are: (1) The creation of flexibility in provisioning material; (2) The assessment activity anticipates and accommodate the different learning style of students; and (3) It could build the student ability in pedagogic aspects so that he/she can have proactive, collaborative, and independent experience and encourage the student's complexly thinking ability. The implications of hybrid e-learning model implementation with integrated pedagogic aspect are (1) Interaction occurring between student and teacher or between students; (2) Learning process can run either at the same time and place (synchronous), or at the same time but different place (chatting online), or at different time and place (asynchronous); (3) It develops massive collaboration between students, and between student and teacher, and sharing knowledge



online with peer; (4) It grows the student's active participation in implementing learning activity; (5) There is feedback between teacher and student or between students; (6) The students could complete the task quickly and correctly; (7) This learning explore the students to express their opinion online; (8) The students could complete the task independently; (9) the students compete with their peer; and (10) the students make self-development corresponding to talent and skill during learning activity process.

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**Agus Efendi** was born in Bangkalan Regency of Madura, on August 19<sup>th</sup>, 1967. He is the seventh child out of seven siblings born from (late) H. Mohammad Moein and (late) Siti Salma. He got married with Sri Sutami on May 12<sup>th</sup>, 1996 and has three sons: Muhammad DaryAqil Al-Islami, Farhan Muwardiansyah dan Raihan Noviansyah.

Agus Efendi completed his elementary education in SD Negeri Pejagan I Bangkalan graduated in 1980, SMP Negeri I Bangkalan graduated in 1983, and he was graduated from IPA (Natural Science) major of SMA Negeri 2 Bangkalan in 1986. In 1986 he continued his study to the graduate (S1) program in Electronic Engineering Education Department of Technology and Vocational Education Faculty (FPTK) IKIP Surabaya and graduated in 1992. In 1995 he continued his study to postgraduate program in Electronic Engineering Education Study Program of IKIP Yogyakarta and graduated in 1998. He had been studying in Doctorate (S3) Program of Education Science Program of Surakarta SebelasMaret University since 2009 to 2015.

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Several scientific works resulting from research, services to community and Efficient Technology Work (KaryaTeknologiTepatGuna = TTG) have been presented and published in some journals. He has ever become a Book Editor of Building Directorate for Vocational Middle School in 2009. He has also written some modules for SMK (Vocational Middle School) and PLPG along with other works in Electronic Engineering field.



## THE USED OF VULCANIC ASH IN CONCRETE MORTAR

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**ABSTRACT :** *This research aims to determine: (1) the effect of the addition of volcanic ash as a partial replacement of fine aggregate toward the specific gravity of concrete mortar, (2) the effect of the addition of volcanic ash as a partial replacement of fine aggregate toward the compressive strength of concrete mortar. This research is experimental research, convening a trial to get the results that confirmed the relationship between the variables investigated. The variables of this research are independent variable and dependent variable. The independent variable is the percentage variation of volcanic ash 0%, 5%, 10%, 15%, 20% and 25% of the needs of fine aggregates. While the dependent variable is the specific gravity and compressive strength of concrete mortar. Test specimen to test the specific gravity and the compressive strength of concrete mortar cube-shaped side 5 cm. Mortar mix with a ratio of 1:6 and the test performed at 28 days. Each variation amounted to 4 specimens. From the test results found that: (1) The partial reimbursement of the fine aggregate by volcanic ash will increase the specific gravity of concrete mortar, the greater the percentage of volcanic ash, the greater the specific gravity of concrete mortar. However, after the optimum value is reached, then the addition of volcanic ash will result in a decrease in the specific gravity of concrete mortar. And the results showed that the addition of volcanic ash by 9,763% with the optimum specific gravity obtained concrete mortar of 2206,855 kg/m<sup>3</sup>. (2) The partial reimbursement of the fine aggregate by volcanic ash has caused the rising mortar compressive strength of concrete, the greater the percentage of volcanic ash, the higher the compressive strength of concrete mortar. However, after the optimum value is reached then the addition of volcanic ash into concrete mortar will decrease the compressive strength of concrete mortar. And the results showed that the addition of volcanic ash optimum obtained by 7% with the compressive strength of concrete mortar maximum of 12,737 MPa.*

Keywords: compressive strength, specific gravity, volcanic ash, concrete mortar

### I. INTRODUCTION

Volcanic ash from the eruption of Mount Kelud spread around Solo and Jogjakarta, the ash With no losses and gains. Losses or problems facing societies around the affected ash is a disturbance to health, especially respiratory and with the amount of volcanic ash abundant environmental causes such as rooftops, courtyards, gardens, roads and other points to be dirty. The advantages or benefits presence of volcanic ash in agriculture can fertilize the land and building the field can be used as an additive or replacement of building materials.

The amount of ash is abundant around the site as well as the composition of the ash contains silica and alumina, it can be used as an ingredient pozolan so that when mixed in the building materials can reduce the amount of cement and sand. Therefore in this study will be used as an additive of volcanic ash in building materials, namely concrete mortar.



Previous research has been conducted using volcanic ash from Mount Merapi for high-strength concrete mixtures based mikrosilika appears that the addition of a mixture of volcanic ash in concrete can produce lightweight high strength concrete with high specific gravity.

Cement mortar used for various purposes eg: masonry, masonry sides of embankments, a couple blocks, ceramic wall adhesive mate, concrete plastering, installation divider rigid pavement and other expenses.

This study aims to investigate the influence and characteristics of the materials of volcanic ash mortar with views of the mechanical properties, namely compressive strength. The results of this study are expected to be informed and disseminated so that it can be harnessed and used by practitioners, communities and governments to work plastering and masonry.

Research purposes

1. To determine the effect of volcanic ash as a partial replacement of fine aggregate toward the specific gravity of concrete mortar.
2. To determine the effect of volcanic ash as a partial replacement of fine aggregate toward the compressive strength of concrete mortar.

## **II. THEORITICAL REVIEW**

### **A. Volcanic ash**

Volcanic ash is a material of volcanic material derived from the earth's crust which is pumped into the air during an eruption. Volcanic ash can fall at distances of up to hundreds of kilometers to thousands of kilometers from the crater caused by the wind gusts. (Sudaryo and Sutjipto, 2009)

Judging from the history of geology, volcanic ash contains the main components of silica and alumina. Volcanic ash is said to be pozzolan, which is a material with the main content of silica and alumina which can react with lime (lime) at low temperature (room temperature) and the presence of water to produce a hydrate which have the nature of binding (binding) or cementation (Adamiecet al. 2008). Taking into account that the most abundant element found in magma is silica ( $\text{SiO}_2$ ) and oxygen (Krisnadwi, 2014).

Volcanic ash, often called sand is volcanic or pyroclastic fallout fallout of volcanic material ejected into the air when an eruption occurs, consisting of large up-sized rocks smooth. Large rocks (lump - gravel) usually falls around the crater to a radius of 5-7 km from the crater, and the size of the fine can fall within reach hundreds and even thousands of km km from the crater because it can be affected by the wind. Volcanic ash can be used as an ingredient because it contains elements pozolan silica and alumunia so as to reduce the use of cement as a building material. Volcanic ash can also fertilize the soil around the mountain. (Wikipedia Indonesian, 2014)

Many of the impacts caused by the eruption of Mount Kelud, One is the rain of volcanic ash. Volcanic ash contains silica compound or silicon oxide ( $\text{SiO}_2$ ). This compound is similar to glass making materials. The structure and shape of Silica visible jagged edges when viewed



microscopically. This silica compound also is Glass Hard, where the structure is very delicate. In Indonesia, Silica has a composition of 0.01 to 0.4% Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, Calcium Oxide (CaO), Manganese Oxide (MgO), Titanium dioxide (TiO<sub>2</sub>), Disodium Oxide (Na<sub>2</sub>O), Titanium dioxide (TiO<sub>2</sub>), with white, off-white, reddish or white. In addition to the manufacture of glass, silica is also used as an ingredient in cement and ceramics industries. (Ikubaru's Blogzia, 2014)

## **B. Mortar**

Mortar is a mixture consisting of fine aggregate (sand), adhesive materials (clay, lime, portland cement) and water. Mortar function is as a binder matrix constituent part of a construction either structural or non-structural. The use of mortar for the construction of a structural example masonry mortar sides to the foundation structure, while non structural example mortar bricks for a wall charger.

Mortar often called Mortel or species is a mortar made up of sand, glue and water. The adhesive material can be clay, lime, fly ash and portland cement. The sand serves as a filler material (material which was fused).

Tjokrodimuljo (2004), mentions that the mortar that both must have the properties as follows: cheap, long-lasting (durable), tractable (stirred, transported, installed, flattened), adhere well to the stone, quick dry / hard, resistant against water seepage, cracks do not arise once installed.

## **C. Cement**

Cement is a type of material that has properties all at once cohesive adhesive that allows adhesion of mineral fragments into a solid mass (Murdock L.J & Brook, K.M. 1986: 67). Cement in question is the cement that will harden in the presence of water called hydraulic cement. Portland cement is made from a fine powder of crystalline mineral whose composition is calcium or limestone (CaCO<sub>3</sub>), aluminate (Al<sub>2</sub>O<sub>3</sub>), silicate sand (SiO<sub>2</sub>), hematite (Fe<sub>2</sub>O<sub>3</sub>) and compounds MgO and SO<sub>3</sub>. With the addition of water it will be as strong as a rock.

Portland cement consists essentially of a complex compound consisting of bubuk smooth with fine grains of about 0.05 mm. Portland cement raw materials is highly dependent on the levels of the original materials contained in the portland cement raw material sources. Components of good raw material portland namely:

- 1) limestone (CaCO<sub>3</sub>) : 60% - 67%
- 2) Sand Silicate (SiO<sub>2</sub>) : 19% - 24%
- 3) The clay (Al<sub>2</sub>O<sub>3</sub>) : 4% - 8%
- 4) Iron Ore (Fe<sub>2</sub>O<sub>3</sub>) : 2% - 6%
- 5) MgO : ± 4.5%
- 6) SO<sub>3</sub> : ± 3%

(Murdock L.J & Brook, K.M. 1986: 27).



Based on the description above, it can be a sense of cement is a material produced from finely crystalline powder that have adhesive and cohesive properties that will bind and harden hydraulically after mixing with water.

#### **D. Fine Aggregate**

According SNI 03-2847-2002 (2002: 4) fine aggregate is: "Sand nature as a result of the disintegration of the" natural "rock or sand produced by stone crushers industry and has the largest grain size of 5.0 mm. Sand should not contain impurities clay, organic material and other inorganic materials. The impurities contained in the sand should not be more than 5% by weight. To investigate whether there is any dirt contained in the sand is usually used a glass measure filled with sand were investigated, then given water, shaken and stirred, then the measuring cup was placed for some time, then the light falling on it. The thickness of this layer will give you the sense that how much dirt contained.

Meanwhile, according to Kardiyono Tjokrodinuljo (1996: 13-14) explains that:

Natural sand formed from rubble for several reasons. Sand can be obtained from the ground, on the bottom of the river or by the sea. Fine aggregate having a good shape (round or approaching the cube), a clean, hard, and good gradation. Fine aggregate has the chemical stability, and in certain cases must be wear resistant and weatherproof.

### **III. RESEARCH METHODS**

This research uses quantitative methods with experimental approach carried out in laboratory conditions and equipment that fit the needs. Research was conducted in three places, to test fine aggregate material in laboratory of PTB FKIP UNS, test volcanic ash material in laboratory of FMIPA UNS and to test compressive strength and specific gravity of the test specimen in the laboratory of the Faculty of Engineering UNS.

The sample in this study is a cube-shaped concrete mortar side of 5 cm. In this study mortar with a volume ratio of cement: sand is 1:6 in the mix with the addition of volcanic ash then tested at 28 days. The number of samples to be taken as many as 48 pieces.

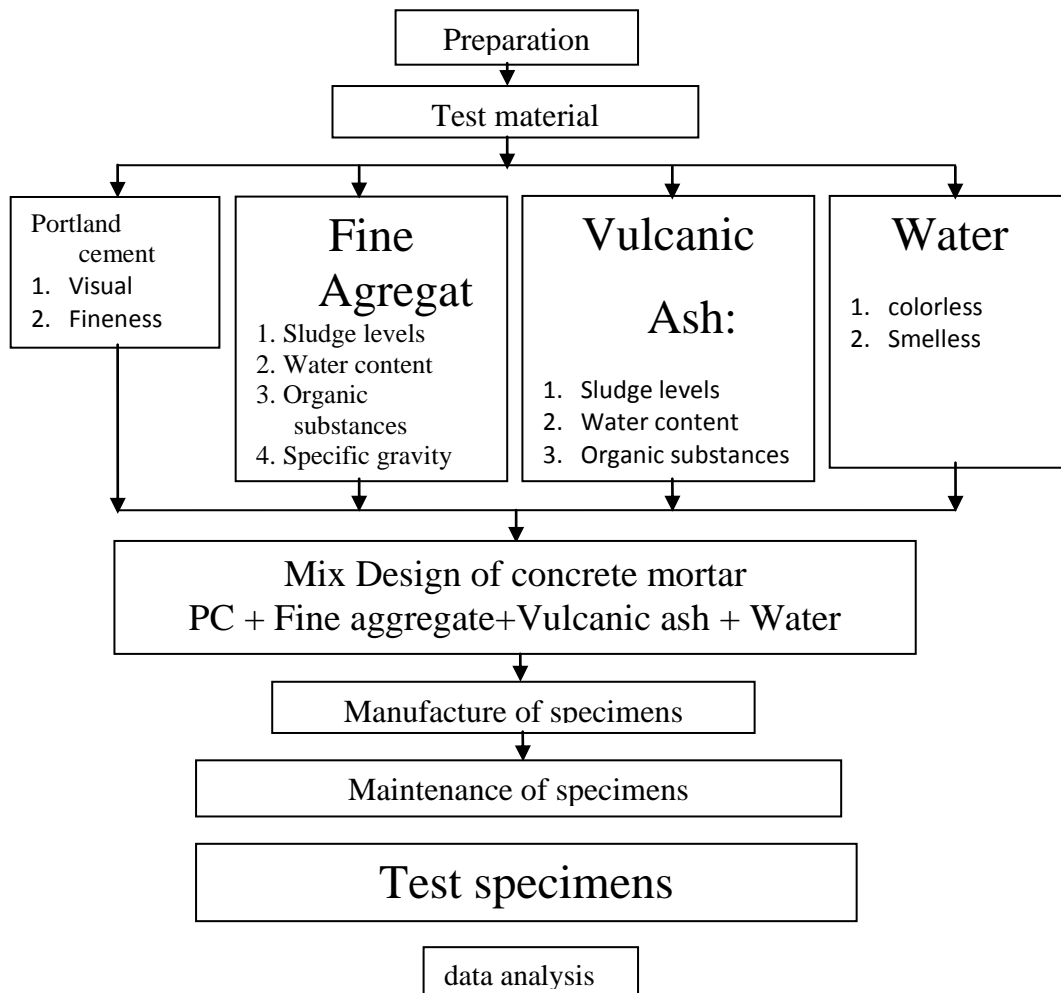
The procedure was carried out research with implementation steps were divided into seven phases:

1. Stage One, namely the preparation and provision of materials. At this point all the materials and tools that will be used is prepared beforehand. The materials used are cement, water, sand, and volcanic ash.
2. The Second Stage, the stage of test material. The first of test materials is testing the portland cement. The next test is a test of fine aggregate, and final test materials is testing the volcanic ash.



3. The third stage, which is the planning phase mixture. In the mix design, material needs to be used can be determined after the results of testing the material is known. At the design stage mix, the design refers to the standard ISO 03-6882 2002.
4. The fourth stage, the stage of manufacture of the specimens refers to the standard ISO 03- 6825 2002. The cube-shaped specimens with sides 5 cm.
5. Fifth Stage: stage maintenance, mortar test specimens treated with soaked in water for 28 days.
6. Sixth Stage. At this stage, two kinds of tests that test the specific gravity and the compressive strength of concrete mortar, concrete mortar done after 28 days.
7. Seventh Stage, the data analysis stage. Analysis of the data used is normality test, homogeneity test and regression analysis using SPSS software.

Schematically stages of this research can be seen in the flowchart stages of research on the image below:



**Figure 1.** Research Flow chart

#### IV. RESULTS AND DISCUSSIONS

##### A. The Effect of Volcanic Ash as a Partial Replacement of Fine Aggregate Toward the specific gravity of Concrete Mortar

The test of specific gravity conducted on mortar concrete cuboid side 5 cm. From the test results specific gravity in concrete mortar, obtained the data as shown in table 1.

**Table 1.** The test results specific gravity of concrete mortar

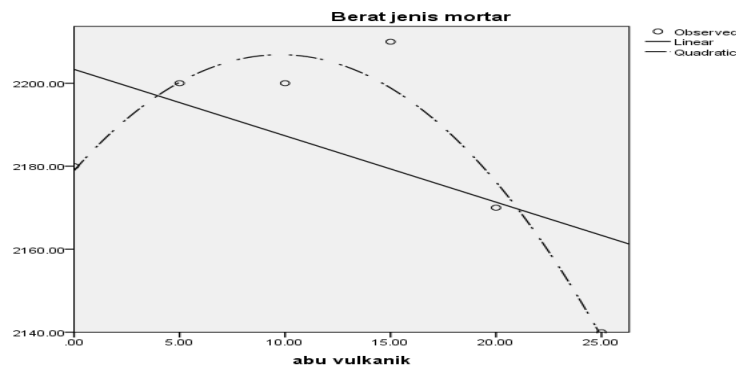
The percentage of volcanic ash	No	Dry weight (gr)	Volume (cm <sup>3</sup> )	Specific gravity (gram/cm <sup>3</sup> )	Average
0%	1	274,1	125	2,19	2,18
	2	273,5	125	2,19	
	3	270,7	125	2,17	
	4	271,2	125	2,17	
5%	1	273,1	125	2,18	2,20
	2	277,8	125	2,22	
	3	275,3	125	2,20	
	4	274,7	125	2,20	
10%	1	277,5	125	2,22	2,20
	2	273,8	125	2,19	
	3	273,9	125	2,19	
	4	272,8	125	2,18	
15%	1	275,8	125	2,21	2,21
	2	276,6	125	2,21	
	3	274,2	125	2,19	
	4	27,2	125	2,21	
20%	1	270,8	125	2,17	2,17
	2	269,8	125	2,16	
	3	270,8	125	2,17	
	4	271,6	125	2,17	
25%	1	268,7	125	2,15	2,14
	2	267,8	125	2,14	
	3	268,5	125	2,15	
	4	266,9	125	2,14	

To determine the effect of volcanic ash as a partial replacement of the gravity of fine aggregate concrete mortar used regression analysis. And regression analysis using SPSS. From the quadratic regression analysis where the independent variable is the percentage variation of the



volcanic ash and the dependent variable is the specific gravity of concrete mortar, obtained the following results:

- From the test results showed that the value of F Sig. less than 5% alpha ( $0.016 < 0.05$ ). It showed that of the independent variables tested (variation of volcanic ash) affects the specific gravity of concrete mortar.
- Correlation values (R) ties these two variables at 0.967 where it indicates that there is a very strong correlation between the partial replacement of fine aggregate by volcanic ash with a specific gravity of concrete mortar.
- While the coefficient of determination (R square) of 0.936. This suggests that the ability of volcanic ash variation affecting the rise and fall of concrete mortar specific gravity value of 93.6% and the remaining 6.4% is influenced by other variables.



**Figure 1.** Graph of percentage replacement of volcanic ash relationship with a specific gravity of concrete mortar

Model equation of the regression line is:

$$y = 2178.929 + 5.721x - 0.293x^2$$

And from the regression equation can be obtained by partial replacement of fine aggregate by volcanic ash and optimal specific gravity mortar produced. Based on the calculation of the regression line shows that the optimal replacement of volcanic ash is 9,763% by specific gravity of concrete mortar  $2206,855 \text{ kg/m}^3$ .

From the results of the regression analysis states that the partial replacement of fine aggregate by volcanic ash provides a very strong influence on the specific gravity of concrete mortar. Where the partial replacement of fine aggregate by volcanic ash has caused the rising specific gravity of concrete mortar, the greater the percentage of the volcanic ash also increase the specific gravity of concrete mortar. This is caused due to the volcanic ash finer grains of sand so that he can fill the pores in concrete mortar, which in turn makes the mortar more dense so that its specific gravity to be increased. But after reaching the optimum value, the addition of volcanic ash resulted in a decrease in the specific gravity of concrete mortar. This is due to the volcanic ash not only fill the pores but also to

replace the position of fine aggregate, where the volcanic ash grains a finer result susutnya become larger fireworks. Resulting specific gravity of mortar decreased.

**B. The effect of Volcanic Ash as a Partial Replacement of Fine Aggregate Toward the Compressive Strength of Concrete Mortar**

The test of compressive strength done when the aged of concrete mortar was 28 days. Tests performed on concrete mortar measuring 5 x 5 x 5 cm. From the results of the compressive strength test of concrete mortar, obtained the following data:

**Table 2 .Compressive Strength of Concrete Mortar**

The percentage of volcanic ash	No	P maks (N)	Surface Area of specimens (mm <sup>2</sup> )	Compressive Strength (N/mm <sup>2</sup> )	Average
0%	1	32000	2500	12,80	12,29
	2	27100	2500	10,84	
	3	32600	2500	13,04	
	4	31200	2500	12,48	
5%	1	25000	2500	10,00	12,31
	2	35300	2500	14,12	
	3	34800	2500	13,92	
	4	28000	2500	11,20	
10%	1	31100	2500	12,44	12,34
	2	30300	2500	12,12	
	3	31200	2500	12,48	
	4	30800	2500	12,32	
15%	1	31500	2500	12,60	12,85
	2	32500	2500	13,00	
	3	33100	2500	13,24	
	4	31400	2500	12,56	
20%	1	23600	2500	9,44	9,61
	2	24800	2500	9,92	
	3	24200	2500	9,68	
	4	23500	2500	9,40	
25%	1	22200	2500	8,88	8,52
	2	19200	2500	7,68	
	3	21500	2500	8,60	
	4	22300	2500	8,92	

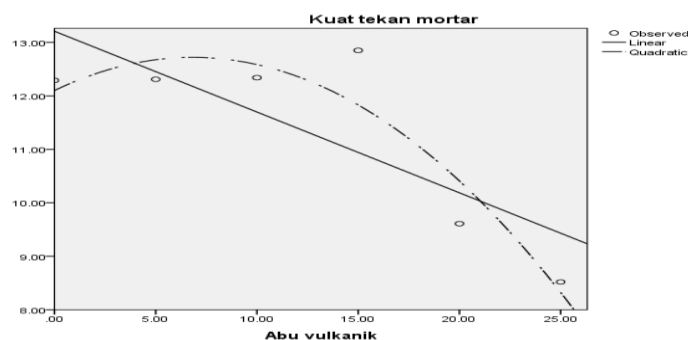




To determine the effect of volcanic ash as a partial replacement of fine aggregate on the compressive strength of concrete mortar used regression analysis using SPSS.

From the quadratic regression analysis where the independent variable is the percentage variation of the volcanic ash and the dependent variable is the compressive strength of concrete mortar, obtained the following results:

- a. From the test results showed that the value of F Sig. less than 5% alpha ( $0.042 < 0.05$ ). It showed that of the independent variables tested (variation of volcanic ash) affects the compressive strength of concrete mortar.
- b. Correlation values (R) ties these two variables at 0.938 where it indicates that there is a very strong correlation between volcanic ash as a partial replacement of fine aggregate with compressive strength of concrete mortar.
- c. While the coefficient of determination (R square) of 0,879. This suggests that the ability of variation of volcanic ash affecting the rise and fall of compressive strength is 87.9% and the remaining 12.1% is influenced by other variables.



**Figure 2.** Graph of relationship percentage replacement of volcanic ash with the compressive strength of concrete mortar

Model equation of the regression line is:  $y = 12.1 + 0.182x - 0.013x^2$

From the results of calculations based on the regression line showed that the volcanic ash optimal replacement by 7% with mortar compressive strength of concrete equal to 12,737 MPa.

From the results of the regression analysis states that the partial replacement of fine aggregate by volcanic ash has caused the rising compressive strength of concrete mortar, the greater the percentage of the volcanic ash also increase the compressive strength of concrete mortar.

This is caused due to the volcanic ash finer grains of sand so that he can fill the pores in concrete mortar, which in turn makes the mortar more dense so that its specific gravity to be increased. In addition, the increase was also caused by the volcanic ash contains chemical compounds that are reacting hydraulic binding free lime or calcium hydroxide  $\text{Ca}(\text{OH})_2$  which is released when the cement hydration process. The chemical reaction that occurs makes the original free lime is conditioned mortar hardens along the water and pozzolan contained in volcanic ash which ultimately affect the compressive strength of concrete mortar. Levels of calcium hydroxide as a result of the hydration

process is reduced because the binding that occurs with pozzolan that is contained in volcanic ash causing porosity and permeability is reduced so as to make concrete mortar becomes denser and stronger.

But if the addition of volcanic ash too much then it will lead to lower strength concrete mortar. This is due to volcanic ash had lower levels of violence than fine aggregate, so as the number of volcanic ash is added it will result in decreased strength of the concrete mortar.

## V. CONCLUSIONS

Based on the results of research on the effect of the addition of volcanic ash as a partial replacement of fine aggregate to the specific gravity and the compressive strength of concrete mortar, it can be concluded:

1. Partial replacement of fine aggregate by volcanic ash will increase the specific gravity of concrete mortar, the greater the percentage of volcanic ash, the greater the specific gravity of concrete mortar. However, after the optimum value is reached, then the addition of volcanic ash will result in a decrease in the specific gravity of concrete mortar. And the results showed that the addition of volcanic ash by 9,763% with the optimum specific gravity obtained concrete mortar of 2206,855 kg/m<sup>3</sup>.
2. Partial replacement of fine aggregate by volcanic ash has caused the rising mortar compressive strength of concrete, the greater the percentage of volcanic ash, the higher the compressive strength of concrete mortar. However, after the optimum value is reached then the addition of volcanic ash into concrete mortar mix will decrease the compressive strength of concrete mortar. And the results showed that the addition of volcanic ash optimum obtained by 7% with the compressive strength of concrete mortar maximum of 12.737 MPa.



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**EI-02-110**

**INFLUENCED FACTORS OF ENTREPRENEURSHIPS INTEREST OF ALUMNI OF FASHION STUDY PROGRAM AT DEPARTMENT OF FAMILY WELFARE OF FACULTY OF ENGINEERING OF THE STATE UNIVERSITY OF PADANG**

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**ABSTRACT :** *This research operationally is aimed to describe factors which influence entrepreneurship interest of alumni of Fashion Study Program at Department of Family Welfare of Faculty of Engineering of the State University of Padang (FT UNP). It is reviewed from three indicators; (1) Good feelings on entrepreneurship, (2) Take attention at entrepreneurship, and (3) Courage on entrepreneurship. The type of the research is qualitative descriptive where the research which is identifying, reviewing and describing researched subject as it is and resulting answers on the observed formulation of the problem. Population of this research is alumni of Fashion Study Program at Department of Family Welfare of FT UNP who graduates in the period of 2009 to 2014. Meanwhile the sampling is total sampling which consists of 47 persons. Data of the research is primary data which is obtained from questionnaire. The data analysis used percentage descriptive analysis technique through SPSS version 15. The result of the research firstly was reviewed in term of feeling of happiness is 38, 3% respondent, it means that good feelings on entrepreneurship in low. Secondly, It was reviewed from the alumni attention on entrepreneurship is 55, 3% respondent, it means that the alumni attention on entrepreneurship is low. The last, it was reviewed from alumni courage on entrepreneurship is 36, 4% respondent, it means that the bravery of alumni on entrepreneurship is also low (afraid of taking a risk in entrepreneurship).*

**Keywords:** *interest, entrepreneurship*

## **I. INTRODUCTION**

The world development has been growth rapidly which forces the people to think forward. There have some effort which has been done to improve the quality of human resources. One of them are through education which is aimed to give them knowledge and skills. The learners can develop their knowledge and skills in line with interest which is hoped to help themselves in career development.

The state university of Padang (UNP) is one of institutions of formal educational in higher education which has a role preparing human resources in the producing scholars in various disciplines. UNP has Fashion study program which is intended to generate capable and skilled associate expert performing duties as instructor, supervisor in the field of dressmaking or as well as being able to provide employment (entrepreneurships). For entrepreneurships, the learners need to have an interest, because it is a situation in which a person who has the attention to a field of work is driven by interested feelings, high motivation which brings out desire to pursue certain the field.

Hurlock (1990: 149) argues that "The interest is a source of motivation to encourage people to do what they want and they are free to choose". Interest is also a person of interest in something as proposed by Muhibbin (2007: 136) that "interest is the tendency with high excitement or great desire for something"



The interest is also influenced by various factors, both internal, external and objects. As stated by Ambiyar (1993: 14) that: "Generally, there are three (3) factors that underlie the emergence of interest in a person, they are:

1) The internal factors, is a factor of self are closely related to age, intelligence, talent, gender, motivation, and so on. 2) External factors are outside factors that are related to things, circumstances and people who are nearby, such as: information, attention and the role of parents, peers, neighborhood, community, and others. 3) Factor where its object is one observation to the object being desires and interests. If the state of the object situation that gave a positive stimulus for someone it will arouse interest of the object.

Based on the facts, just little alumni of fashion study program who are interested in entrepreneurship even though they already have enough skills for entrepreneurship. In accordance to interviews conducted by the author with the alumni fashion study program of FT UNP (JKK FT UNP) who graduates on 2009 to 2014 in March 2014. There are several factors that influence them in term of entrepreneurships such as environmental factors as well as families. Lack of encouragement for entrepreneurship of the family and the environment gives less motivation. Yet entrepreneurship in the family also plays an important role as a provider of cooperative networks, financial support, as well as courage and constructive feedback. Therefore, factors that affect the interest of entrepreneurship firstly are support from family. Further growth of an entrepreneurial spirit which is needed in entrepreneurial activity has been growth up. The entrepreneurial spirit that encourages individuals establish and manage the business in a professional manner, including confidence, initiative, achievement motivation, leadership, and bravery to take risks.

Robert Hisrich in Alma (2004: 12) explains that Entrepreneurship is the process of creating something different by devoting all his time and energy accompanied by bear risk, financial, psychological, social, and receive remuneration in the form of money and personal satisfaction. While Scarborough and Zimmerer in Suryana (2011: 15) argues:

Entrepreneur is someone who creates a new business in facing risk and uncertainty in order to obtain profit and growth by identifying opportunities and combine the necessary resources to take advantage of these opportunities.

Syahril (1999: 139) also argued that: "Entrepreneurship is the courage to make an effort and meet the needs of life that a person on the basis of its capability by exploiting all kinds of potential to produce something useful, both for themselves and others. Thus, entrepreneurship is one manifestation of human consciousness that life is a struggle with the effort that should be done with the powers that be, by opening new businesses and their own risk to achieve benefits in accordance with the expertise and skills possessed.

Achieving a successful entrepreneur, there are many factors that influence it. Skinner in Ambiyar (1993: 31) states that interest in entrepreneurship includes having good feeling of



entrepreneurship, having attention to entrepreneurship and entrepreneurial courage. Senses of excitement are psychic atmosphere within oneself towards something different and give rise to complacency in a person so that he will feel happy about something. Feelings are closely related to one's personal, and then the response of good feelings in entrepreneurship will bring interest in entrepreneurship (Hantoro, 2005). Meanwhile, factors that arise interest as stated by Crow and Crow (1973: 22) are divided into three factors;

1) *The factor inner urge*, i.e. curiosity or an urge to produce something new and different. This encouragement can make a person interested in studying a science, conducting scientific research, or other activities that challenges. *The factor inner urge* is: a person's perception of self, self-esteem, personal expectations, needs, desires, satisfaction, and expected achievement. 2) *The Factor of Social Motivation*, means that an interest in efforts to develop themselves in science, which may be inspired by a desire to gain the ability to work, or their desire to obtain an award of family or friends. Social motivation is an urge to act that is not learned, but we learn in a social group in which we live. 3) *Emotional Factor*, which is the interest relating to feelings and emotions. For example, the success would lead to a feeling of satisfaction and interest, while failure can eliminate a person's interest. So, emotion is used to describe a very pleasant feeling or a very annoying

Attention is a state of the manner in which consciousness is focused and directed to a particular object with the same reaction, further enables sharp and clear observation of the object (Pasaribu, 1996: 20). According Slameto (2010: 105) Attention is the activities which are carried out in conjunction with selecting someone stimuli coming up from the environment. Thus, entrepreneurship is about focusing attention and awareness and attitudes towards a business field that endeared by giving reactions and willing creativity and creative in accordance with the business concerned.

Suryana (2011: 34) states that "courage to take expected risks first is a key in the business world, because the results that will be achieved will be proportional to the risk taken". These courage commitments have the same intent to have a strong determination to learn from successes and failures. In line with the above opinion, "courageous spirit in taking risks means independent minded and courage to start a business without fear or anxiety overwhelmed even under uncertain conditions" (Kashmir, 2012: 18). Thus, entrepreneurial courage is the courage to take expected risks previously, independently minded and dare to start a business without fear overwhelmed.

Factors of good feeling on entrepreneurships, having attention to entrepreneurship and entrepreneurial courage are related to each other. Therefore, being an interested entrepreneur's need the willingness, ability, skills, encouragement of family, environment, risk-taking and high confidence in achieving success.

The purpose of this study is to collect the data and describe how big the entrepreneurship



interest of Alumni of Fashion Study Program at JKK FT UNP who graduates on 2009 in terms of good feeling entrepreneurship, attention to entrepreneurship and entrepreneurial courage.

## **II. METHODOLOGY OF THE RESEARCH**

This type of research is descriptive quantitative research. The population in this study was Fashion Study Program at JKK FT UNP graduates of 2006 to 2009. Total population is 47 people, and using total sampling. The type of data in this study is primary data. Primary data were obtained from the respondents themselves dealing with the factors that affect entrepreneurship interest of Alumni Fashion Study Program at JKK FT UNP graduates of 2006 to 2009 were taken through a questionnaire. The data collection is done by using a questionnaire and through test validity and reliability. The first step in data analysis was as follows:

1. Determining the frequency of distribution
2. Determining the level of percentage
3. Classifying Technique

## **III. DISCUSSION**

Based on the research, the discussion of variable factors that affect interest in entrepreneurship consists of indicators of good feeling on entrepreneurship, attention to entrepreneurship and entrepreneurial courage. It is known by referring to the percentage and category obtained at each indicator of this study as follows.

### **A. Good Feeling on Entrepreneurship**

Based on the analysis that has been done, then the factors that affect entrepreneurship interest of Alumni Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of good feeling in entrepreneurship percentage is the highest value of 32%. It is in a class interval between 100 and 103, then the results of the descriptive analysis of data obtained showed good feelings entrepreneurship indicators including at very low levels with a percentage of 38.3%. It means that the alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 have less good feelings in entrepreneurship.

According to Wasty (2006: 37), "feeling can be interpreted as a psychological atmosphere that takes part personally in the situation. The opening up to a different matter with the state or the value of the self". Feelings are closely related to one's personal, and then the response of good feelings in entrepreneurship will bring interest in entrepreneurship (Hantoro, Sirod 2005). Crow and Crow (1973: 22) say that the interest arises because of three factors, namely a boost in self, motivational factors of social and emotional factors.

Alumni of Fashion Study Program have had knowledge and skills in terms of fashion, and they must have desire of the self to entrepreneurship. Especially when it is difficult to find employment, it should be graduates of the course of fashion to create jobs by entrepreneurship. If entrepreneurship alumni, they can hire employee for some people so that unemployment will decrease. Indeed, for



creating an entrepreneur need a strong mental readiness and supported by the ability and willingness to become an entrepreneur.

### **B. Attention to Entrepreneurship**

Based on the results of data analysis of the factors influencing the interest in entrepreneurship Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of attention to entrepreneurship, the percentage of the highest value of 40%. It is in a class interval between 40 and 41. The results of the analysis of data description obtained showed indicators of attention to entrepreneurship, including at a very low level of 55.3%. It may imply that the alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 is still less attention to entrepreneurship. The attention to entrepreneurship is the concentration of a situation or a person's attitude toward a business field that is liked by giving reactions and willingness of creativity with the business field, (Pasaribu, 1996: 20).

### **C. Couraging of Entrepreneurship**

Based on the results of data analysis of the factors influencing the interest in entrepreneurship Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of entrepreneurial courage, the percentage is the highest value of 41% it is in a class interval between 45 and 47. Then, the results of the analysis of data description obtained showed that courage entrepreneurship indicators are including the low level of 36.4%. It means that Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 for the courage to take risks in entrepreneurship is still lack. In line with the opinion of Suryana (2003: 14) "Courage to take expected risks firstly is a key in the business world, because the results that will be achieved will be proportional to the risk taken".

## **IV. CONCLUSIONS AND SUGGESTIONS**

### **A. Conclusions**

Based on the description in the discussion of the results of this study can be summarized as follows:

1. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of good feeling in entrepreneurship are in the very low levels (38.3%). It means that interest in entrepreneurship graduates of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 have less feelings of pleasure entrepreneurship.
2. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 in terms of attention to entrepreneurship are in the very low levels (55.3%). It means that entrepreneurship interest of graduates Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 is very low (lack of attention to entrepreneurship).
3. Factors that influence the entrepreneurship interest of Alumni of Fashion Study Program at JKK





FT UNP graduates of 2006 to 2014 in terms of entrepreneurial courage are the very low levels (36.4%). It means that, in terms of courage entrepreneurship, entrepreneurship interest of graduates Fashion Study Program at JKK FT UNP graduates of 2006 to 2014 are not had the courage to entrepreneurship.

## **B. Suggestions**

There are suggestion to parties based on the result of the research are as follows

### **1. Students of Fashion Study Program**

It is recommended that students of fashion study program to increase their interest in entrepreneurs, so that they can manage a business, creating jobs, and achieve success in business.

### **2. Chairman of Fashion Study Program**

- a. Advised to pay more attention and increase the role of entrepreneurship courses so that students of fashion can apply the knowledge and skills they have gained, in order to have an interest in entrepreneurship. They then can create jobs in the field of fashion after finishing his studies, in accordance with the objective of D3 Program.
- b. From the aspect of entrepreneurship education, this research gives input on the essential elements in Fashion Study Program especially in increasing student interest in entrepreneurship associated with good feelings in entrepreneurship, attention to entrepreneurship, entrepreneurial courage.
- c. However, the findings of this study have showed that all of the factors studied require improvement. It is hoped that all parties consider solutions both the department and the faculty, especially the chairman of the appropriate course to overcome these problems

### **3. Subsequent Researchers.**

In subsequent researchers are hoped that this research can be used as a source of comparative literature and materials as well as consideration to further investigation. Because of the scope of the investigation is not yet able to describe all factors to entrepreneurship for alumni of Fashion Study Program. Researchers suggest the next researcher will reflect upon and examine other factors that affect the interest which has not been studied but influence entrepreneurship interest.





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EI-02-099

**THE INFLUENCE OF RECITATION METHOD ON THE  
IMPROVEMENT OF CREATIVITY AND SKILLS OF HAIRPIECE  
SUBJECT BEAUTY GOVERNANCE STUDIES PROGRAM HOME  
ECONOMIC FACULTY OF ENGINEERING  
SEMARANG STATE UNIVERSITY**

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**Abstract :** *This study intends to determine the effect of recitation methods to increase creativity and skills on Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University. The population in this study are students of Hairpiece Subject of beauty governance studies program home economic of Engineering Faculty, Semarang State University with a sample of 35 people. Data to reveal the effect of the method of recitation to increased creativity and skills Hairpiece Subjects used multiple linear regression and F-test to determine the effect simultaneously between creativity and skills as well as t test to determine the effect of partially between creativity and skill. Results showed no effect partially between creativity and skill. Based on the calculation results are known t for 2788 amounted X1 and X2 t for 3166 amounted to N of 35 known t table value of 1.70. While simultaneously Based on the results of calculations known calculated F value of 1.260 with 2 df numerator and denominator df 32 known value of F table 4.17 (0.05) and 7.50 (0.01). So F arithmetic <F table (1.260 <4.17) so that it can be concluded there is no influence between creativity and skills of recitation methods to increase creativity and skills of Hairpiece Subjects simultaneously or  $H_a$  rejected.*

Keywords: method of recitation, creativity and skill, hairpiece

## **I. INTRODUCTION**

Learning is a process of behavioral changes and the ability to react relatively permanent for their individual interactions with the environment in meeting their needs, while Learning is a deliberate effort by educators to convey science, organize and create a system environment with a variety of methods so that students can perform learning activities effectively and efficiently and with optimum results.

The development of science and technology further encouraging effort - an effort to reform the use of technology in the learning process. Educators demanded to be able to use a tool - a tool or medium used in the study, also using the appropriate method for the purpose of learning can be achieved.

The purpose of education is basically drove the learners towards the changes in behavior. Through changes in intellectual, moral and social expected that learners can live independently as individuals and social beings. In achieving this objective, learners need to interact with a learning environment that is regulated by the teacher through a learning process.

Learning by UUSPN No. 20 of 2003 is the process of the interaction of learners with educators and learning resources in a learning environment. Learning as a learning process developed by teachers to develop creative thinking can improve thinking ability of students, and to improve the ability to construct pengetahuanbaru an effort to raise a good mastery of the learning materials.



Therefore, as teachers must strive to find appropriate methods so that what has been included in the curriculum can be accomplished, especially in providing a better understanding, focused and sustainable to a mastery of concepts and skills. It is associated with the limited time available in the learning process and the amount of material to be submitted in accordance with the message in the curriculum.

Many methods are considered appropriate in the presentation of learning material in education skills, but the focus of this study, is the learning method of recitation or method of assignment, this method is one method of learning that emphasizes the student to learn, discover and feel yourself / practice even led to changes in behavior or creativity.

The problems of this study that should be resolved is How the Influence of Recitation Method Against Creativity and Skills Improvement of Hairpiece Subject's student beauty governance studies program home economic of Engineering Faculty, Semarang State University.

Knowing the recitation Method Effect Against Creativity and Skills Improvement Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University?

## **II. LEARNING**

Learning is an internal process that is experienced by every individual, therefore experience gained everyone in the learning process will be different. Learning is a process that can not be represented as directly experienced by the individual concerned. Learning as an individual's mental activity in interacting with the environment can produce changes in behavior that are relatively constant, thus becoming an important aspect in learning activities is the environment. How this environment created by arranging its elements so as to change the behavior of individuals. Because learning can be defined as the process of creating an environment that enables the process of learning. So in the main learning is how individuals learn.

The learning activities in schools is a basic function and most businesses strategically to realize the goal of instructional carried by the educational institution / school. In the execution of the functions and duties required instruksionalnya skilled teachers and professionals, because in the hands of teachers also lies the possibility of success or failure in school educational goals achieved. Therefore, the learning activities must be improved, with the selection of appropriate learning method so that the learning process can take place effectively and efficiently.

This is necessary also in the education system because this type of education beauty berorientation in which the skills of the learning process is a combination between theory and practice. Vocational education, more focused on skills (skills), designed to hone skills curriculum, discipline, and the concept of student participants about employment and entrepreneurship. Therefore, an increase in creativity becomes important in the learning process, but it also depends on each individual how to hone and improve its capabilities.

### **A. Recitation Method**



Recitation method or task is a method of learning that provides opportunities for learners to carry out tasks based on the guidelines that have been prepared teachers (Subana, 1995: 199). PNo principle the method of recitation is methods of teaching, where the teacher gives a task for learners to be completed and accounted for (Didactic / methodical General, 1993/1994: 21).

In the method of recitation, there are two important phases, namely the phase of learning and recitation phase, the learning phase is the phase of the students do the work, the writing lesson learners obtain extensive practice opportunities to be able to build a bouquet with good rhetoric, with drill composition (Ahmad, 1990: 30). While the recitation phase is the phase learners accountable for the implementation of the task, this method is also commonly referred to as a joint recitation (Socialized resitation) (Shah, 1995: 206). Thus the technique of recitation is not just a chore, but it must be accounted for by learners.

According to Nasution (1988) argued that homework can be:

- 1) The homework as their own learning, for example, studying a chapter of a textbook, translate a foreign language, reading, memorizing, and so forth.
- 2) Homework as a training tool, for example, solve the problems of the material that has been taught about the rules and principles of how to solve them.
- 3) Homework in the form of the conclusion of a number of materials that relate to the material that will be or has been learned.

In line with the above restrictions, so in this study the target is homework assignment as a training tool in which students are required to do the tasks of the material that has been taught.

Using this method seems right to education beauty procedures requiring intensive exercises to boost creativity and skill. Work assignments are structured on each completed the learning process can provide significant stimulus for students in an effort to further explore and pursue the subject matter / object of the problems in learning. Work assignments are structured provides a positive role in promoting creativity and skills of the students and also give emphasis on the essential position of execution of tasks in a structured, as one of the components that are involved in the learning process.

Recitation method is a method that can be used to emphasize the mastery of skills through the provision of duty on college student, In addition this method is also carried out if deemed appropriate time in the classroom learning materials is insufficient, while not yet fully mastered by college student, Recitation method or the task is not just a chore, but a method of learning by giving the task to college student to learn something individually or group later accountable the result is in front of the class through presentations, portfolios or in other forms. Thus the method of recitation is often called the method of assignment which is a method in which students were given special assignments outside class hours.



## **B. Creativity**

According to Roger's creative process emerged as a force associated with the new ideas and grow as a unique case of someone who is related to the interest, the events, the people in her life with someone else (Jack L. Davies, 2003: 2)

Gardner suggests a creative individual as someone who has always had the ability to solve problems, produce, or depictions of new thinking as outlined in the idea or notion that is ultimately accepted as part of a particular culture. Medium according to Robinson & Clinkenbeard, idea or ideas in problem solving are important in a development that is also a part of the intelligence. Then the creativity, talent and intellect are interrelated, since all three are important in solving problems (Anita Woolfolk: 482).

Creativity is a skill that is based on the intellectual abilities such as intelligence, aptitude, skills learning outcomes which are also supported by affective and psychomotor factors. In addition to being someone who still need a productive creative potential that comes from personality characteristics and conducive environment. Through the creation of a conducive learning atmosphere learners will be able to develop the activity and creativity in an optimal learning according to their abilities. This is also confirmed by Utami Munandar (2004: 12), that creativity is the result of the interaction between the individual and his environment. Someone affect and are affected by the environment where it is located, thus the change in the individual and in the environment can support or can hinder creative efforts. The implication is that creative ability can be improved through education.

According to George Land, creativity is a skill that can be developed and a process that can be managed. Learning to be creative like doing sports. It takes practice to develop correct muscle and involving the environment to develop (Linda Naiman, .p.3). This means that creativity can be developed through intensive exercises, because creativity is one person's intellectual ability or thinking. Creative thinking exercises can be done through general knowledge or specialized knowledge. Various ways, techniques or strategies that can be used to improve the ability to think creatively.

One strategy that can be used to enhance the creativity of learners is the use of learning methods. The use learning methods that tepatdalam learning process is expected to help learners improve understanding of concepts and principles that will ultimately be able to grow and enhance the creativity of learners through ideas and new ideas. Creativity in the course of the expected hair piece is a source of ideas in design that will be realized or practiced.

## **C. Skills**

According to Gagne called skills that are categorized into five types: 1) intellectual skills (skills intellectuals) in the form of one's learning process becomes competence to a subject so that he can classify, identify, demonstrate and generalize a symptom; 2) cognitive strategies is the ability of a person to be able to regulate intellectual activity in addressing the problems faced by regulating the internal processes of each individual in mobilizing attention, remembering and thinking; 3) verbal



information (verbal information) in the form of a person's ability to use spoken or written language in uncovering a problem with the control of information and processes are grouped according to function. This includes memorizing strategy, strategy elaboration, setting strategies, metacognitive strategies and active strategies; 4) motor skills; 5) attitudes (1988).

Skills required in the course of hair bun piece is placed on the manufacture and assesori especially in realizing the idea or design that has been made, including: a. Conformity and type arrangement, b. Mechanical arrangement: penyasakkan, fiber direction, shape, c. Penyelesaian end: tidiness, installation.

#### **D. Subjects Hairpiece**

Hairpiece is one of the subjects that must be taken and controlled student of beauty procedure on the 6th semester, because in these courses are taught how to make the kinds of -macam bun bun hairpiece as well as making ornaments out of hair, related to the studentis expected to embody the creativity or new ideas in every manufacture of hairpiece bun and garnish bun of hair material.

In the course hairpiece students equipped with the knowledge to recognize the various types and kinds of hairpiece, as well as the use of the technique and its use in accordance with the objectives. In addition, students should also be able to make arrangements chignon hairpiece made of himself and adapted to the shape of the face.

There are various techniques that must be mastered for the students in making the bun bun in making the student must master a variety of basic manufacture hairpiece, thick hair and long hair so that in the end students are expected to develop creativity by referring to the destination and type of bun that they will make. in the manufacturing practice in the classroom is often insufficient instructional time on the other side to get maximum results they need to repeat over and over. Hence the necessity of giving the task to the students that the skills being honed, thus recitation method deemed appropriate for this study.

#### **E. Hypothesis**

Based on the theoretical basis of the above, it can put forward the hypothesis in this study: "there is a significant positive effect Recitation Method Against Creativity and Skills Improvement Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University.

- a. Ho means that there is no significant positive effect between the method of recitation Against Creativity and Skills Improvement Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University.
- b. Ha means that there is a significant positive effect Recitation Method Against Creativity and Skills Improvement Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University.



### III. RESEARCH METHODOLOGY

#### A. Place and Time Research

The research was conducted on students of the 6th semester system S1 majoring beauty governance studies program home economic of Engineering Faculty, Semarang State University.

#### B. Research methods

In accordance with the objectives and problems in the research as well as other considerations based research methods used was to determine the effect of recitation Methods Against Creativity and Skills Improvement Hairpiece Subject's student of beauty governance studies program home economic of Engineering Faculty, Semarang State University?

The sampling technique used is total sampling and used linear regression analysis. While the data obtained from the practice of making bun and assesori

#### C. Research variable

The variable is the object of research or the focal point. In this research, there are two independent variables (X) and the dependent variable (Y).

1. The independent variable (variable X) include:
  - a. creativity (X1), in this research is the mastery of students' understanding of the material or hair piece. The indicators used in this study were: 1) a source of ideas, 2) design
  - b. Skills (X2). The indicators used in this study are: a). Type & type arrangement, b) .Technic arrangement; c) .resolution
2. The dependent variable (Y) is a recitation of the methods used in teaching courses hair piece.

#### D. Methods of Data Collection and Data Analysis

The data collection methods used to find data on things or variables such as notes, transcripts, books, newspapers, agendas and so forth. Document method used in this study is the result of the creativity assessment and appraisal skills

Data analysis method is a method used to process research data in order to obtain a conclusion. The analytical method used in this research are:

1. Simple regression analysis.

Specifications model used:

$$\hat{Y} = a + bX$$

Information:

$$\hat{Y} = \text{revenue}$$

a = constant

X = value hair piece

a1 = regression coefficient values hair piece to the success of the method of recitation

Proof hypothesis was conducted by F test or tests simultaneously.

To test the hypothesis of the influence of the creativity and skill results simultaneously (overall) of the success of the method of recitation is done by comparing the F arithmetic with F table.





To facilitate the completion of the calculations use the formula:

JK reg

K

F = -----

JK res

(Nk-1)

Information:

F = F price regression line

JK reg = sum of squares regression

JK res = number of quadratic residues

k = number of variables

n = number of respondents

Statistical hypothesis to test the value of F is formulated as follows:

- a.  $H_0 = a_1 = a_2 < 0$ , meaning there is no significant positive effect between creativity and proficiency results simultaneously to the success of the method resitasipada beauty student of 6th semester system.
- b.  $H_a = a_1 = a_2 > 0$ , it means there is a significant positive influence between creativity and proficiency results simultaneously to the success of the method of recitation at a beauty student of 6th semester system.

Rule conclusion:

- a. If  $F_{\text{arithmetic}} > F_{\text{table}}$  then  $H_0$  is rejected, which means that there is the influence of variables creativity and proficiency results simultaneously to the success of the method of recitation beauty student of 6th semester system.
  - b. If  $F_{\text{arithmetic}} < F_{\text{table}}$  then  $H_0$  is rejected, which means there is no influence of variables creativity and proficiency results simultaneously to the success of the method of recitation beauty student of 6th semester system.
2. To determine whether there is influence creativity and proficiency results partially on the success of the method resitasipada beauty student of 6th semester system, it can be done by t test with a hypothesis as berikut:
- a.  $H_0 = a_{1.2} a_{2.1} < 0$  means there is no significant positive effect between creativity and proficiency results partially on the success of the method of recitation at a beauty student of 6th semester system.
  - b.  $H_0 = a_{1.2}, a_{2.1} > 0$  means there is a significant positive influence between creativity and proficiency results simultaneously to the success of the method of recitation at a beauty student of 6th semester system.



#### IV. RESEARCH RESULT

Hairpiece is one of the subjects that must be taken and controlled student of beauty procedure on the 6th semester, this course teaches how to create a kind of hairpiece -macam bun and make a bun of hair ornaments, terkait to that studentis expected to embody the creativity or new ideas in every manufacture of hairpiece bun and garnish bun of hair material.

In the course hairpiece students equipped with the knowledge to recognize the various types and kinds of hairpiece, as well as the use of the technique and its use in accordance with the objectives. In addition, students should also be able to make arrangements chignon hairpiece made of himself and adapted to the shape of the face. Relating to governance capabilities required to be possessed repetitive exercises that require a longer time while the lecture is limited. Through the method of recitation expected creativity and skills of the students, the better.

##### A. Description of Research Results

###### 1. Creativity

The results obtained using a 20 item question refers to the following indicators: a source of ideas and design

###### 2. Skill

Referring to the seven (seven) the following indicators: a.Tema, b. Mechanical arrangement: Lounge / line, shape, color, line, c.Tempat: window display, exterior displays, interior display.

Here are presented the results obtained from the calculation of the value of creativity and skill

X1	X2	Y	X1X2	X1Y	X2Y	X12	X22	Y2
78	90	87	7020	6786	7830	6084	8100	9025
77	90	86	6930	6622	7740	5929	8100	7396
86	86	86	7396	7396	7396	7396	7396	7396
80	92	88	7360	7040	8096	6400	8464	7744
92	95	95	8740	8740	9025	8464	9025	9025
88	87	89	7656	7832	7743	7744	7569	7921
85	88	89	7480	7565	7832	7225	7744	7921
87	95	93	8265	8091	8835	7569	9025	8649
76	94	87	7144	6612	8178	5776	8836	7569
79	96	91	7584	7189	9024	6241	9216	8281
75	93	87	6975	6525	8091	5625	8649	7569
95	94	94	8930	8930	8836	9025	8836	8836
77	92	88	7084	6776	8096	5929	8464	7744
80	86	86	6880	6880	7396	6400	7396	7396
76	96	90	7296	6840	8640	5776	9216	8100
80	85	86	6800	6880	7310	6400	7225	7396
73	85	82	6205	5986	6970	5329	7225	6724
78	89	86	6942	6708	7654	6084	7921	7396
75	92	86	6900	6450	7912	5625	8464	7396
83	86	86	7138	7138	7396	6889	7396	7396
78	89	86	6942	6708	7654	6084	7921	7396
64	93	84	5952	5376	7812	4096	8649	7056
58	84	76	4872	4408	6384	3364	7056	5776
83	94	90	7802	7470	8460	6889	8836	8100
86	88	88	7568	7568	7744	7396	7744	7744
76	92	86	6992	6536	7912	5776	8464	7396
91	94	93	8554	8463	8742	8281	8836	8649

76	88	85	6688	6460	7480	5776	7744	7225
75	86	84	6450	6300	7224	5625	7396	7056
76	90	86	6840	6536	7740	5776	8100	7396
91	89	90	8099	8190	8010	8281	7921	8100
86	98	94	8428	8084	9212	7396	9604	8836
65	89	82	5785	5330	7298	4225	7921	6724
72	93	88	6696	6336	8184	5184	8649	7744
81	88	86	7128	6966	7568	6561	7744	7379
2778	3166	3060	251 421	243 717	277 424	222 120	286 852	269 457

## B. The regression equation

Based on the research and analysis of the research results obtained by the linear regression equation as follows:

$$\hat{Y} = 9.096 + 0.729 X_1 + 0.224 X_2$$

Where:

Y = a method of recitation

X<sub>1</sub> = creativity

X<sub>2</sub> = skill

The linear regression equation means that the positive constant value of 9.096 states that creativity and skills positively influence the success of the method of recitation. Regression coefficients X<sub>1</sub>, stated that any increase in the creativity of the unit, it will cause an increase or an increase of 0,729 recitation method. While the regression coefficient X<sub>2</sub> stated that any increase in the skills of the unit, it will cause an increase or success of the method of recitation of 0.224.

## C. Hypothesis testing

### 1. Partial

To determine whether there is influence between the independent variable on the dependent variable partially the t test. Based on the results of the calculation are knownt for 2788 amounted X<sub>1</sub> and X<sub>2</sub> t for 3166 amounted to N of 35 known t table value of 1.70. The result of the comparison is clear:

- 1) X<sub>1</sub> - 2788 t - t Table 1.70 - t > t table - H<sub>a</sub> accepted
- 2) X<sub>2</sub> - 3166 t - t Table 1.70 - t > t table - H<sub>a</sub> accepted.

### 2. Simultaneous

To determine the effect of creativity and skills to the success of the method of recitation simultaneously tested F. Based on the results of calculations known calculated F value of 1.260 with 2 df numerator and denominator df 32 known value of F table 4.17 (0.05) and 7 50 (0.01). So F arithmetic <F table (1.260 <4.17) so that it can be concluded there is no influence between creativity and skills to the success of the method of recitation on the 6th semester student progdi beauty procedures simultaneously or H<sub>a</sub> rejected.



## V. DISCUSSION

The results showed a significant influence partially (separately) between creativity and skills to the success of the method of recitation on students of grammar beauty 6th semester while simultaneously (together) the results showed no significant relationship between creativity and skill to success method of recitation at a beauty student of 6th semester system.

## VI. CONCLUSIONS AND SUGGESTIONS

### A. Conclusions

According to the results of research as described in Chapter V, then some conclusions can be summarized as follows:

1. To determine whether there is influence between the independent variable on the dependent variable partially the t test. Based on the calculation results are known t for 2788 amounted X1 and X2 t for 3166 amounted to N of 35 known t table value of 1.70. The results of the comparison:
  - a). X1 - 2788 t - t Table 1.70 -  $t > t$  table -  $H_a$  accepted
  - b). X2 - 3166 t - t Table 1.70 -  $t > t$  table -  $H_a$  accepted.
2. To determine the effect of creativity and skills to the success of the method of recitation simultaneously tested F. Based on the results of calculations known calculated F value of 1.260 with 2 df numerator and denominator df 32 known value of F table 4.17 (0.05) and 7.50 (0.01). So F arithmetic  $< F$  table (1.260  $< 4.17$ ) so that it can be concluded there is no influence between creativity and skills to the success of the method of recitation on the 6th semester student beauty governance studies procedures simultaneously or  $H_a$  rejected.

### B. Suggestion

Based on the conclusion, it can be proposed some suggestions as follows:

1. Necessary understanding in more depth planning hair piece, especially in developing sources of ideas
2. Assessed the need for more about other things that can affect the success of the method of recitation



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## DESIGN MEDIA INTERACTIVE LEARNING FOR DAILY PRAYERS BASED MOBILE DEVICE WITH RAPID APPLICATION DEVELOPMENT METHOD (RAD)

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**ABSTRACT** : Developments in information technology and science today become a necessity that must be mastered by every individual in order to compete in the world of work. For that the education required to be able to equip learners with the knowledge and skills appropriate field. Requirement for a concept and mechanism of teaching and learning based on information technology was inevitable. The times, knowledge and skills can change the attitudes and behavior of this can occur because of the interaction between a new experience with the experience never experienced before. For addressing these developments, it is necessary to have a reliable resource and requires a change in the material flexible and geared towards the development of technology and the science. Besides having the knowledge and expertise that is competitive it's also needed skills and a good understanding of religion to become a man physically and mentally healthy. It is necessary to combine education faithful and devoted (IMTAQ) with science and technology (IPTEK). This research resulted in the design of applications for the daily prayer readings based mobile device, which aims to become one of the media or a learning tool and also make it easier for people on the daily prayer readings with the RAD method.

**Key Words** : Technology Information, Mobile device, RAD, IMTAQ

### I. INTRODUCTION

Taxonomy of Learning are defined based on the assumption that educational programs can be viewed as an attempt to change the behavior of students by using multiple subjects. Indonesia as a country with a Muslim majority is considered very important for entering religious elements in their education. Therefore besides having competitive knowledge and expertise is also needed skills and a good understanding of religion to become a man physically and mentally healthy. So we need to combine education faithful and devoted (IMTAQ) with science and technology (IPTEK). It is also in conformity with one of the domains in which the domain Affective Blooms taxonomy that emphasizes behavior on aspects of feelings and emotions, such as interests, attitudes, appreciation, and how adjustment.

Developments and changes that occur in the life of society, nation and state in the country and the issues to date from abroad that may affect the community and the nation. In this life is inseparable from science and technology (Science and Technology Dan IMTAQ (Iman and Taqwa, science and technology can be specified as a science / knowledge while IMTAQ itself as Faith / Faith. A new breakthrough to facilitate learning for children, adults and the elderly is a device mobile that can implement a variety of such recognition in the form of the teachings of Islam whom studied daily prayer readings.

Therefore, the government has issued Law on National Education Section 3 of Chapter II UU Sisdiknas No. 20 2003 aiming that education serves to develop the ability to form the character and



civilization of the nation's dignity in the context of the intellectual life of the nation, aims to develop students' potentials to become the Man of faith and devoted to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible".(Kemdikbud, 2003)

Islamic educational applications especially applications daily prayer readings actually been much made but there are still many shortcomings. In the version originally just a prayer inscribed with Arabic display less clear and well meaning, then comes the next version with additional features early versions until now there has not led to the translation feature displays prayer readings in two languages and features instructional evaluation.

The research aims to design the shapes of other applications for daily prayer readings by adding features that bring prayer readings translation in two languages and features instructional evaluation and also writing clearer to further maximize the mobile-based devices. Methods of software development process model that is incremental especially for shorter processing time. Utilizing information technology develops currently using mobile phones as a medium of learning.

Application design can't do additional data daily prayer readings automatically, the addition of daily prayer readings to be done manually.

## **II. Framework Theory**

### **A. Definition of Prayer**

Prayer comes from the Arabic word which means: calls, invites, requests, supplications, prayers, and so on.(Munawir, 2002). Pray that means calling, call, or invoke the aid of God Almighty for everything to be desired. The call to God can be in the form of speech beads (SubhanAllah), Praise (Alhamdulillah), forgiveness (Astaghfirullah) or seek refuge (A`udzubillah), and so on.(Kaelany, 2000)

Prayer the position as a frame of a series of Faith and Islam. Because he has a religious value which will determine the safety of life in the world and provide a good place in the hereafter. Thus, prayer is expressed as the path that produces what is aspired. It is very important to implement the learning process so as to enhance the good faith in which faith would have a positive impact in people's lives.

### **B. Mobile Device**

The mobile can be interpreted as an easy transfer from one place to another, for example, mobile phones mean that the phone terminal which can be move easily from one place to another without termination or interruption of communications.

The mobile application comes from the application and mobile. Application which means the implementation, the application, use. In terms of applications is a ready-made program designed to perform a function for the user or other applications and can be used by the intended target, while mobile can be interpreted as a transfer from one place to another (Buyens, 2001). This application can



be accessed through wireless devices such as cell phones and PDAs. With the spread of telecommunication devices today demands also the growing need for mobile applications.

### **1. J2ME**

The Java 2 Micro Edition (J2ME) in addition to providing the same Java language, excelled in portability (the ability to run anywhere). J2ME is a combination formed between a set of Java interfaces are often referred to as the Java API (Application Programming Interface) with JVM (Java Virtual Machine) designed specifically for the instrument, ie, the JVM with limited space (Raharjo, Imam, & Haryono, 2007). J2ME is divided into configuration and profile. Configuration is a Java library and the minimum capabilities possessed by the developers of J2ME, which means a mobile device with java capabilities would be optimal to be appropriate. Configuration is to set things about the similarities that can be used as the size of the suitability of the inter-device. J2ME has been defined in two configurations, namely the Connected Limited Device Configuration (CLDC) for small devices and Connected Device Configuration (CDC) for larger devices.

### **2. Unified Modeling Language (UML)**

UML (Unified Modeling Language) emerged for their visual modeling needs to specify, describe, construct, and documentation of the software system. UML is a visual language for modeling and communication about a system using diagrams and supporting texts. UML only works for modeling. So the use of the UML, is not limited to particular methodology, despite the fact that the most widely used UML in object-oriented methodologies. (M. Shalahuddin, 2013)

## **III. METHODOLOGY**

### **A. Methodology Data Collection**

The methodology used in this study was the observation or observation. This method is done by observing directly the phenomena to be studied. The phenomenon is studied in the form of an assessment of examples of mobile applications that already exist. In addition, the study was done for the literature search and data collection by reading books, reports relating to the object of research and can be used as theoretical basis and can be used as a comparison.

### **B. Systems Development Method**

Method of Rapid Application Development (RAD) is a method of software development process model that is incremental especially for shorter processing time. If the software needs are well understood and the scope of the software coped well so users can complete the creation of the software with the time that work on several components of each processing can be done in parallel (M. Shalahuddin, 2013). RAD's concept model is the development of software interact with each other is essential intended to be highly agile development and in dealing with the changes that occur. Furthermore this RAD concept model for a short processing time period of 60-90 days.





## Use case Apps Reading Prayer Everyday based J2ME

Name Use case : Reading Prayer Everyday

Actor : User

Application Name : Application Reading Prayer Everyday based J2ME

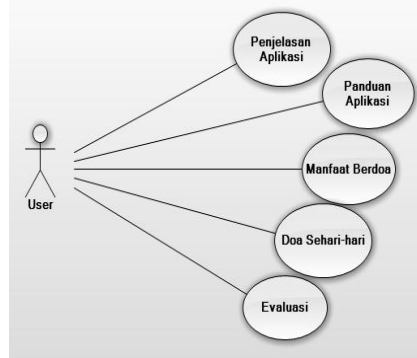


Figure 3.2 Use Case Diagram Reading Apps Everyday Prayer

### 3. Activity Diagram

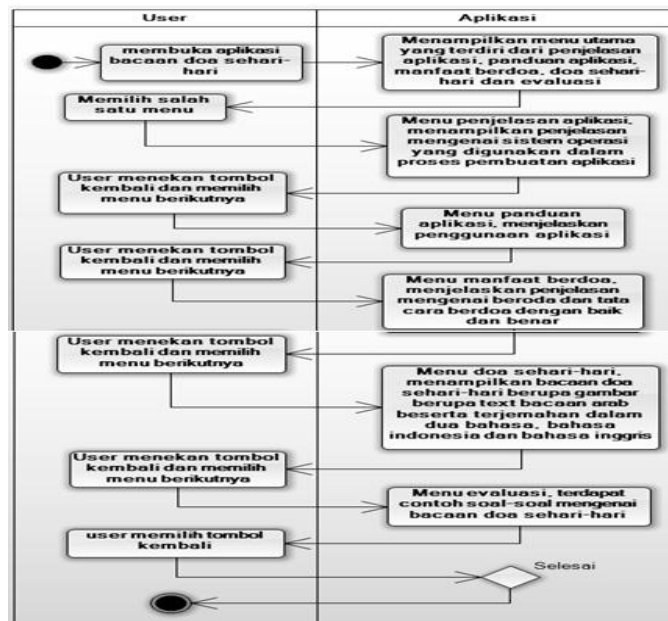


Figure 3.3. Activity Diagram Reading Prayer Everyday

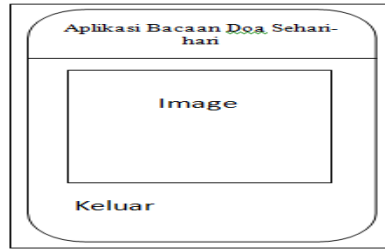
## V. RESULTS OF DESIGN

### A. Interface Design Reading Prayer Everyday

Interface design are the main design which will be used by applications, interface design is functioning separately design the look and design of the application form designed a simple layout.

#### 1. Initial View

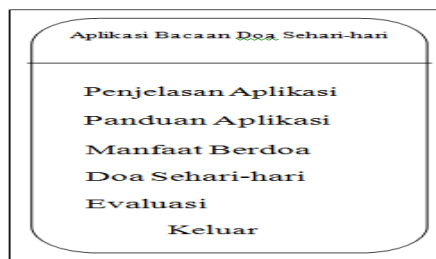
Splash screen page is the first page to appear when the app daily prayer readings run. This page is a splash page when the application runs. This page contains the elements Image Item and Assign a new Ticker section titles in the form of applications opener.



**Figure 3.4** Initial View Reading Apps Everyday Prayer

2. Display the Main Menu

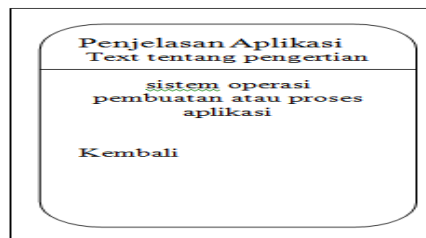
This form is designed to display the main menu in the main menu of the application, namely application menu description, application guidelines, the benefits of prayer, daily prayer and evaluation. In addition there is an exit button that serves to exit the application.



**Figure 3.5.** Main Menu Display Applications Reading Prayer Everyday

3. Explanation Menu Display Applications

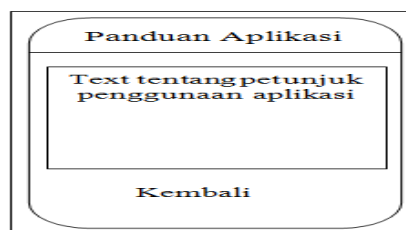
Explanation Display Application Form is designed to display the explanation of the operating system used in making the application or process an application. In addition there is a button that is returned that serves to exit the application.



**Figure 3.6.** Explanation Menu Display Applications

4. Display Menu Guide Application

Display Form Application Guide is designed to show you how to use the application procedures properly. In addition there is a button that is returned that serves to exit the application.

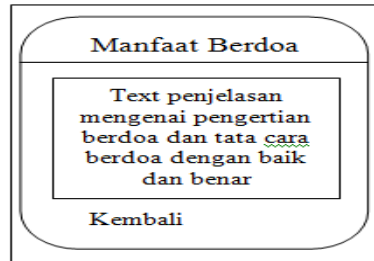


**Figure 3.7** Display Menu Guide Application

5. Display Menu Benefits of Prayer



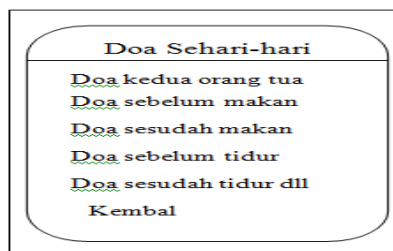
This form is designed to display an explanation about praying and explanation regarding the procedures to pray properly. In addition there is a button that is returned that serves to exit the application.



**Figure 3.8** Display Menu Benefits of Prayer

#### 6. Display Menu Daily Prayer

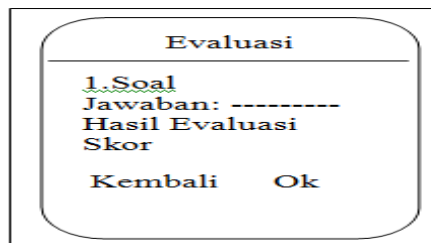
Form the daily prayer which consists of images of text such as Arabic, Latin letters of the Arabic language, the meaning of the text reading prayers in Indonesian and English. In addition there is a back button that serves to return to the form selection of daily prayer readings in the application.



**Figure 3.9.** Display Menu Daily Prayer

#### 7. Display Menu Evaluation

This form is designed to display the menu sample evaluation questions of daily prayer readings. Where the user to answer any questions that exist in the application and the application displays the results of the assessment of each user answers. In addition there are two buttons, namely: Return the function returns the menu to the main menu and the Ok button that serves to show the results of the valuation of answering questions.



**Figure 3.10.** Display Menu Evaluation

### B. Planning Application Testing

The software testing is a stage to find mistakes and shortcomings in the software that is built so it can be known whether the software is fit for purpose or not. The test methods used in this software is a black box testing method. Black box testing focuses on functional requirements of the software.

Black box testing itself is held in the functional testing environments builders. Black box testing following:

**Tabel 1.** Deskripsi *Black Box Testing*

Menu	Input	Output	States
Main Menu	List dipilih: Penjelasan Aplikasi	Penjelasan Aplikasi	
	List dipilih: Panduan Aplikasi	Panduan Aplikasi	
	List dipilih: Manfaat Berdoa	Manfaat Berdoa	
	List dipilih: Doa Sehari-hari	Doa Sehari-hari	
	List dipilih: Evaluasi	Evaluasi	
	List dipilih: Exit	Exit	
Penjelasan Aplikasi	Menu dipilih: Pengertian	Pengertian	
	Tombol Back	Menu utama	
Panduan Aplikasi	Menu dipilih: Penjelasan	Penjelasan	
	Tombol Back	Menu utama	
Manfaat berdoa	Menu dipilih: Penjelasan	Penjelasan	
	Tombol Back	Menu utama	
Doa Sehari-hari	Menu dipilih: kumpulan doa sehari-hari	Kumpulan doa beserta penjelasan	
	Tombol Back	Menu utama	
Evaluasi	Menu dipilih: Contoh soal	Soal dan hasil	
	Tombol Back dan Ok	Menu utama dan hasil jawaban	

### III. CONCLUSIONS

#### A. Conclusions

Based on the data collected and the analysis of the application of daily prayer readings that have been there it can be concluded:

- 1) Applications Reading Prayer Everyday based J2ME is designed to facilitate the study of daily prayer readings, in addition to the use of mobile media as a learning medium.
- 2) Reading Apps Everyday Prayer can only be implemented on a Java-based mobile phones such as Nokia, Nexian etc.
- 3) The application does not use the media connection GPRS (General Packet Radio Service) so that these applications can be learned anywhere without the need to pay attention GPRS connections in its territory.



## B. Recommendations

The suggestions for developing applications are:

- 1) Applications Reading Prayer Everyday based J2ME is expected to be further developed, as can display animations, so users will more easily understand the material.
- 2) The need for monitoring of memory used in order to avoid over flow memory.

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EI-02-101

## MODEL DEVELOPMENT OF LEARNING DIGITAL TECHNIQUES PRACTICUM IN VOCATIONAL HIGH SCHOOL USING SIMULATION PROGRAM

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**Abstract :** Most vocational high schools (SMK) mainly private SMK not have adequate practicum equipment, but the equipment needed to support its students' understanding of the theory they have learned. There is inadequate practicum equipment not only in numbers but also in terms of The type of equipment. The simulation program is a program that is designed such that can simulate events such as the actual incident. With the simulation program, practicum implementation to do exactly the same with the practicum implementation using practicum equipment, ultimately limits the amount and type of practicum equipment will be eliminated.

Keywords: practicum equipment, SMK, the simulation program

### I. INTRODUCTION

Most vocational schools (SMK) mainly private SMK not have adequate equipment practicum, but the equipment needed to support its students understanding of the theory they have learned. There is inadequate equipment practicum not only in numbers but also in terms of the type of equipment. High price of a piece of equipment practicum make many vocational schools (SMK) is not able to hold it, as a result of the school's difficulties in implementing practicum. In addition to the lack of equipment practicum, the ratio between the amount of equipment with a balanced number of students who did not make the implementation practicum also be inefficient. In a proportion of teachers have sought to innovate by providing practical learning in other ways even if ways are not in accordance with the type of practicum that should be done by the students, for example, the manufacture of radio, bell-making and others.

Of the many types of practicum held at Vocational High School (SMK) in particular in the areas of electronics expertise, the author tries to develop a model practicum on the subjects of digital techniques using simulation program. Although at this time there has been some simulation programs such as Proteus, Matlab, SimLib and others and there is also a Web-based, but a simulation program was created for general use and not for specific use and for Web-based will be a lot of problems on the Internet network as most private vocational school does not have internet network, even if there was not sufficient bandwidth to implement the web-based practicum.

### II. BASIC THEORY

Practicum the activities undertaken to provide insight to students about subjects they have learned, understanding gained from the practicum is a fact that proves or test a concept they have learned through theory.

According Zaenuddin (1996) practicum useful for:<sup>4)</sup>

- Coaching skills required students
- Implement and integrate the knowledge and skills possessed significantly in practice
- Prove something scientifically or do scientific inquiry
- Respect for the knowledge and skills possessed

For the implementation of pratikum very important in supporting teaching and learning in vocational schools. It's just to implement the correct practicum enormous costs required to provide facilities and infrastructure.

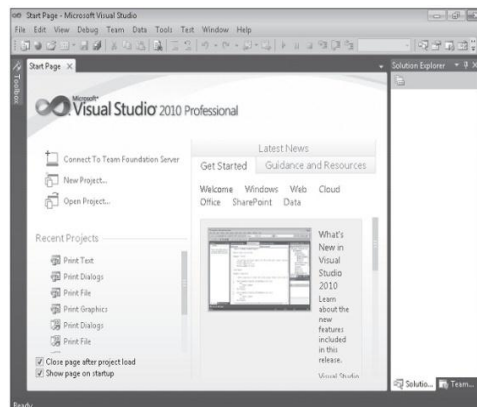
The simulation program is an application program that is designed to mimic/make event like the actual incident, many simulation programs that exist today can be used for the implementation of practicum such, Proteus, MatLab, EWB, SimLib and others, it's just that the program does not specifically designed for implementation practicum in schools.

Visual Basic 2010 is an application program that has adopted the concept of Object Oriented, the application program that will be used to create a simulation program practicum digital techniques in vocational high schools. This program is used because it is more familiar and easier to manufacture and do not have to memorize coding library that will be used for when an object is used automatically library will indirectly include in coding.

GUI (Graphic User Interface) has been introduced since Visual Basic 6.0, with the GUI design module practicum becomes easier.

The basic manufacture of Visual Basic is form, with their Form display settings become easier and making the script easy for a simple ( simple scripting language).<sup>5)</sup>

Making the program using Visual Basic is done by making an application in Form view. Then the script given in the component of the program - given component. Form prepared by the components that are in the Toolbox and any components used must be arranged through the window Property properties.<sup>5)</sup>



**Figure 1.** Interface Visual Basic2010.<sup>2)</sup>



### III. SIMULATION PROGRAM DESIGN

The simulation program that will be created consists of two parts:

#### 1. Teacher Activity Sheet (LKG)

In the sheet (Form), the teacher can do several activities, namely:

- a. Designing practicum module that will do right by students
- b. Conducting tests on modules made practicum
- c. Monitoring pratikum activities undertaken by students.
- d. The report examines student practicum

#### 2. Student Activity Sheet (LKS)

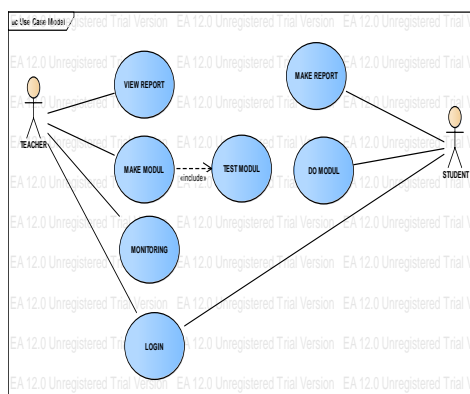
In the sheet (Form) The students can do activities, namely:

- a. Conducting practicum accordance with practicum module that has been designed by teachers
- b. Create activity report practicum
- c. Repeat practicum activities for stabilization.

Practicum module is designed using two types namely:

- a. Connected to the network through a LAN (Local Area Network)
- b. Do not connect to the network (Portable)

#### A. Use Case Diagram

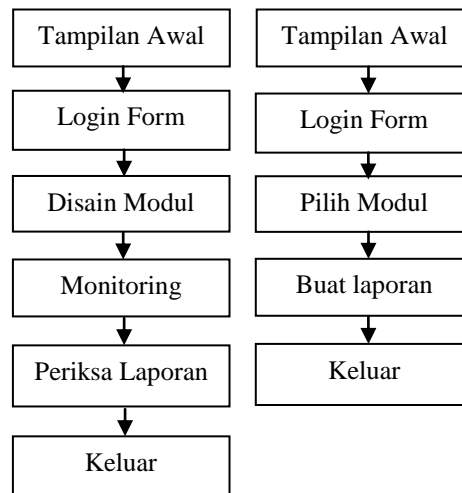


**Figure 2.** Use Case Diagram

Use case diagram created to illustrate how a teacher interacts with module practicum, of the image can be seen that the teachers are working on the module and inspect practicum report carried out by the students. While students do practicum accordance with practicum modules made by teachers and create reports practicum after practicum implemented.

Practicum implemented before students and teachers having to login to the system, it is necessary to identify users of the system. If the system is run on the network, students can immediately make a report practicum and the report can be viewed by teachers who are then given ratings. And if it does not run in a network that students can do practicum repeatedly. In addition, teachers can monitor student activities at the time of practicum in sheet activities of teachers so that students will always focus in implementing practicum because their actions can be monitored by the teacher.

## B. Design Interface

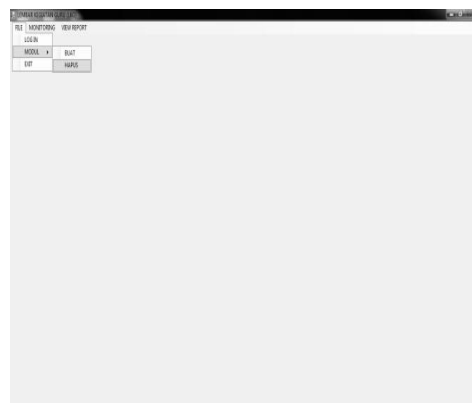


**Figure 3.** Disain interface Teacher and Student

## C. Rancangan Tampilan



**Figure 4.** Student Activity Sheet



**Figure 5.** Teacher Activity Sheet

From the picture above can be seen menu display that can be accessed by students and teachers at the time practicum. The menu consists of:

1. Menu on the student sheet comprising:
  - a. Login
  - b. Module



- Flip Flop
  - Gate Elementary
  - AND Gate
  - OR Gate
  - Xor Gate
  - Inverter
  - Combination
  - Register
  - PIPO
  - PISO
  - SIPO
  - SISO
  - Counter
  - UP
  - DOWN
  - Microcontroller
- c. Exit
- d. Report
2. Menu on sheets of teachers consists of:
- a. Login
  - b. Module
    - Create
    - Delete
  - c. Exit
  - d. View Report

#### IV. CONCLUSION

Practicum module is designed to make it easy for students and teachers in implementing practicum. With the practicum module is expected to be limited practicum equipment which has been the problem will be reduced.

With the program simulation, losses due to damage to equipment due to errors in the installation of the component or circuit will be removed because this module does not have a component that is real.

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EI -02 -014

## IMPROVING THE COMPETITIVENESS OF VOCATIONAL HIGH SCHOOL GRADUATES IN THE FACING THE ASEAN ECONOMIC COMMUNITY THROUGH PLANTING OF EMPLOYABILITY SKILLS

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**Abstract :** Globalization is a challenge and an opportunity that can be used by Indonesia to live equally and contiguous with the international community. Globalization as AFTA, NAFTA, AFLA, and AEC (ASEAN Economic Community) on the one hand can open an opportunity to accelerate the pace of development, but on the other hand carries increasingly intense competition. The implementation of the AEC will have a major impact on economic development of Indonesia because the product of other countries and foreign workers will have freedom to compete with the products and labor in Indonesia. Enforcement of AEC also be the early phase for Indonesia in development of economic quality in Southeast Asia. The policy of AEC is two sides of coin for Indonesia, one side being a good opportunity to demonstrate the quality and quantity of products and the human resources to other countries, but on the other hand can be a challenge if Indonesia cannot use it properly. Efforts to improve the quality of human resources to compete against the application of the AEC must be implemented in order to achieve progress and catch up with other countries. The momentum enactment of AEC should be a national agenda in improving the competitiveness of labor, especially labor vocational graduates. As a result of the dynamics and the development of increasingly rapid technological changes, then the contribution of vocational school should be optimized and should be oriented in employability skills. Employability skills are important aspects of competences owned by candidates for employment to be skilled and able to face job competition. Preparation and labor development of vocational school graduates should be optimized through the planting of employability skills.

**Keywords:** Competitiveness, Competences of Vocational High School Graduates, Employability Skills.

### I. INTRODUCTION

Globalization is an external challenge for Indonesia that will change the lifestyle of the people from agrarian and traditional trader into a modern industrial society as can be seen in *World Trade Organization (WTO)*, *Association of Southeast Asian Nations (ASEAN) Community*, *Asia-Pacific Economic Cooperation (APEC)*, and *ASEAN Free Trade Area (AFTA)*. In addition, external challenges are also associated with a shift in global economic power, influence and impact techno science as well as quality, investment, and the transformation of education (Anonymous, 2013). Therefore, the development of education should be directed to produce smart and competitive Indonesian people through increasing the availability, affordability, quality and relevance, equity and certainty of obtaining educational services (Directorate Secondary Education Ministry Education and Cultural of The Republic of Indonesia, 2013).

Enforcement of AEC (ASEAN Economic Community) also be the early rounds for Indonesia in the development of quality economies in Southeast Asia. AEC policy are two sides of a coin for Indonesia, one side being a good opportunity to demonstrate the quality and quantity of products as well as human resources to other countries, but on the other hand can be a challenge if Indonesia can



not use it properly. Efforts to improve the quality of human resources to compete against the implementation of the AEC must be implemented in order to achieve progress and catch up with other countries.

Momentum enactment of AEC will be a national agenda in improving the competitiveness of labor, especially labor vocational graduates. As a result of the dynamics and development of increasingly rapid technological changes, then the contribution should be optimized with the implementation of vocational-oriented employability skills. Employability skills are important aspects of competencies possessed by prospective workers to be skilled and able to face job competition. Preparation and workforce development of vocational graduates should be optimized through the planting of employability skills.

Implementation of the AEC will have a major impact on economic development of Indonesia because of the product outside the country and foreign workers will have freedom to compete with the products and labor in Indonesia. Therefore, along with the rapid implementation of competition necessary reforms in vocational education to cope with the fast pace of the change. One alternative that requires anticipation of the implementation of vocational high school is the shift in competence profiles of graduates needed by the business industry. Knowledge is no longer the only requirement to make someone successful graduates. Employability skills, which include personal and interpersonal abilities of graduates become essential basic needs controlled so that graduates are able to exist in entering the business industry.

The business industry today are not only prioritizing academic skills (hard skills) high, but also pay attention to skills in terms of the values inherent in a person's labor or often known as aspects of employability skills. Ability employability skills can be termed as non technical capabilities that have a role as important as academic skills. Educational institutions are expected by employers, government and communities to produce graduates who not only have the academic knowledge and skills, but also have the employability skills that can develop well so that it becomes an asset to the business industry that employs (Lane, 2016).

Vocational school graduates do not currently have only slightly limited employability skills, so often the complaint by the business industry. One cause of low employability of the graduates of vocational skills, because the process of planting in the learning process has not been given serious attention on employability skills compared to learning hard skills. According Napitupulu (2013) education in schools today are still largely focused equip students with the competencies of hard skills, such as knowledge that is rote, while knowledge about the world of work is generally obtained when plunging into the world of work.

A vocational graduates who are competent to be proficient not only in technical capabilities such as: disassembling the machine, assemble a computer, make various kinds of cookies are called hard skills, but also to be able in terms of employability skills such as working together in teams, solve problems, take the initiative, pull the trigger, and master information technology in their work. That is



why the business industry today is not only a priority on academic skills (hard skills) is high, but also pay attention to skills in terms of the values inherent in a person or commonly known as the aspect of employability skills. This capability can also be called non technical capabilities that have a role as important as academic skills (Mansour and Dean, 2016).

A key factor of economic growth and competition, and even social stability in many countries, including developed countries is vocational education (Hanafi, 2013). The main requirements for development in the modern era such as the people have the education and vocational training to make it easier to meet the changing technology (Oluwale, et.al, 2013). For example, to meet the needs of economic development, China actively involved in global cooperation and exchanges in the field of vocational education. The Chinese government has sent delegations to over 20 countries including: Australia, Germany, Canada, and the United States only to develop vocational education (Xi Yu, 2005).

Another example is the key to economic progress and industrial technology development in Japan. Education and vocational training in Japan is considered as a vehicle for the development of skills for economic development (Kennedy, 2014). Similar disclosed Agrawal (2013) that the experience of Japan as an industrial center in the East Asia region with a relatively low unemployment rate, but can achieve a high economic growth rate because people have vocational technology skills.

As a result of the dynamics of technological developments in the world of work is increasingly rapidly changing, the contribution of vocational education provision needs to be optimized is oriented to the demands of the world of work and industry (Bukit, 2014). Results of research on employment of graduates of technical and vocational education shows that, for technical and vocational graduates have mastered the technical skills, but employers are not satisfied on the ability of employability skills. The ability of employability skills are skills related to employee motivation, communication skills, interpersonal skills, critical thinking, problem solving and entrepreneurial skills (Rasul, et. el, 2013).

Vocational High School as one of the mid-level vocational institution that produces graduates to work in the industry need to prepare as well as possible in order to be able to produce graduates who are competitive both at home and abroad (Ali, 2010). Challenge organizers Vocational High School today is the inadmissibility of graduates in the business industry with quality jobs that suit their needs as well as a vehicle for competition in entering employment.

## **II. DISCUSSION**

### **A. Vocational High School As Vocational Education Providers**

Education is the most appropriate to face the challenges of globalization is education oriented on the industrial world with an emphasis on learning approach and supported by appropriate curriculum. Vocational high school is an educational institution that is responsible for the development of vocational education in Indonesia. Business industry which is the target of the learning process and results of the school has the character and feel of its own. Therefore, schools in the learning process should be able to learning approach the right and liking the industrial world. To face it, education in



Indonesia, especially vocational training demanded to prepare a skilled workforce to fill the purposes of development, change the student status of the load status into a national asset, human resources professionals create reliable and superior face of global competition. Indonesia's development has progressed rapidly in all sectors, the development may not be successful if not supported by competent workforce.

Vocational education is education that prepare students who are interested to be educated labor into specific areas in accordance with the demands of the working world. Thus, there are two variables that are interrelated variable learners and field of work/workplace. There are two possibilities regarding the relationship between students with field work: first, the competence of learners generated from vocational education in accordance with the requirements of the field of work (match); and second, the competence of learners do not conform with the requirements of the field of work (mismatch). Effective vocational education is education that can produce graduates' competence in accordance with the requirements of certain occupations / world of work (Calhoun and Finch, 1982).

Based on the various definitions mentioned above, it can be argued that vocational education is education organized for students who plan and develop a career in a particular field of expertise to work productively and professionally and also ready to continue on to higher education. Some of the reasons why the need for skilled labor as the support of industry excellence are: (1) skilled personnel are directly involved in the process of production of goods and services and it is necessary to support the growth of industry in a country (2) The global competition is growing increasingly tight and sharp, so skilled labor is considered as a factor of excellence to face global competition; and (3) the more a country has a highly skilled and productive, the stronger the economic development of the country concerned (Djojonegoro, 1998).

Vocational education is an investment in the future of each individual. The economic system is very important for the individual and society. The aim of the policy of human resource development through vocational education by Sudira (2015) are: (1) creating employment opportunities for all who need it in a balanced, equitable, free to choose, and provides incomes and decent; (2) vocational education to develop any potential learners in their entirety; (3) human conformity with the work so that the loss of income and production as small as possible. The consequence of this policy is the government, together with the AEC should continue to create employment opportunities widely. Government together with vocational education institutions and vocational professional certification agency set up vocational education programs to meet the competency requirements of jobs.

Education emphasizing vocational education to the preparation work with the development of competencies and skills to think, work, and apply the innovation work. Preparation of the workforce through vocational education in the AEC according Sudira (2015) should be directed to: (1) The development of skills and competence in the analysis and problem solving; (2) Development of skills and competencies perform information processing; (3) Communication skills that contribute to a productive and harmonious relationship between employees and customers; (4) Teamwork skills that



contribute to the employment relationship and the impact that productive; (5) Initiative and enterprise skills that contribute to the innovative impact; (6) Planning and organizing skills that contribute to strategic planning short-term and long-term; (7) Self-management skills that contribute to satisfaction and growth performance; (8) Learning skills that contribute to a sustainable career development and extension workers; (9) Technology skills that contribute to the effective execution of the work.

That is why the Government of Indonesia continues to encourage junior high school graduates to continue their education in vocational school in the hope that they can become a graduate skilled and ready to work. Skilled and productive graduates who are needed in the industrialized world who currently control the economic sector. It is inevitable that the industry excellence in a country is determined by the quality of skilled workers directly involved in the production process, especially in the face of the AEC.

### **B. Definition Of Employability Skills**

Employability skills can be defined as a person's ability to adjust to a job that allows it to survive and realize their chances of success in work (Hanafi, 2014). This understanding shows employability skills have implications for the skills and knowledge that can improve workforce skills. Moreover, employability skills contribute to maintaining a good job, cope with change and the dynamics of the work, as well as securing various types of work in the workplace.

Employability skills are important aspects of competencies possessed all employees to become skilled workers who are able to explore the world of work (Rashid and Yahya, 2011). Another notion is expressed Weligamage (2010) that employability skills are the skills, understanding and personal attributes that make it easier for graduates to get jobs and succeed in his chosen work. Based on such understanding, it can be concluded that the ability of a person in the form of employability skills can make it easier to get a job and rewarding yourself so important owned by prospective migrant workers in order to survive and improve their performance in the workplace.

Hartshorn & Sear (2005) considers that employability skills as additional attributes, including knowledge, skills, and abilities of individuals as capital for graduates to be able to succeed in the job. Employability skills interpreted as generic skills that allow students to gain and maintain progress in doing the work (Bennett, 2006). This definition frame that employability skills are non-technical skills needed in the workplace to make someone achieve success in the job.

Employability skills as a core skill group, describes the main functions of the knowledge, skills, and attitudes of individuals are needed in the workplace (Overtoom, 2000; Khalid, et.al, 2014). Based on this understanding, it was revealed that employability skills are core skills that can improve the quality of the individual dealing with various situations in the workplace so that it can be said that employability skills are skills that can help individuals enter the workforce. The implication of this statement stating that employability skills are the skills and abilities that allow graduates to get jobs and succeed in the job.





Based on the above definition, it can be concluded that the employability skills is a set of non-technical skills are transferable to help individuals adapt to change and cope with the demands of the work environment based on the dynamics and changes in the labor market. Moreover, employability skills as the main abilities that are important for labor to survive and develop a career in the workplace, especially in the face of the AEC.

### **C. The ASEAN Economic Community**

ASEAN Economic Community (AEC) is a form of regional economic integration which came into effect in 2015. The AEC is one of the pillars of the establishment of the ASEAN Community and is a form of economic integration in Southeast Asia. AEC is a form of economic integration of ASEAN in terms of a system of free trade between ASEAN countries. Definition of ASEAN economic integration in general is the removal or elimination of economic barriers (economic frontier) between the economy of ASEAN countries. Economic constraints include all the restrictions that led to the mobility of goods, services, factors of production, and also the flow of communication, actual or potential operationally, the ASEAN economic integration can be defined as the lifting of discrimination and political unification (policy) as norms, rules, and procedures.

Enforcement will make ASEAN as a single market and production base which occurs the flow of goods, services, investment and skilled labor is free and free capital flows between countries in the ASEAN region (Fadli, 2014). The free flow of skilled labor must be used by Indonesia as an opportunity to create employment and reduce unemployment. The AEC is an ultimate goal of economic integration to be achieved ASEAN community as stated in the ASEAN Vision 2020, in which there is a convergence of interests of the member countries of ASEAN to deepen and broaden economic integration. An economy that is open, outward-looking, inclusive and relies on market forces is a basic principle in the efforts to establish this community. Based on the blueprint that has been adopted by all member countries of ASEAN, the Southeast Asian region through the establishment of the AEC will be transformed into a single market and production base. A highly competitive area; a region with equitable economic development; and a region fully integrated into the global economic.

### **III. CONCLUSION**

- a. Employability skills are the ability of labor adjustment vocational school graduates to a job that allows it to survive and realize their chances of success in work.
- b. Employability skills for vocational school graduates do not yet support the development of several important employability skills needed in the working world in the face of the AEC.
- c. Need recommendations for integrating curriculum revisions and employability skills into learning activities so as to promote the development of employability skills of vocational high schools graduates.



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## THE ROLE OF COSMETOLOGY LABORATORY IN PREPARING COMPETENT GRADUATES

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**ABSTRACT :** A cosmetology laboratory is a facility equipped with specialized equipment to conduct experiments as a means of supporting the development of science and education. The role of cosmetology laboratory was evaluated in terms of: 1) the number of existing labs standardized against the subjects within the curricular structure of the department; 2) laboratory floor area compared to the number of students; 3) facilities and infrastructure; 4) performance of practicum subject lecturers and technician. The present study was descriptive of the conditions of the cosmetology lab. Data were collected by means of observation and questionnaires. Data were analyzed using descriptive statistics. The collected data were compared with existing laboratory standards. Results showed that the number of labs was adequate, but those labs were underused. The lab area remained inadequate, so that the practicum had to be done in several shifts to meet the target competence of graduates. Lab facilities and infrastructure were adequate but less than optimal (76%). Lecturers' performance showed a mean score of 3.95, categorized as good. Technician's performance showed a mean score of 3.125, categorized as adequately good. In conclusion, there is a need for improvement of lab operations by utilizing the existing labs and taking the existing curriculum into account. This is because the ratio of the number of labs, lab floor area, facilities and infrastructure, and technician's performance were adequate but less than optimal. Practicum lecturers' performance was adequate but it required improvements.

**Keywords:** Laboratory, lab standardization.

### I. INTRODUCTION

The Undergraduate Study Program of Cosmetology Education is among the study programs of the PKK (Home Economic Education) Department of Faculty of Engineering of the State University of Surabaya (Unesa). It was established by the decree of the Minister of Education and Culture in 2009. Admission of cosmetology students was initiated in 2006, being one of the following concentrations: culinary art, fashion, and cosmetology education within the PKK Department. The number of students is shown in the following table.

Admission Year	Number of Students	Transfer	Graduated
2010	38	2	36
2011	54	7	38
2012	50	-	2
2013	60	4	-
2014	53	4	-
2015	59	5	-
Total	315	22	76

Source: The 2015 PDPT of Unesa



The above table shows that approximately 260 students would use labs for the purposes of study program practicum, testing and analysis of scientific experimental studies, experimentation, or observation. The present study sought to assess the adequacy of lab conditions, especially the cosmetology labs, with regard to the needs and the number of students. The cosmetology practicum labs consisted of a science lab, a computer lab, a facial make-up lab, and Spa. With the integrated laboratory grants, the Cosmetology Department received additional labs for hairdo, wedding, entrepreneurship, and facial skin care. The purpose of the present study was to examine the efforts to improve the labs for the purpose of increasing the competence of graduates by taking into account the number of students, lecturers, and facilities and infrastructure in the Cosmetology Department.

According to *Kamus Bahasa Indonesia* (2008), a laboratory is a room equipped with specialized equipment to conduct experiments, investigations etc. According Jaya (2012), a laboratory is defined as a place equipped for testing and analysis of scientific experimental studies, a place that provides an opportunity for experimentation, observation, or practicum in a field of study. According to Ibrahim (in Lutfi, 2013), a laboratory is a means of supporting the department of the study program concerned, and the basic resource to develop sciences and education.

Labs play multiple roles in the learning process, including: (1) the students and teachers are involved in conveying concepts based on investigations, discoveries and experimentations; (2) the students and teachers are involved in linking the concepts discussed to everyday life; (3) the students and teachers are involved and the former can give student grouping-oriented tasks and (4) students and teachers are involved to create models of learning to strengthen the understanding of concepts (Daryani, 2008: 1).

Availability of adequate labs in a college is vital. According Supardi (2012), availability of labs is a demand in line with developments in teaching and curricular developments that require students to be active. Therefore, it is necessary to optimize the number of the available labs standardized to the subjects in the curricular structure of the study program, lab floor area relative to the number of students, facilities and infrastructure, and the performance of practicum lecturers and technician. Thus, the present study deals with “Optimizing the Laboratory of the Undergraduate Study Program of Cosmetology Education of PKK Department of State University of Surabaya”.

## **II. METHODS**

The present study was descriptive of the conditions of the cosmetology lab. It performed a theoretical study and optimized the lab performance. The standards used were government regulations on the number, area, facilities and infrastructure of a laboratory. The objective of study was the optimization of cosmetology labs, consisting of the number of the existing labs standardized by the subjects in the curricular structure of the study program, the lab floor area



relative to the number of students, facilities and infrastructure, practicum lecturers' performance, and technician's performance. The objects of the study were labs, students, practicum lecturers, and technician. Currently, the cosmetology labs consisted of a bridal lab, a facial skin make-up lab, a facial skin care lab, a Spa lab, a hairdo lab, a science lab, a computer lab, and a salon.

Data were collected by observations and questionnaires. Observations were conducted to obtain data on the number of labs, lab floor area, and lab facilities and infrastructure. Questionnaires were used to collect data from students about the performance of lecturers and technician. The objects of the present study were the bridal lab, the facial make-up lab, the skin care lab, the spa lab and the hairdo lab. Data were analyzed by using the descriptive statistics of percentage and mean values. Conclusions of the observation results were drawn using Regulation of the Minister of Education and Culture No. 40 of 2008, in which observation results shall be converted as follows: 1 = bad (1.00 – 1.99) or equivalent to  $\leq 25\%$ , meaning that the lab requires repairs; 2 = less good (2.00 – 2.99) or equivalent to  $26\% \leq 50\%$ , meaning that the lab can still be used but does not meet the standard; 3 = fairly good (3.00 – 3.80), or equivalent to  $51\% \leq 75\%$ , meaning that the lab can still be used but does not meet the standards; 4 = good (3.81 – 4.00) or equivalent to  $\geq 76\%$ , meaning that the lab meets the criteria. By the same guidelines, the questionnaires were assessed using the criteria: 5 = excellent; 4 = good; 3 = pretty good; 2 = poor; 1 = bad.

The procedure of the present study consisted of three stages: preparation, execution and reporting. The preparatory stage began with lab observations, review of the theory, preparation of proposals, drawing up of instruments, validation of the instruments and a seminar of the proposal. Lab observations were carried out by a team of researchers by identifying and observing the existing labs of the cosmetology department, consisting of the cosmetology lab located on the 2<sup>nd</sup> floor of A3 building, the entrepreneurship lab (salon) on the 1<sup>st</sup> floor of UPT building, the bridal lab on the 2<sup>nd</sup> floor of A8 building, the facial make-up lab on the 3<sup>rd</sup> floor, the SpA lab, the facial skin care lab, and the hair care lab on the 4<sup>th</sup> floor. The conditions of facilities and infrastructure are as shown in figures in the Appendix. Temporary observations showed that the lab facilities remained relatively lacking, and so did the layout of facilities. This was due to the fact that, at the time of photographing, there was no lecture because of the even-semester break.

The execution stage was conducted by documentation of the labs; data collection by administering the questionnaires to students; interviews with students, practicum lecturers, sub-lab officers, and technician; organizing and processing of data collected; and group discussions of researchers. Data collected were analyzed. The reporting stage consisted of drawing up a draft report, conducting a seminar on the study results, preparing a research report, drafting the article and including it in a national seminar.



### III. RESULTS AND DISCUSSION

This section is organized as follows: (a) the number of labs; (b) the lab floor area; (c) the lab facilities and infrastructure; (d) the performance of practicum lecturers; (e) the performance of technician.

#### 1. The Number of Labs as Standardized by Subjects

Over time, the Cosmetology Department has several labs in accordance with the needs of the curriculum, including the Design lab, the Science lab, the Computer lab, salon, the Bridal lab, the Facial Makeup lab, the Skincare lab, the Spa lab, and the hair care lab. Based on observations and review of curriculum (appendix) and faculty policies, the labs qualifying the criteria for the study were the bridal lab, the makeup lab, the facial skincare lab, the spa lab, and the hair care lab. The number of labs is shown in the table below:

<b>Lab Names</b>	<b>Subjects</b>
1) Bridal lab	1. Makeup design
	2. Basics of Housekeeping
	3. Traditional hair and bun styling
	4. Modern hair and bun styling
	5. International Bridal Make-up
	6. Indonesian Bridal Make-up I
	7. Indonesian Bridal Make-up II
	8. Decorative Make-up
	9. Crafts
	10. Fantasy Make-up Show
2) Facial Make-up Lab	1. Basics of Make-up
	2. Facial Make-up
3) Facial Skincare Lab	1. Facial Skincare
4) SpA	1. Solus per Aqua
5) Hair Care Lab	1. Hair care
	2. Basic hairdressing
	3. Hair coloring
	4. Hair curling and straightening
	5. Hairdressing Design

The bridal lab (on the 2<sup>nd</sup> floor of A8 building) was used by the students for the subjects: Traditional Hair Styling (3 credits), Modern Hair Styling (3 credits), Indonesian Bridal Makeup I (3 credits), Indonesian Bridal Makeup II (3 credits), International Bridal Makeup (3 credits), Basics of Housekeeping (2 credits), Crafts (2 credits), Room Decor (2 credits), and Fantasy Makeup Show (4 credits). The Facial Makeup lab was used for the subjects of Basics of Makeup, Makeup Design and Facial Makeup. The Facial Skin Care lab was used for the subjects of Facial Skin Care (3 credits), and the Hair Care lab was used for the subjects of Basics of Hairdressing, Hairdressing Design, and Hair Curling and Straightening and Hair Coloring. The SpA lab was used only for the subject of SpA. The lab floor area was unevenly distributed in which there was a lab used for a large number of subjects, while there was a lab used only once in a year, such the SpA lab.



## 2. Lab floor area

Observations showed the floor area of the labs is as follows:

Lab Names	Size	Area
1. Bridal lab	9 x 18 m	162 m <sup>2</sup>
2. Facial Make-up lab	9 x 9 m	81 m <sup>2</sup>
3. Facial Skin Care lab	9 x 9 m	81 m <sup>2</sup>
4. SpA	9 x 9 m	81 m <sup>2</sup>
5. Hair Care lab	9 x 9 m	81 m <sup>2</sup>

Based on the field data, the bridal lab of 18 x 9 m was used optimally for practicum subjects. The lab consisted of a warehouse and an instructor room, both being 2 x 3 m in size. The Facial Make-up and Skin Care labs had a warehouse and an instructor room, both of which were 2 x 3 m in size. In addition to having a warehouse and an instructor room, the SpA lab also contained partitions for steam and Jacuzzi rooms, each measuring 2 x 2 meters. Similarly, in addition to having a warehouse and an instructor room, the Hair Care lab was partitioned for hair washing room of 2.5 x 9 meters. The partition led the practicum room to be a bit cramped. Additionally, with the number of students, lab area and practicum subjects, the students taking practicum subjects for each class had to be divided into two parts or sometimes divided into 3 shifts. Based on regulation of the Minister of Education and Culture No. 40 of 2008, with regard to lab practicum, such activities as massage requires an area of 8 m<sup>2</sup>, hairdressing 4 m<sup>2</sup>, and facial skin care 6m<sup>2</sup> per learner. Thus, the area of the existing labs in the Department of Cosmetology remained inadequate given the average number of students per class of 50. Thus, in order to optimize the competencies that must be achieved by students, the practicum subjects should be carried out by turns; for example, the hair care lab with an area of 68 m<sup>2</sup> should be used only by 18 students for a practicum, thereby requiring 3 shifts. With regard to the Spa lab with an area of 54 m<sup>2</sup>, since an individual learner requires an area of 8 m<sup>2</sup>, each class should be divided into 4 shifts of 7 learners.

## 3. Facilities and Infrastructures of Facial Makeup Lab

Observations showed that the facilities and infrastructure of labs at the Department of Cosmetology are as follows:

Lab Names	Space available (%)				Mean (%)
	Practicum	Instructor	Warehouse	Cupboard	
1. Bridal lab	100	70	80	80	82.5
2. Facial Makeup Lab	90	80	80	80	82.5
3. Skin Care Lab	90	80	70	60	72.5
4. SpA	80	80	80	80	80
5. Hair Care Lab	70	70	70	70	70

Based on the observation guide, a makeup lab should have the following items: (1) students' practicum tables; (2) students' practicum chairs; (3) a lecturer's table; (4) a lecturer's chair; (5) a whiteboard and its accessories; (6) practicum equipment; (7) minimal practicum materials; (8) adequate electrical devices; (9) cleaning tools; (10) trash cans; (11) AC; (12) ventilation; (13) sewers; and (14) mirrors. In general, the five labs had 1 to 13 items, while several labs had additional facilities in accordance with the following lab characteristics.

Standard Facilities	Lab Names				
	Bridal	Facial Makeup	Skin Care	SpA	Hair Care
1 to 13	Adequate	Adequate	Adequate	Adequate	Adequate
14. Change rooms	√	√	√	√	-
15. Clothes Racks	√	√	-		-
16. Sinks	-	√	√	√	-
17. Water Heaters	-	-	√	-	-
18. Drying places	-	-	√	-	-
19. Trolleys	-	-	√	√	√
20. Facial beds	-	-	√	-	-
21. Electric devices Facial	-	-	√	-	-
22. Vavozone	-	-	√	-	-
23. Wood lamps	-	-	√	-	-
24. Bathtubs	-	-	-	√	-
25. Body steam	-	-	-	√	-
26. Massage Beds	-	-	-	√	-
27. Wash bags	-	-	-	-	√
28. Drog cups	-	-	-	-	√
29. Steamers	-	-	-	-	√
30. Tripods	-	-	-	-	√
Facility condition	83%	90%	83%	80%	75%

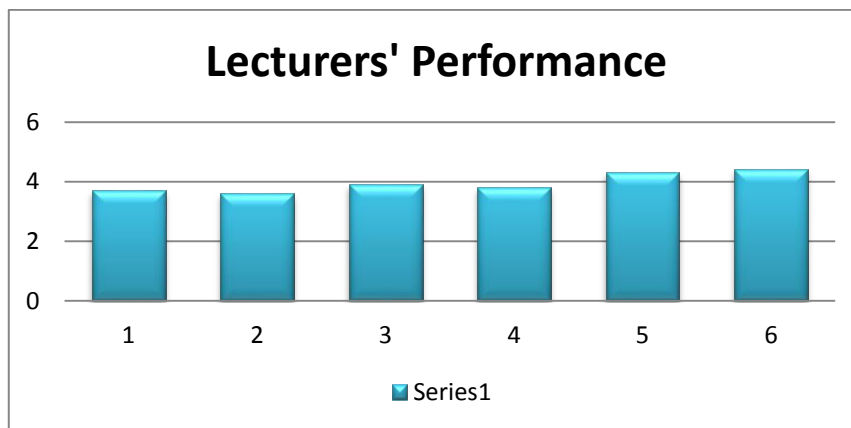
Lab Names	Conditions of Infrastructure and Facilities			Conversion
	Infrastructure	Facilities	Mean (%)	
1. Bridal lab	82.5	83	82.7	4
2. Facial Makeup Lab	82.5	90	86.25	4
3. Skin Care Lab	72.5	83	77.7	4
4. SpA	80	80	80	4
5. Hair Care Lab	70	75	72.5	3

Table 6 shows that the conditions of the lab infrastructure and facilities of Department of Cosmetology, particularly the bridal, facial makeup, skin care and spa labs meet the criteria, thus requiring no repair but only improvement. However, the hair care lab can be used but remains short of the standards.



#### 4. Practicum Lecturers' Performance

Data collected for the performance of practicum lecturers consisted of (1) all those lecturers who at the time of starting lab works explained the procedures for working at the lab; (2) lecturers performing supervision, mentoring and guidance to students; (3) lecturers' motivating the students to work with discipline; (4) lecturers' explaining the tools and materials to be used for working at the lab according to the practicum topics; (5) lecturers' evaluating performance, tools, and materials after working at the lab; (6) lecturers' urging the students to continually maintain the cleanliness and neatness of the lab. Data are presented as follows:



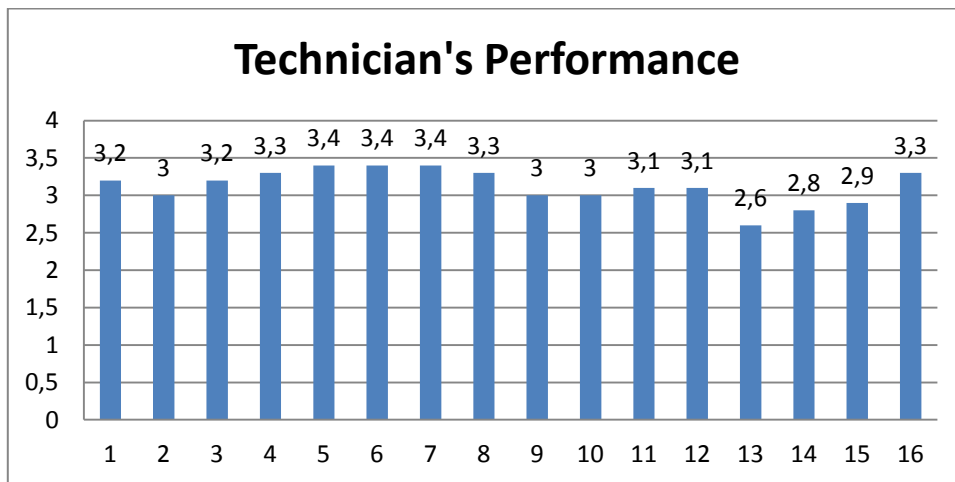
**Figure 1.** Performance of practicum lecturers

The above figure shows that lecturers' optimization of supervision, mentoring and guidance to students had the lowest score in the above six items, despite the closeness to the good category (3.6). Lecturers' performance with regard to monitoring, mentoring and guidance to students had the highest score of 4.4 with a good category, that is for the item of lecturers' evaluating performance, tools, and materials in accordance with lab works, and urging the students to maintain the cleanliness and neatness of the lab.

#### 5. Technician's Performance

Since its establishment in 2006, it was only in 2010 that the Department of Cosmetology had a technician. The technician was an alumnus of a cosmetology vocational senior high school and had experience with working in a salon in Surabaya. The issue was an imbalance of the number of labs with the number of students and technician in the Department of Cosmetology. The items for the performance of technician consisted of the technician's duties with regard to the readiness of devices and materials, such as (1) setting up the devices at the lab; (2) repairing minor damage to the devices; (3) checking the devices before use; (4) preparing the materials or tools for student activities; (5) reporting the severely damaged devices that should be replaced; (6) maintaining cleanliness and simultaneously the security of the lab; (7) being aware of the schedule of lab use at least in the week; (8) keeping the cleanliness of the lab and storing the tools and materials in their place; (9) recording and reporting the chemicals diminishing in amounts for immediate replenishment; (10) recording the lab tools or materials at the ledger and inventory cards; (11)

together with lecturers preparing and checking the lab tools or materials; (12) continually monitoring and serving the students during the practicum; (13) checking the fire extinguishers; (14) continually checking the floor in order to avoid slips; (15) checking the ventilation and maintaining good air circulation during the practicum; (16) being at the lab during the practicum, except with the permission of the lecturers or being ordered for practical purposes. The above items are presented in the following figure.



**Figure 2.** Technician's Performance

The above figure shows that the technician's performance for the items of checking fire extinguishers, continually checking the floor in order to avoid slips, and checking the ventilation and maintaining good air circulation during the practicum are within the poor to fairly good enough category with a mean score of 2.73 (as per regulation of Minister of Education and Culture No. 40 of 2008). Other items are fairly good and good. However, the overall performance of the technician is fairly good with an average score of 3. The low performance of the technician was possibly due to the fact that there was only one technician in the Department of Cosmetology. Thus, the number of technicians in the Department of Cosmetology should be increased.

#### IV. CONCLUSION

Based on the results of data analysis, conclusions can be drawn that the number of lab in the Undergraduate Study Program of Cosmetology Education, especially the bridal, makeup, facial skin care, spa and hair care labs was adequate, but its use was less than optimal. The area of the existing labs remained inadequate, leading practicums to be done in several shifts to meet the target competence of graduates. Lab facilities and infrastructure were adequate but less than optimal (76%). Lecturers' performance was categorized as good with a mean score of 3.95 (rounded). Technician's performance was categorized as fairly good with a mean score of 3.125. Thus, there is a need for improvement of lab operations by utilizing the existing labs and taking the existing curriculum into account. This is because the ratio of the number of labs, lab floor



area, facilities and infrastructure, and technician's performance were adequate but less than optimal. Practicum lecturers' performance was adequate but it required improvements.

It is recommended to add labs with the floor area as per the standards of regulation of the Minister of Education and Culture No. 40 of 2008; for example, every learner requires 4, 6, and/or 8 m<sup>2</sup> of makeup labs, depending on the competencies to be achieved, such as 4 m<sup>2</sup> of hairdressing floor area for each learner, 8 m<sup>2</sup> of massage floor area for each learner. There is a need for improvement of lecturers' performance and addition of at least a technician for each two labs for optimal use of the labs. The curriculum of SpA subject should be reviewed by increasing the credits to 4 credits distributed to the odd semester and second semester, thus optimizing the use of the labs. And so does the use of the skin care and makeup labs. Lab facilities and infrastructure can be improved by referring to the labs in the appendix of the present study report.

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*ATTACHMENT*



Bridal Laboratory



Bridal Laboratory



Facial Makeup Lab



Skin Care Lab





SpA Lab



Hair Care Lab





EI-02-097

## THE USE OF INTERACTIVE WORKSHEET ON IMPROVING THE EFFECTIVENESS OF FINANCIAL ACCOUNTING PRACTICES IN TEACHING RESTAURANT

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**ABSTRACT :** *Teaching restaurant is a special type of restaurant owned by a certain department in a university that aims to teach culinary education and/or culinary service students on operating a restaurant in a real situation and to be functioned as a laboratory. Most of the time, financial accounting practices is the hardest part for students to be conducted in teaching restaurant since the students study a limited theory/courses on that topic. This research aims to propose the use of interactive worksheet as an alternative learning media on improving the effectiveness of financial accounting practices in Teaching Restaurant. This research is a descriptive research type. This research describes the unique characteristics of Teaching Restaurant in State University of Malang (UM), how the financial accounting practices conducted in Teaching Restaurant in UM, and how the use of interactive worksheet may improve the effectiveness of financial accounting practices in Teaching Restaurant in UM. The effectiveness of the practices can be measured in term of accuracy and time spent needed to write financial statements, such as income statement and balance sheet.*

**Keywords:** interactive worksheet, financial accounting, teaching restaurant

### I. INTRODUCTION

According to the catalog of Industrial Technology Department, State University of Malang, one of the competencies in the Culinary Education Program for *SI* (bachelor degree) and the Culinary Service Program for *D3* (associate degree) is having the ability to manage a food service business.<sup>1)</sup> Some of the subjects that are given to *SI* students in order to have the ability to manage food service businesses include: Hospitality Business Management, Economics, Restaurant Business Management and Entrepreneurship. Meanwhile, the subjects that are offered by Culinary Service Program for *D3* are related to the management of catering business, such as Entrepreneurship, Catering Business Management and Café Business Management. One topic presented on the subjects that is related to hospitality business management is the topic of financial accounting in a food service business.

Financial accounting in food service business management is very important to the success of the operations of the food service itself.<sup>2)</sup> Food service students' ability to manage the finances of the business is needed when the students run the business practice in the business practicum courses, such as Restaurant Business Management, Entrepreneurship, Café and Catering Business Management. Various culinary courses in many country, either in the form of culinary study programs or hospitality management study programs, have included the ability of managing food service business as one of the general competencies that have to be mastered by graduates of culinary study programs or hospitality management study programs.<sup>3,4)</sup> This also applies to food service courses at many universities in Indonesia. As an example: on a restaurant business management course at State University of Malang, the topic of financial accounting and management is given in several subjects.



These topics include the subjects of Hospitality Business Management, Economics, Entrepreneurship and some other practicum subjects that aim to allow students to master the topics as well.

Although the topic of financial accounting have been taught on several business management subjects, the students' mastery level on that topic is relatively low. This can be seen in the distribution of the students' academic achievement on the topics in which more than 50% of students scored below 70. The preliminary observation reveals that one of the students' ability which is considered low on the business management course is students' knowledge and skills in financial accounting and management. The most possible causes of this finding is the limited time allocated to teach financial accounting and management and the lack of teaching materials that is easily to be understood by the students of food service program in State University of Malang, which generally are graduates of vocational high schools and have never studied financial accounting and management for food service business.

An electronic media is a form of media that has a higher appeal for students learning than a print media, especially an electronic media that has a user interface that allows students to interact with the material presented in the media.<sup>5)</sup> An electronic media enables students to learn independently and provide opportunities for faculty and students to brainstorm in creative ways to solve the case study.<sup>6)</sup> In addition, the selection of learning strategies, understanding lecturer on learning and cognitive abilities of students and an appropriate electronic media design has been shown to affect the level of students understanding and academic achievement.<sup>6)</sup> Therefore, this study was designed to describe the unique characteristics of Teaching Restaurant and Boutique (TRB) in State University of Malang (UM), how the financial accounting practices conducted in Teaching Restaurant in UM, and how the use of interactive worksheet may improve the effectiveness of financial accounting practices at TRB in UM.

## **II. RESEARCH METHOD**

This research is a descriptive research. Primary data were collected by directly observing and documenting the operation of teaching restaurant owned by Industrial Technology Department at State University of Malang as well as the learning process on the hospitality business management course. Secondary data were collected by studying the various literature on teaching restaurant, financial accounting and hospitality business management subject and learning media.

## **III. RESULTS AND DISCUSSION**

### **A. Teaching Restaurant**

Teaching Restaurant, sometimes named as Training Restaurant, is one alternative learning media (laboratory) used by hospitality programs to prepare students for hospitality careers. For hospitality department students, practices to operate teaching restaurants improves students' skill and critical thinking required in the restaurant industry. Teaching restaurants have several main functions,



such as teaching laboratories, generating revenue and attracting new enrollment/ potential new students.<sup>4)</sup>

Hospitality and culinary programs that own and operate teaching restaurants also encounter some dilemmas. Many researchers point out that a teaching restaurant consumes many departmental resources, either financial or non-financial resources.<sup>3,7,8)</sup> Those studies explain that teaching restaurants need relatively high intensity of human resource as well as high capital investment. Hospitality departments that own teaching restaurants should assign laboratory staffs and/or faculty members to supervise the restaurants continuously and buy equipment that can be used for the operation of the restaurant only. On the other hand, the department has limited budget to fully funding the daily operations of teaching restaurants because the restaurants generally do not generate profit.<sup>3,7)</sup> Thus, a hospitality department should find a creative way to operate teaching restaurants as commercial facilities while maintaining their learning function.

Laboratory of production kitchen, teaching restaurants, and industrial practices placements are practical elements and vocational focused courses in food and beverage management studies. Teaching restaurants are expected to become a learning media to deliver a mix of practical, leadership, and management skill to students. In this type of restaurant, students should not only learn food production and service, but they must also learn managerial skills and techniques.<sup>9)</sup> Therefore, students are required to hold different responsibilities (either in the kitchen area or in the service area) during their practical activities in teaching restaurants. For instance, a student who makes salad on a particular day may become a team captain, or a waiter, on another day.

Although the main purpose of training restaurants is not to generate profit, training restaurants are required to generate revenue to cover their operational costs.<sup>3)</sup> Hospitality departments, who own training restaurants, expect training restaurants to become more profitable, so the department is able to reduce its subsidy, and gradually achieve the extent of no subsidy. Achieving a condition without any subsidy means that training restaurants have been successful in creating a realistic learning condition, mixing training and profit making effectively. Therefore, training restaurants should not only be treated and managed as laboratories, but also as business centers. The summary of training restaurant characteristics and its comparison to other general types of restaurants is presented in Table 3.1.

**Table 3.1.** The Differences between Training restaurants and General restaurants

	General Restaurant	Training Restaurant
Main Purpose	To generate profit	To function as learning media and to generate revenue
Employee	Regular-paid employees Have a relatively permanent position Unpredicted turnover	Students Have a position (responsibility) rolled Periodic turnover rate

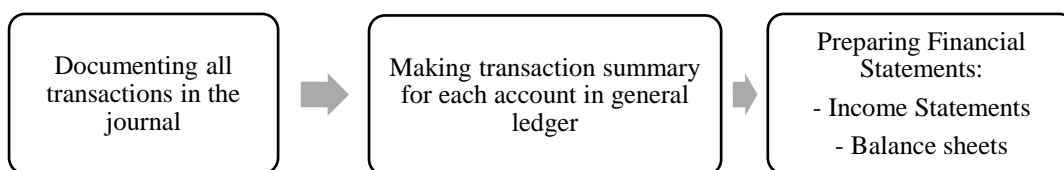


Operational Hour	Opens in regular hours throughout the year	Opening hours follows the academic calendar
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The unique characteristics of training restaurants may become challenges for the restaurants to gain profit. According to Nies<sup>8)</sup>, more than half of the students restaurants owned by various schools in the US are located inside the school area and operated within limited hours during the school time period. These characteristics may create limited access for the public to dine in training restaurants. In addition, training restaurants also experience periodic turn over because different group of students operate the restaurants for each period (semester/quarterly). A high turnover rate requires the restaurants to find creative ways to maintain good relationships with their customer since there is no familiarity factor that commonly supports good relationships between front-line employees and customer.

### B. Financial Accounting Practices in Teaching Restaurant

Financial accounting practices in Teaching Restaurant and Boutique (TRB) at State University of Malang include preparing daily and monthly sales history for each menu item and completing all stages in standard financial accounting (as shown in Figure 3.1), which are: documenting all transaction in the journal, making transaction summary for each account in general ledger, preparing income statement and writing balance sheet. All of this stages is completed by the students who operate TRB in monthly cycle. In each month, the students are rolled to take the responsibility to prepare financial reports.



**Figure 3.2** Stages of Financial Accounting Practices in Teaching Restaurants and Boutique (TRB)

Students who have the responsibility to prepare the financial reports are supervised by the teaching restaurant manager. Then, the financial reports are sent to the faculty member who taught the hospitality business management. The faculty member have the responsibility to check the financial reports and to provide some suggestions when any mistakes are found.

### C. Interactive Worksheet

Financial accounting has an important role in the operational success of Food and Beverage (F&B) businesses, such as catering business, café, and restaurant.<sup>2)</sup> Thus, having an interactive media that can help and facilitate students on preparing financial statements while students are operating and managing Teaching Restaurant and Boutique (TRB) in *Universitas Negeri Malang* is necessary. An



interactive learning media is an alternative media to deliver various course materials to students attractively, including financial accounting course material. An interactive learning media in financial accounting have the capability to deliver the theory of financial accounting and to give the students opportunity to solve case study on preparing financial statements independently. Thus, an interactive learning media on financial accounting is very helpful to improve the effectiveness of financial accounting practices in Teaching Restaurant since the students who operate TRB usually do not have enough capability to prepare financial statement effectively due to limited knowledge and skill on financial accounting subject.

Although most of the students who operate TRB do not have enough knowledge and skill on preparing financial statements, the students have enough capability to operate mathematical function in MS Excel. Thus, the students usually write TRB's monthly financial statements using MS Excel. However, in many cases, the students did various types of mistakes when preparing the financial statements because of many reasons such as miscalculation when either transferring amount of transactions from journal to general ledger or transferring amount of balance from general ledger to income statement as well as transferring balance from general ledger to balance sheet. To overcome this problem, an interactive media based on microsoft excel application can be the alternative solution. To enhance the capability of worksheet in microsoft excel, *Visual Basic for Application* (VBA) can be embedded into the worksheets in order to make the worksheets more interactive. VBA is a modest language program that can be applied with Microsoft Excel to execute long task, repetitive and complex in which cannot be run properly in manual manner.<sup>10)</sup> Moreover, this type of language program is suitable for students with non-information technology background, such as Culinary Education students in Industrial Technology Department in State University of Malang.

A learning media of financial accounting using an interactive worksheet (Microsoft Excel based that is enhanced with Macro/Visual Basic Application) is easy to be operated by the students independently and also attractive. To increase the effectiveness of the financial accounting practices in Teaching Restaurant and Boutique (TRB) in State University of Malang, the learning media should meet the students' characteristics. Since the students do not have enough knowledge and skill on preparing financial statement as well as Macro/VBA language program, the interactive worksheets should contain financial accounting material, user guidance, and functional menu that represent each stage on preparing financial statements (menu on general journal, general ledger, income statement and balance sheet). The financial accounting material in the learning media delivers the theory that enable students to read the theory on input transaction into journal and transaction accounts classification. This menu also provides definition of each terminology that is commonly used in preparing financial statements, particularly in restaurant setting. Moreover, the learning media should also be enhanced with exercises which are written based on real transactions in Teaching Restaurant and Boutique in *Universitas Negeri Malang* to make students being familiar with the financial accounting practices in the teaching restaurant. The financial accounting materials written in the



learning media must be valid and coherent. The material should be written based on financial accounting theory obtained from books and journal article (literature) related to the Basic Accounting and Financial Accounting. This is consistent with the learning media assessment criteria according to Ariani and Haryanto<sup>11)</sup> that is the accurate strategies and materials should be in line with the learning goals and learning objectives.

The user guidance menu delivers an instructional guide for user on how to use the learning media. It also should contain troubleshooter for any problem that may arise. In addition to functional menu, the learning media should also have an account setting menu that enables a user to set the accounts needed to prepare financial statement according to the characteristics of the restaurant operation. In other word, a user is able to add/delete accounts as needed. The functional menu: 1) general journal menu, enables a user to entry transactions to debit and credit column of general journal. The total amount entered into credit and debit column should be equal in order to conform the double accounting system. If a user forgets or confuses on entering a transaction whether a transaction should be entered into debit or credit column, he may read the course material that embedded in the learning media by clicking the financial accounting material menu. The functional menu displays the general ledger and financial statements generated based on the input transactions in general journal.

#### **D. Measuring the Effectiveness of Financial Accounting Practices in Teaching Restaurant**

The use of an interactive worksheets developed by using Microsoft Excel and VBA applications has several benefits and drawbacks. The benefits include relatively shorter times needed to prepare financial statements because of the use of interactive worksheets by the students ensures that the general ledger, income statements and balance sheets are valid. This may occurred since the students are only needed to enter transactions into general journal without calculating general ledger, balance sheet and income statement. Thus, the students are only have to ensure that the financial transaction data entered into the general ledger is correct, then the interactive worksheets automatically generate the financial data on the general ledger, income statement, and balance sheets.

The drawbacks of the use of interactive worksheets is the media does not have any capability to detect whether a students entering a transaction into a correct column (debit/credit) or not. Once the students enters transaction into wrong column, then the media delivers incorrect financial statements (income statement and balance sheets). This mistake cannot be detected by the system (media). The solution of this problem is a user need to fully understand the rules to write/enter financial transactions into general journal, especially regarding to the column in which the transactions have to be recorded (debit/credit). Thus, the presence of financial accounting material in the interactive worksheets is important.

The effectiveness of financial accounting practices in Teaching Restaurant and Boutique (TRB) can be measured in term of the accuracy of the monthly financial statements delivered by the students and amount of time needed by the students to prepare the monthly financial statements. As explained in the previous discussion, the financial statements is generated by the media automatically once the



transaction entered into the system. Thus, the interactive worksheets can minimized mistakes occurred during the financial accounting practices in TRB. In addition, the interactive worksheets also help the students to save time while preparing financial statements since they do not have to do financial stages (entering transaction into general journal, categorize transaction in the general ledger and preparing income statement and balance sheets) manually. The students are only required to enter transactions into general journal.

#### **IV. CONCLUSION**

Teaching Restaurant and Boutique (TRB) at State University of Malang is different from other general type of restaurant. TRB has to balance two main functions, generating profit and functioning as learning media, while general type of restaurants main function is to generate profit. TRB is fully operated by students who take hospitality business management course, thus it always be operated by different group of students in each semester.

The financial accounting practices in TRB is also fully performed by students. Currently, students uses Microsoft excel to prepare financial statements of the restaurant. Students performs all the stages (documenting transaction into general journal, making transaction summary in general ledger, preparing income statement, preparing balance sheet) needed to prepare income statement and balance sheet. Interactive worksheet may help the process of preparing financial statement in TRB. Interactive worksheet is developed by inserting macro/VBA application into Microsoft excel. By using interactive worksheet, students is only needed to documenting the transaction into general journal, while general ledger, income statement, and balance sheet is generated by the interactive worksheet automatically. Since the process of preparing income statement and balance sheets is performed automatically by the interactive worksheet, thus the accuracy of the financial statement is increased and the time needed to prepare the financial statement is decreased. In other word, the use of interactive worksheet may improve the effectiveness of the financial accounting practices in Teaching Restaurant and Boutique at State University of Malang in term of higher accuracy and lower time spent.



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EI-02-098

## THE EFFECTIVENESS OF IMPLEMENTATION LEARNING MODEL WITH WORK VALUES EMBEDDED FOR JUNIOR HIGH SCHOOL STUDENTS.

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**Abstract :** This study aims to determine the effectiveness of the implementation of learning models of work value embedded for junior high school students. This study used the approach of R & D with the stage dissemination for model implementation. Subjects study involved junior high school students in Grade 2 which are about 150 students. Data has been collected through observation and questionnaires. Data were analyzed using descriptive statistics. The study found that learning model applied effectively in instill the value of work for junior high school students, with learning scenarios: (a) construction of work interests, (b) production, (c) access to progress, process and clarification, (d) the meaning of the work results, ( e) exhibition and sale, (f) reflection.

**Keyword :** Work Values embedded, construction of work interests, production and progress access

### I. INTRODUCTION

Students in junior high school (*Sekolah Menengah Pertama - SMP*) are a child between the ages of 11-14 years. This age is the important age to instill the basics of character, especially in relation to the values of work, so that at an early age they are already familiar and understand the essence of the importance of the work. The development of the child's age is one factor that must be considered in the provision of literacy classes. According Muijs, & Reynolds, (2008) there are stages where the material has been considered to be appropriate skills for granted. They believed that children with different ages have different views of the real world.

To face their surrounding environment, children also interact with other people and thus they can also learn from those with different learning levels. A child at the age of five years have been able to indicate a choice to accept and reject, for example, be a pilot, a cowboy, a policeman, a fireman or a football player. He is limited only by his imagination and fantasies concerning the roles and intends to assume that these considerations are not guided by any real consideration.

Thompson (1973) describes the selection work in accordance with the child's development, namely; (1) in the age 11-12, children tend to do the work or activities that suit their interests and preferences alone, (2) in the age of 13-14 years, children have started doing the work or activities that are based on their respective capabilities, in addition to their interests and favorites. Based on these opinions, the junior high school students have been appropriately applied learning models that embed value of work.

Results of a preliminary study that conducted by authors suggest that skill learning that took place in the junior high schools, in general, only able to instill work values in the low category. Noviar Diar's research results (2009) showed that teachers tend to teach science in the cognitive domain so



that the affective and psychomotor aspects have not shown a significant effect on student achievement in junior high school level.

Associated with low autonomy and lack of role of student activity in learning skills, it is necessary to look for a learning model that can develop student work insights. One of developed models is a learning that instills work values which are applied in teaching skills on the craft subjects in junior high schools. The developed learning model of work value is expected to meet a balanced education taxonomy and foster interest in the work, the work appreciation, technology mastering, entrepreneurial insight, and give satisfaction in learning.

Work values can be defined as any activity that produces goods or services (Brothers, 2004). The essence of work here emphasizes their results in the form of products or services from a working activity. Sverko et al. (2008) emphasizes that the value of the work is what one considers to be important to consider when working. Furthermore, Kraska (1993) suggests that the value of the work is one part of the work ethic that becomes a guide and it is believed by every individual in the act and behave according to the value or the rules of the workplace. Moreover, Šverko et al. (2008) states that the value of the work related to the rules of work that emphasizes the importance of objectives relating to: economic security, social interaction, or utilization of capabilities. In relation to the importance of work value for an individual, Roe and Ester (1999) says that the value of the work has be proved to play a significant role in both the selection of individual vocational and specific behavioral and psychological conditions including job satisfaction, commitment, and working motivation.

Based on the above reason, the implementation of learning in term of work value which is integrated on craft lessons can form the character of students to work from an early age. It can also foster an interest to continue to study in vocational school after graduating from junior high school.

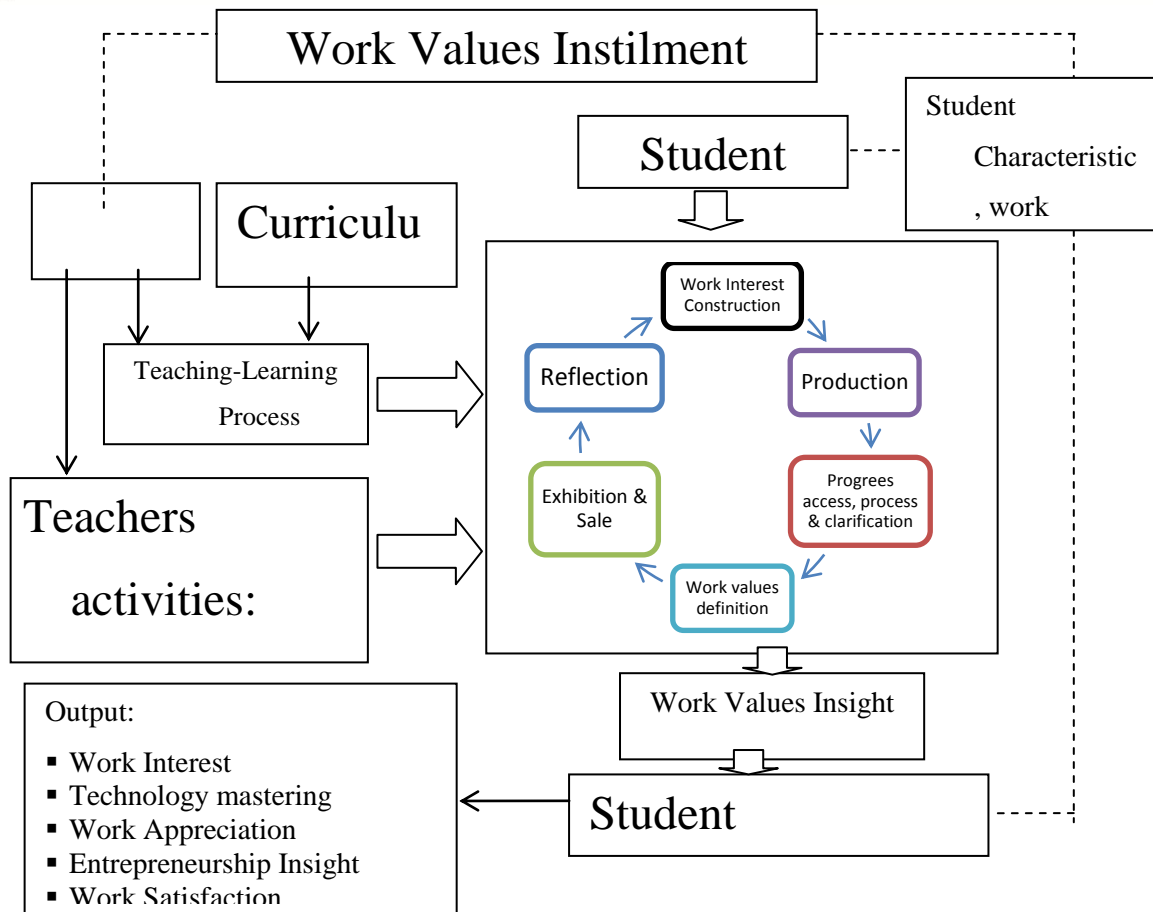
## **II. METHOD**

This research use research and development (R & D) approach. Stages of development consist of : (1) a preliminary study, (2) development model, and (3) the application of the model. The subjects in this study involved grade 2 students about 150 people which were taken by purposive sampling method. Methods of data collection used observation and questionnaires. The instrument was a student questionnaire responses developed through FGD, and the Delphi technique. Data were analyzed using descriptive statistics.

## **III. RESULTS AND DISCUSSION**

### **A. Results of Model Development and Implementation**

From stages in preliminary studies and stages of model development, the empirical model of work values instillation was produced as shown in Figure 1 below. The model consisted of 6-step learning scenarios which have been through the process of learning trials. The trial results showed that the model is effectively used in learning the craft in order to instill the value of working in junior high school students. The model with work values embedded is shown as follows:



**Figure 1.** Final Learning Model with Work Values Instillation

From observation on the process of work values instilment learning trials, the results were shown as follows :

**Table 1.** Observation on the Dimension Process of Work Values Instilment in Learning

No.	Stages	Dimension	Progress Level							
			HA	%	A	%	LA	%	NA	%
1	Work Interest Conctruction	Work Interest	8	66, 7	4	33, 3	0	0	0	0
2	Production	Technology mastering	12	75, 0	2	12, 5	2	12, 5	0	0
3	Progress Access / process & clarification	Work appreciation	10	71, 4	3	21, 4	1	7,2	0	0
4	Work results definition	Entrepreneurship Insight	7	26, 9	7	26, 9	12	46, 2	0	0
5	Exhibition & sale									
6	Reflection	Learning Satisfaction	9	64, 3	5	35, 7	0	0	0	0





Source: Processed Data sheet observation

Description: HA=highly accomplished, A=Accomplished, LA=Less accomplished, NA=Not accomplished.

Table 1 shows that: (1) the construction phase of work interests can meet the dimensions of the working interest, with a very accomplished results 8 (66.7%), accomplished 4 (33.3); (2) the stage of practical activities (production) meets the dimensions of the mastery of technology, with a highly accomplished 12 (75%), accomplished 2 (12.5%), and less accomplished 2 (12.5%); (3) stage of progress access clarify the process and be able to meet the dimensions of the appreciation of work with a very accomplished 10 (71.4%), accomplished 3 (21.4%), and less accomplished 1 (7.2%); (4) The meaning of the work stage, exhibition and sale meet the dimensions of entrepreneurial insight, with a very accomplished 7 (26.9%), executed seven (26.9%), less accomplished 12 (46.2%); and (5) the stage of reflection meets the dimensions of job satisfaction, with highly accomplished 9 (64.3%), terlaksana 5 (35.7%). The results of the assessment, in general, there are two respondents expressed that the model need minor revision so that the sub-indicators of each dimension in the learning can be accomplished and the remaining states are met.

The observation of learning scenarios with work values instillation on a limited trial obtained as follows: (1) observer (rater) 1 assesses 15 aspects in the study is done, only two aspects are not implemented, (2) the observer 2 (rater) assess only two aspects which was not carried in learning, and 15 aspects which are observed already accomplished.

The level of consistency and stability of the observer in observing the accomplishment of the learning model of value investment work, from meeting to meeting, known from the results summarized in the average percentage as follows.

**Table 2.** Results of the Accomplishment of Learning Scenario with Work Values Embedded Model

Observer	Mean of Accomplishment (%)	Description
1	88	Good
2	88	Good
Mean	88	Good

Table 2 shows that the consistency and good stability. This is shown by the average percentage of agreement obtained by 88%, including both Sax criteria (1980: 570). It means that both observers have the same perceptions and views to construct observation sheets which were observed. Thus, data on the enforceability of the model work in the learning value investment has high level reliability.

The observation of the effectiveness of the stages of the model with work values instillation which were conducted by two observers at 3 different schools generated as follows:

**Table 3.** Effectiveness Level of Model Implementation

No.	Stages of Work Values Instillation	Effectiveness					
		Intensity	Efficiency	Systematize	Practicality	Productivity	Mean
1.	Work Interest	3.5	3.4	3.4	3.3	3.5	3.4
2.	Production	3.3	3.5	3.3	3.4	3.6	3.5
3.	Progress Access/process & clarification	3.4	3.5	3.3	3.3	3.5	3.4
4.	Work results definition	3.5	3.3	3.3	3.4	3.5	3.4
5.	Exhibition & sale	3.2	3.3	3.4	3.3	3.5	3.4
6.	Reflection	3.5	3.2	3.4	3.3	3.5	3.4

Table 3 shows that the construction phase of work interests, practice activities (production), access stage of progress, process and clarify, stage of definition the work results, stage exhibitions and sales, and the stage of reflection is effectively used in the planting of the value of working which were viewed from of the criteria scores, intensity, efficiency, systematize, practicality and productivity. Thus it can be determined that stage of implantation on the learning model worked very effectively and can be used in the instillation of work values in the junior high school grades.

The observation of the effectiveness of planting work values components which were assessed from aspects as follows: Learning plan, media and learning resources, tools and materials, methods of learning with the instillation of work values, learning stages, and the impact on students. The obtained results of the analysis can be shown as follows:

**Table 4.** Level of Effectiveness of Learning Component

No.	Components of Work Values Instillation	Effectiveness Level					
		Intensity	Efficiency	Systematize	Practicality	Produktivitiy	Mean
1.	Learning Plan	3,4	3,4	3,4	3,4	3,5	3,4
2.	Media & Learning Resources	3,4	3,4	3,3	3,3	3,3	3,3
3.	Tools & material	3,4	3,4	3,3	3,3	3,5	3,4
4.	Learning Method	3,5	3,3	3,3	3,5	3,5	3,4
5.	Learning Scenario	3,5	3,4	3,4	3,4	3,5	3,4
6.	Learning Evaluation	3,5	3,2	3,2	3,3	3,4	3,3
Mean		3,5	3,4	3,3	3,4	3,5	3,4

Table 4 shows that: (1) the level of effectiveness of the learning plan obtained results very effectively used in learning process which were viewed from criteria scores such as intensity, efficiency, systematic, practicality and productivity. They are all highly effective; (2) the effectiveness of media and learning resources obtained results very effectively used in the learning criteria scores,



intensity, efficiency, systematic, practicality and productivity which are all highly effective; (3) the effectiveness of teaching methods are very effective results are obtained with the criteria used in learning scores, intensity, efficiency, systematic, practicality and productivity are all highly effective; (4) the effectiveness of learning scenarios obtained results very effectively used in learning and the criteria scores of intensity, efficiency, systematic, practicality and productivity are all highly effective; (5) evaluation of the effectiveness of the results obtained were very intense, efficient, systematic, very practical and productive.

#### IV. CONCLUSION

Based on the results of research and discussion, it can be concluded as follows: (1) the preliminary study stage and the stage of development of the model produced an empirical model of work value instillation (2) in the phase of application of the model, trials were conducted and found the six stages of the learning process of planting the value of work, namely: ( 1) construction work interests, (2) production, (3) access to progress, process and clarify, (4) the definition of the work, (5) exhibition and sale, and (6) reflection, which effectively instill work values for junior high school students in learning the craft subject. It is based on very fulfilling learning dimension in instilment the value of work, the accomplishment of the learning component and process stages with work values embedded implementation,

Based on the conclusions outlined above, it can be recommended some suggestions for consideration by the parties relating to the development of learning the craft subject in junior high schools, so that they would be able to apply the learning model with work values embedded in skill learning in junior high schools in order to instill the value of work from an early age.

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## THE IMPROVEMENT OF LEARNING INTEREST AND MASTERY ON WOODEN TRUSS PLANNING USING TEAM ASSISTED INDIVIDUALIZATION LEARNING METHOD

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**ABSTRACT :** *This present study aims to determine: How the application of cooperative learning methods TAI Type (Team Assisted Individualization) can explain the increase both interest and mastery of Wooden Truss Planning competency On Wood Structures Subject. The Variables of this study were the student's interest in learning process and competency mastery. This study was conducted in two phases, namely (a) the initial observation phase; and (b) the stage of action implementation. The implementation of the action was conducted in four cycles: (a) planning the action, (b) the implementation of the action, (c) observation, and (4) reflection. The study was designed in cycles until the performance indicators were achieved. The results of the study showed that the Application of Cooperative Learning Methods TAI Type (Team Assisted Individualization) on Wooden Truss Planning on Structure Wood Subject lead to the increasing interest and mastery of competencies through two cycles. The improvement was indicated by those whose score > 70 were 21 % in the first cycle and increased to 85% in the second cycle which can be categorized as achieving learning achievement indicator. The improvement in students' learning interest in the first cycle was 30% which was categorized in high category, 48% in less high category, 14% in the low category and only 8% in the very high category. In the second cycle, there were some changes; mostly 53% in the high category, 40% in the very high category, while only 7% in the less high category. This model can be applied to the wood structure subject in the implementation of wooden truss planning assignment and not to mention on subjects which have similar learning characteristics.*

**Keywords:** Team Assisted Individualization, Cooperative Method, Learning Interest and Competencies

### I. INTRODUCTION

Learning process in the class is an integrated process between the lecturer - student and its supporting factors. Good communication between students and lecturers offer great assistance during the process of learning and understanding the learning material. Learning process is always aimed at realizing the students' student competency comprehensively. Students – centered learning is expected to enable students to master necessary competencies in the learning subjects. In order to do so, teachers must realize that students require continuous and sustainable training or practice.

The wooden structure subject on the curriculum 2012 is a combination of wooden structures I and II with 3 credits. The structure of wood subject has a comprehensive understanding in analyzing the real problems in the field of wood construction. The realization of this competence is the final task of planning the structure of a wooden building frame that is the wooden truss. This characteristics of this task is comprehensive which includes all learning material that has been given during the learning process. Therefore, during the implementation of this assignment, students should apply the whole of the learning material to finish the assignment. Based on the reflection on the learning process that has been conducted on the subject of the wooden structure, it can be concluded that the competence of students was less maximum in the wooden structures subject. The less maximum students' competence can be indicated from the results of tests. Based on the results of the test, most of the students did not achieve the learning mastery well. Other indicators show that the results of the



students' assignment evaluation that have been performed, students' learning mastery was also less maximum. One of the indicators was the time of assignment submission was frequently late.

Based on the considerations above, it is necessary to develop a learning method which involves the participation of the entire students so that learning and teaching is not dominated by any particular student. One of the methods that is able to involve the participation of the student is cooperative learning. Cooperative learning method focuses more on the process of learning in groups, instead of doing anything with the group. The learning process in the group will assist students to find and develop their own understanding of the subject matter which can not be found in conventional methods.

One of the alternative teaching methods that may be applied to improve students' learning outcomes is the T.A.I. (Team Assisted Individualization). Methods T.A.I. (Team Assisted Individualization) is a learning method which puts students in small groups led by a group leader who has a better knowledge than the other group members. Difficulties experienced by students can be solved together with the group leader and teacher's guidance. The success of each individual is determined by the success of the group, good social interaction skill is necessary among all members of the group. One of the advantages of the method T.A.I. (Team Assisted Individualization) is that can provide opportunities for students to teach each other (peer tutoring) and provides mutual support. This group can also improve interaction between race, religion, ethnicity, and can ease the classroom management of the classroom because the presence of one person of high academic ability in each group, teachers get an expert assistant for each member of the group.

Learning is an activity that brings about changes in individuals. A person's learning activities require a person's outcomes or achievements, as corroborated by Roestiyah (1986) that learning achievement is a result achieved a person experiencing a learning process in the form of habituation, knowledge or attitudes. Learning requires creativity and innovation its process. These innovations require changes in paradigm of teaching into learning, a change in a productive thinking becomes reflective thinking. This means that the understanding the competence is not just knowledge (demonstrating the knowledge) but more on the ability / ability to do. These are based on the principle of learning which are the four principles, namely learning to know, learning to do, learning to live together and learning to be. Therefore, this case implies that learning should implement learning to know, learning to be able to do, learn to work together to obtain something and learn to become something that is learned.

Cooperative learning basically aims at teaching students about the skills of cooperation and collaboration. This cooperative aspects will help students to develop cooperative behavior and a better relationship between students and assist students in cooperative learning. Cooperative Learning by Stone (1990) is a method of learning which provides students to cooperate with each other to understand the significance of the learning subject and in actively completing the task. Cooperative method is expected to improve the quality of learning process, because the the students work together



on the assignment, share the knowledge with friends who are more capable, solve problems in a group, instilling responsibility together and develop social life. Learning activity is expected to be further improved through learning in small groups to develop social skills, individual skills and improve learning kelitas.

Cooperative learning approaches (cooperative learning) is the concept of learning that help teachers take advantage of small groups of students working together to achieve the goals of learning, and enables students to maximize their learning. Cooperative learning can develop academic cooperation between students, form positive relationships, develop self-confidence, as well as improve academic skills through group activities. In cooperative learning, there is a positive interdependence among students to achieve learning objectives. Each student has an equal opportunity to succeed. Student-centered learning activities in the form of discussion, do the assignment in a group, help each other and support each other in solving problems. Through effective learning interactions students more motivated, confident, able to use higher-level thinking strategies, and able to build interpersonal relationships.

Cooperative learning model allows all students to master the material at relatively the same level of mastery. Johnson and Johnson (1984) and Hilke (1990) suggests the characteristics of cooperative learning is; (1) there is interdependence of individual, (2) can be justified individually, (3) heterogeneous, (4) shared leadership, (5) share responsibility, (6) presses on the task and togetherness, (7) forming social skills, (8) the role of the teacher / lecturer observe student learning / student, (9) the effectiveness of learning depends on the group. Learning occurs in small groups (3-4 members), heterogeneous regardless of the differences in academic ability, gender, race, or other.

Methods T.A.I. (Team Assisted Individualization) is one type of cooperative learning methods in which groups are individual - assisted. This method was created and developed by Slavin Slavin create and develop this model for several reasons. First, this method combines the advantages of cooperative and individual learning program. Second, this method emphasizes on the social effects of cooperative learning. Third, this method is conceived to solve the problems in the teaching program, for example in terms of students' learning difficulties individually.

The implementation of Team Assisted Individualization in the classroom is that students are placed in small heterogeneous groups (4 to 6 students per group) and subsequently followed up by providing individual assistance to students who need them. Before the group was formed, students were taught how to work together in a group. Students were taught to be a good listener, able to deliver information to a group of friends, discuss, encourage other friends to work together, respect the opinion of other friends, and so on. Each member in the group has a similar task. Because the focus of this method is the success of cooperative learning groups, it is the students who are good partly responsible for helping someone who is less knowledgeable in the group. Thus, students who are good can develop the capabilities and skills, while students who are less knowledgeable will be helped in understanding the learning problem (Suyitno, 2002: 9).

## II. METHOD

This study was conducted at the Department of Civil Engineering, Semarang State University. The subject of research is the students of Construction Vocational Education who took wood structure subject. Variables of this study were student interest and competence in the subject of Wood Structures with the implementation of cooperative learning methods Type T.A.I. (Team Assisted Individualization).

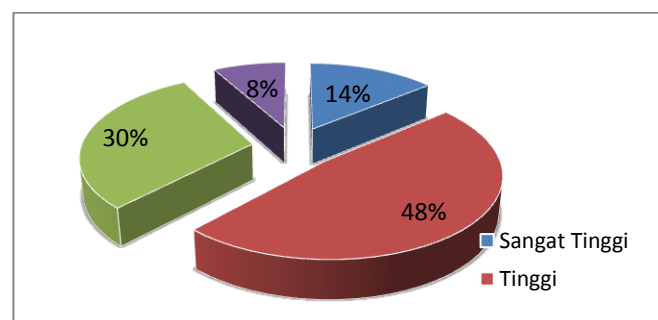
The study was Classroom Action Research with the design from Kemmis and McTaggart (Depdiknas, 2004), the implementation of treatment in the Classroom Action Research consists of four steps: (1) the action planning; (2) implementation of the action; (3) observation; and (4) reflection.

## III. RESULTS AND DISCUSSION

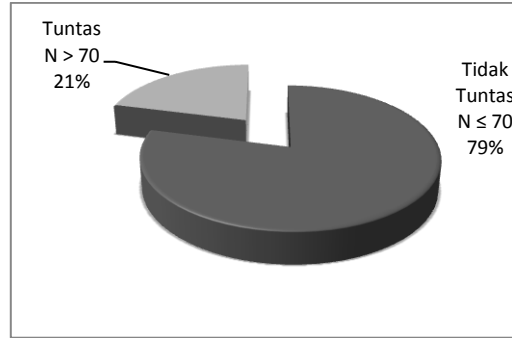
The results of the study describe the implementation of Team Assisted Individualization Method that focused on the components of students' interest and mastery of competencies in planning wooden truss assignment. Students' mastery of competencies was measured through the mastery of concepts including determining the dimensions of the wood, the accuracy of determining the dimensions of wood, fluency in answering and timeliness of completion.

Figure 1 shows the student's interest in wooden structure subject in cycle I. These results provide an explanation that 30% of the students were in the high category, 48% were in the category of less high, 14% were in the category is not high and only 8% was in the category of very high. High interest in learning was less visible on all aspects of attention, relevance, confidence and satisfaction. Meanwhile, in the category of high that no more on the aspects of self-confidence, satisfaction and relevance.

Meanwhile, in the first cycle, the learning outcomes overall value obtained were still below standard, namely that scored above 70 only amounted to 21% and most of the 79% gain value  $\leq 70$  as shown in Figure 2. This shows the level of achievement indicators mastery learning have not been fulfilled. These results do next as a reflection on the conduct of the cycle II.



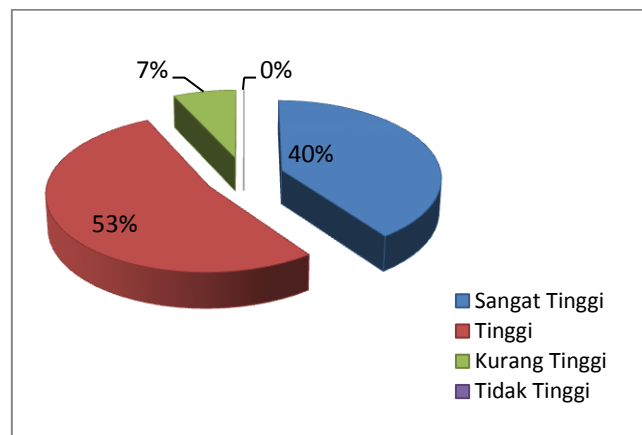
**Figure 1.** Students' Interest in Learning (Cycle I)



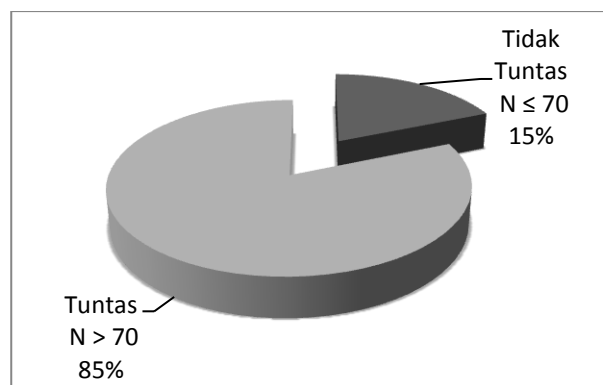
**Figure 2.** Learning Mastery (Cycle I)

Figure 3 shows that the results of students' interest during the implementation of learning in the second cycle with the application of that method after reflection, explaining that the majority of 53% in the high category and 40% in the category of extremely high, while only 7% in the category of less high and to the category of high no no (0%). High interest in learning are less visible on aspects of relevance, confidence and satisfaction.

Meanwhile, based on the results of research on siklus II explained that the level of mastery of competencies in Cycle II as a whole has met the indicators of success where 85% gain score more than 70 and only a small proportion amounting to 15% who get score less than 70, as shown in Figure 4 ,



**Figure 3.** Students' Interest in Learning (Cycle II)

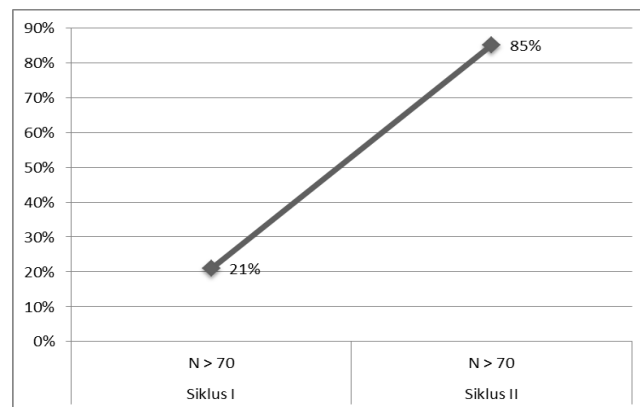


**Figure 4.** Learning Mastery (Cycle II)



Based on the results of the reflection on the first cycle, the improvement was conducted on the learning cycle II especially on optimizing the group work. Approaches were made during the implementation of assistance to grow the awareness and understanding from the students about the importance about the learning process and results. TAI method results in a cooperation among members of the group. Consequently, the conducive communication, mutual empathy, respect and help between members were established in the learning process. This conducive learning atmosphere is expected to further induce the growing interest of the students in becoming better in terms of attention, confidence, relevance and satisfaction. Furthermore, the growing interests is expected to increase the level of mastery of competencies, as shown in Figure 7.

This is indicated by an increase in the percentage of those who gained score more than 70. Those who gained scored more than 70 was 21% on the first cycle, then it increased into 85% in cycle II and have met the learning mastery indicators, as shown in Figure 5.



**Figure 5.** Learning mastery Cycle I dan II (Score > 70 )

Figure 5 above shows that there has been an increase in terms of mastery of competencies. The number of students achieving learning mastery with the score > 70 of the first cycle was 21%. The number increased on cycle II to 85%, this indicates that the Team Assisted Individualization can improve the academic and non-academic ability. The Team Assisted Individualization is more integrated as an embodiment of the competence improvement by improving cognitive, affective, and psychomotoric aspects simultaneously. It is also in accordance with the four pillars of education declared by UNESCO, namely learning to know, learning to do, learning to be and learning to life together.

The four pillars result in that learning should be based on the overall components of the four pillars, so that the learning objectives can be realized. Team Assisted Individualization method which was applied in two cycles in the study were able to explain the students' increased interest and mastery of competencies. This method provides an opportunity for students to appreciate the ability to cooperate with each other in the learning process and will provide reinforcement to the relevance, confidence and satisfaction on themselves. Reinforcing the students' learning interest will further provide reinforcement to the mastery of competencies of the material that is implemented the task of planning the wooden truss.



#### IV. CONCLUSION

The study concluded that the Application of Team Assisted Individualization Method on the wooden truss planning on Wood Structure subject was able to explain the increased interest and mastery of competencies during two cycles. This is indicated by an increase in the percentage of those who gained score more than 70. In the first cycle, those whose score was more than 70 were 21%, this number increased into 85% in cycle II and have met the indicators of learning success

Reinforcing the students' interest in learning in the first cycle is 30% in the high category, 48% in the category of less high, 14% in the category is not high and only 8% in the category of extremely high. In the second cycle, the changes are mostly 53% in the high category and 40% in the category of extremely high, while only 7% in the category of less high

Based on the results and the conclusions it is advisable to implement the Team Assisted Individualization on the wooden structure subject This model can be applied as well as on subjects that have characteristics which is a group assignment.

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EI-02-104

## THE APPLICATIONS OF PSYCHOMOTOR DOMAIN LEARNING STRATEGIES AT VOCATIONAL HIGH SCHOOL

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**Abstract :** Learning is the are relatively permanent change in behavior as a result of the experience. Learning outcomes can be classified into three domains items, namely 1) the cognitive, 2) the affective and 3) the psychomotor. Psychomotor domain contains the behaviors on the development of skills related to physical movement and social skills such as communication and operation of the equipment. This is in line with the opinion Tomei (2005), psychomotor domain associated with the development of physical skills, from simple to complex. In the early stages of learning the basic skills of teachers and students demonstrated Followed, Reviews These skills until mastered. At the high skill level of the student should be Able to develop patterns of movement as required to address the problem. Therefore, for the psychomotor learning the basic skills in a vocational training school more Appropriate applied learning strategies. Because students are trained in a step-by-step, systematic and structured so that such skills can be mastered very well (Arends, 2008). Then, for the psychomotor learning at a high level of skills in vocational school, the which requires the ability to do problem solving, product development or creating a new product, it is more Appropriate to be applied project-based learning strategies. This, along with his research Waras (2003) and Suprpto (2014) the which concluded that the learning method of training is excellent for learning the basic level of skills, and project-based learning strategy is excellent for high-level skills learning and problem solving.

**Key words:** Psychomotor Domain, Learning Strategies, Vocational High School

### I. INTRODUCTION

In general, learning can be defined as the process relatively sedentary behavior changes as a result of the experience. (Hitipeuw, 2009). Therefore, learning is a process to get a wide range of knowledge, attitudes, and skills. This learning process has been started since the man still in the womb until all his life. And learning outcomes learners are intended to be able to think and do something (Crown & Roop, 1992), as well as to provide himself so that his life becomes easier and better.

If seen from Bloom opinion, the learning objectives are divided into three domains, namely: 1) the cognitive domain, 2) the affective domain, and 3) the psychomotor domain. In the cognitive domain associated with behaviors that emphasize the intellectual aspects, such as knowledge, understanding and thinking skills. Affective domain associated with behaviors that emphasize aspects of feelings and emotions, such as interests, attitudes, and ways of adjustment. Psychomotor Domain contains behaviors that emphasize aspects of motor skills, such as typing, swimming, repair or operate machinery and others. (Krathwool at.al., 1964)

Thus, the process of learning is a human attempt to master the specific competence so that behavioral changes relatively sedentary in that person because interacting with the learning environment. According to Bloom opinion, the result of learning can be in the domain of cognitive, affective and psychomotor. In a learning process made possible a third subject matter that are in the domain. But also, a subject matter have a tendency to a particular domain. For example, at Vocational High School, there is a subject matter that is on the cognitive domain, there is the affective domain and



psychomotor domain is in, or is also on the third domain. However, due to secondary vocational schools provide students with a set of skills required by the world of work or industry, then a lot of lesson material nuanced psychomotor domain. Therefore, in this paper raised the topic of: "Application the Psychomotor Domain Learning Strategies at Vocational High School".

## **II. REVIEW**

### **A. Psychomotor Domain**

Psychomotor domain associated with the achievement of learning outcomes through manipulation skills that involve muscle and physical strength. Psychomotor domain is a domain-related physical activity, for example; write, hit, jump and so forth. Psychomotor Domain was formed to address the development of skills associated with manual tasks and physical movement, but also pay attention and include social skills such as communication and operation of the equipment, for example for telephone and skills to play the keyboard, or speaking in public. This is in line with the opinion Tomei (2005), the psychomotor domain associated with the development of physical skills, from simple physical competence up on skills that require muscle coordination complex. In the early stages of the development of the psychomotor domain, learners only imitates his teacher, repeated physical activity is demonstrated and take advantage of trial and error to achieve the correct response. Learners continue to practice a particular skill order to master these skills, but may still lack confidence. Confidence is shown by actions that are accurate, fast, smooth, use minimal force, so the response is done without hesitation. On the level of skill that is inherent (embedded) then the individual can modify movement patterns as required or to address new issues. Until finally, psychomotor responses are completely automated, and learners started experimenting, creating new skills to develop abilities and skills. Thus, skills 'motor' beyond manual and physical skills. There are several classifications of the psychomotor domain, one of them put forward by Simpson (Winkel, 2009). Simpson classification more relevant and useful to assist in the training and development of the psychomotor domain vocational students. In the classification Simpson at the lowest level are given the ability of perception, to distinguish the measures for what needs to be done of the stimulus coming, until the highest skills to create a variety of movement patterns on the basis of the new initiative and the initiative itself. This condition can only be achieved if learners have a high skill and daring to think critically and creatively. For example, able to innovate to create new products, to modify the old car into a futuristic car and others. Psychomotor domain classification by Simpson is divided into seven levels, namely:

1. Perception

Skills / ability to accurately distinguish the two stimulants or more, based on the distinction between the physical characteristics unique to each stimulus.

2. Readiness



Skills / ability to put himself in a state will start a movement or range of motion. This readiness in the form of physical and mental readiness, for example, is ready to start / stop the vehicle at red lights.

### 3. Guided movements

Skills / ability to perform a series of movements, according to the example given (mimic). This capability is expressed by being able to follow the movement exemplified, such as opening or tightening the nut / bolt.

### 4. Accustomed movements

Skills / ability to perform a series of movements smoothly in accordance with appropriate procedures without seeing an example, because it has been trained to perform. Such as the ability to remove and install the wheels of cars with the right procedure.

### 5. Complex movements

The ability to perform a skill that consists of several components with precise, smooth, and efficient. For example, a series of actions in sequence and combine several sub skills into a whole movement that regularly, as disassemble the engine and its parts, then put it back.

### 6. Adjustment patterns of movement

Skills / ability to change and adapt their movements to existing conditions and has reached the level of expert skills. For example, a regular driver who was driving on the left road, suddenly had to adjust to driving on the right path (according to the rules of traffic).

### 7. Creativity

Ability / skills to create a variety of new movement patterns on the basis of the initiative and their own initiative. This condition can only be generated if the person has a high skill and daring to think critically and creatively. For example, to modify an old car into a futuristic car.

## **B. The Learning Theory of Psychomotor Domain (Skills)**

The learning theory of psychomotor domain is not really different from the theories of learning in general. But the learning theory of psychomotor domain has its particularity, because it usually can be measured through observation and learning connotation psychomotor domain is a learned skill and practice. According to Uno (2011) there are two theoretical perspectives that support learning psychomotor domain, namely: 1). Behavioristic learning theory, namely the theory of stimulus-response (S-R), which shows that skilled performance comes from the chain units S-R. 2). Cognitive information processing theory, which focus not only on what is done, but focus on what they thought at the time to do something. The researchers showed that a program of skills (psychomotor) is not a stimulus-chain units are responding, but includes a model of skill and a plan to implement them. Even for high-level skills needed the ability to solve problems of different contextual and product development capabilities or create new products.

Psychomotor program is usually a skill that is hierarchical organization, which includes the skills and sub skills. Therefore, learning the basic skills occurs a series of stimulus-response. Then, in



the next skill learning, movements improved through practices that guided a skills program. That is why learning skills, demanding teachers are able to communicate the program to the learners, analyzing skills into its components, and observed the performance of learners in practice.

Generally a learned skill, previously had to be equipped with a variety of theories that underlie these skills in order to facilitate the learning practice. This is in line with the opinion Reigelut (1999), which states in learning skills, the steps that should be given are: 1) Provide a theory about what should be done, 2) Develop basic skills gradually, 3) Develop skills higher. Then think about learning skills raised by Fitts (in Klausmeier, 1985), there are three stages in learning skills: 1) cognitive stage, which usually lasts relatively short. At this stage learners study and think about how to perform these skills, usually learn the basic theory and existing work instructions. 2) The organizing stage (intermediate). At this stage the feedback operation becomes more organized. 3) Phase refinement. At this stage, specific movement becomes more smoothly, so that control of specific actions to be reduced, and more control is given to the overall movement. In other words, the skills become increasingly automated to do. Then, according Klausmeier (1985), the process of learning a skill has several peculiarities: 1) The transition of handing control to automatic control. At first the movement occurs slowly and irregularly. The movement is guided by worksheets and instructors, then the movement becomes more rapid and irregular without being guided again. 2) The movement was initially vague, became increasingly clear and real, both in quality and quantity. 3) Feedback becomes faster. 4) Furthermore, the patterns of movement are increasingly coordinated. 5) The final result of learning skills is becoming more stable performance and better.

From the opinions of the above it can be concluded that the skills learned there are stages that must be done: 1) Provide basic theories relevant to the skills that will be learned. 2) Develop skills from the basic level to a higher level in stages (step by step), using the job sheet guide and instructors 3) In order for such skills can be mastered properly it is necessary to practice regularly and organized, so that learners achieve the level of skill that is increasingly automated to do. 4) To improve the skills of learners to conform to the world of work or industry, usually at Vocational High School held industry practice program for several months, in industries that are relevant to their fields. 5) To achieve a high level of skills, the learners need to be given the opportunity to seek real solutions to problems in the field or create new products, to conduct critical and creative thinking. Therefore, for the psychomotor domain of learning at the level of basic skills is very suitable when used learning strategy training model. Medium, for the psychomotor domain of learning at a high level of skills better suited for applications strategy project or problem-based learning (Arends, 2008). This is consistent with the results of his research Waras (2003) which concluded that the learning method of training is excellent for learning the basic level of skills, and project-based learning strategy is excellent for high-level skills learning and problem solving. Furthermore, the results of research Suprpto (2014) concluded, on learning the basic skills very well when using learning strategies



directly with the training model. And learning skills that require analytical skills and excellent problem solving using contextual learning strategy and project-based problem solving.

### **C. The Learning Strategies of Psychomotor Domain With Training Model**

In the main learning psychomotor domain is the mastery of skills required. Formation of motor skills is more appropriate when done through practical activities. Through repeated practice will be formed at the same movement habits will produce better work skills. (Wena, 2010). Then the psychomotor domain of learning strategies for basic skills in vocational training model used learning strategy.

Learning strategy of training model focused on the learning objectives that are translated into more detailed tasks. Translation of this task is intended to clarify the achievement of sub-sub skills with a clear sequence in step by step. Then, in a stream of behavioral psychology often use modeling techniques to provide ease in teaching behavior patterns, such as the development of motor skills (Joyce and Weil, 2009). The learning of psychomotor domain with training models are usually used for learning skills at a basic level and intermediate. Furthermore, for high-level skills are commonly used model of project-based learning or problem-solving model.

In general, the learning strategy of psychomotor domain with training model consists of six stages:

1. Submission of the learning objectives
2. Explanation supporting theory practice
3. Demonstrate how to work.
4. Exercise / practice basic level.
5. Exercise / practice advanced.
6. Visits to the industry.

For more details, about learning of training model, described as follows:

#### **1. Submission Learning Objectives**

The initial step of the psychomotor domain of learning training model is to formulate and communicate its goals to be achieved. As disclosed Degeng (1989), the task of learning essentially refers to the results to be achieved. While Mager (1975) says that the learning objectives describe the performance expected by the end of the learning program. Based on these assessments, the formulation of learning objectives are absolutely necessary skills before learning program begins.

#### **2. Explanation of Theory Supporting Practice**

Theory to support practices presented by instructors using lecture method and with the help of audio-visual media, it is intended that teaching becomes more meaningful and can attract the attention of learners. In addition to the audio-visual media of certain parts of the learning practices can be understood more easily, because the use of audio-visual media



### 3. Demonstrate How It Works

According to Meril (Wena, 2010), the most effective way to teach these skills is a demonstration. It should be considered in this process is the teacher must demonstrate the correct way of working, so that learners can understand. This is because, in essence own demonstration stage is the implementation of learning practices. To increase the success of the demonstrations there are 4 things to do teachers, namely: 1) notify the learners to perform skills demonstrated; 2) tells learners what should be recorded in the demonstration; 3) Demonstrate skills step by step clearly; 4) Before practice, reminding measures critical skills. (Joice & Weill, 2009).

### 4. Exercise / Practice Ground Level

Exercise / practice provides an opportunity for learners to practice the skills learned. Practice is done from ground level step by step and continuously. In addition the practice will continually produce perfection motor skills are good. So, in learning the skills, training must be propagated, to develop skills. Finish the exercise, learners are given feed back the results of work by teachers, for the repair and reinforcement.

### 5. Exercise / Practice for Advanced

Exercise / practice for advanced is a continuation of the basic level practical exercises. At this level the task given to learners already more complex than ever before. Therefore, learners are required to better concentration and assiduously to improve the skills from the basic level to advanced. Mastery of advanced skills are indispensable as a provision for them to work later.

### 6. Visits to Industry

A visit to the Industry is intended to provide a real experience to the learners about the reality in the world of work that may eventually they will enter. In addition, to improve and develop the skills they have learned at school. There are several forms of industry visits to the program for vocational education programs, including a study tour and industry practices. Study tours are usually intended to hold a meeting with the world of work in a limited time, usually only a few hours. Study tours are usually only meant to provide orientation and insight into an industry. The industry practice is an activity undertaken by learners to practice or work directly on an industry for 2-3 months or 1-2 semesters, depending on their needs.

## **D. The Learning Strategies of Psychomotor Domain with Project-Based Learning Model**

In reality the form of vocational skills in the field is complex, then the appropriate learning models is a project-based learning model. For example, in the skill areas of timber, in order to create a table, students are not enough to just be able to make the connections timber, profiled, cutting and so on, but students should also be able to assemble the components into a coherent whole so that it becomes a table. Which part should come first, which part is done then, how to design materials, how





to design according to customer wishes. The problem is the actions that need further study. According to Semiawan et al. (1987), project-based learning strategy aims to strengthen the knowledge of the students, and allows them to broaden their knowledge of a particular subject. Similarly, the knowledge gained by students becomes more meaningful and learning activities will become more attractive, because it is more beneficial to their knowledge in solving problems encountered in everyday life. According to Nolker and Schoenfeldt (1983), an important characteristic in the project-based learning model is that students can apply the knowledge and skills possessed in order to complete the project tasks that it faces. Therefore, before engaging students in project-based learning models, the student must already have the knowledge and skills and adequate working attitude with regard to the project to be faced. In project-based learning models typically these models are used to solve a complex problem learning.

In practice, the project-based learning model, there are three steps that must be done, so that the whole process of learning activities can be successful, namely:

1. The planning phase of project learning.
2. The implementation phase of project learning.
3. The evaluation phase of project learning.

The third phase is a unity and mutual support and relate, in order to achieve the learning objectives of the project. Furthermore, these stages will be described in more detail, namely:

**a. The planning phase of project learning**

In the planning phase of the learning project has the breadth of learning that are more complex than planning in general. What else in the practice of vocational skill learning, project work requires basic skills that are very complex, so the planning must be made as detailed as possible so as to provide clear guidance in implementation. Therefore, planning of project-based learning models are designed as follows:

- a. Formulate learning objectives of the project.
- b. Analyzing the characteristics of the students.
- c. Formulate learning strategies.
- d. Creating a job sheet.
- e. Designing a learning resource needs.
- f. Designing an evaluation tool.

**b. The implementation phase of project learning.**

In order for the implementation of project learning can go according to plan and achieve the goals that have been set, it takes some preparation practices (learning skills). The implementation



phase of the project-based learning model is very important, because in this process, students will be able to experience a complex learning. And students will be able to apply a range of skills that they have learned in a complex project assignments. Therefore, the process of implementation skills practices must be in accordance with the planning phase of learning. Things that need to be done in the implementation of project learning are:

- a. Preparing the necessary learning resources.
- b. Explaining the project tasks and working drawings.
- c. Grouping students according to their respective duties.
- d. Work on the project.

**c. The evaluation phase of project learning.**

In order to know the extent to which learning objectives the project can be achieved then it should be evaluated. The evaluation should be done in accordance with the evaluation procedure is correct. With a complete evaluation of the process until the results, as well as with a valid and reliable instrument, the students' progress and weaknesses will be known, so as the improvement of learning can be done precisely.

### **III. CONCLUSIONS**

From the above discussion regarding learning strategies of psychomotor domain at Vocational High School, can be concluded as follows:

1. Psychomotor domain is associated domain with behaviors that emphasize physical activity and motor skills.
2. Learning strategies of psychomotor domain for basic skills using behavioristic learning theory, for high-level skills using cognitive information processing theory.
3. Learning strategy of psychomotor domain for basic and intermediate skills more appropriate to use the learning training model.
4. Learning strategy of psychomotor domain for high-level skills are more complex, it is advisable to use a project-based learning model or problem solving.

### **IV. RECOMMENDATION**

In order to determine the learning strategies that best suit the learning process psychomotor domain, it is recommended as follows: In the process of learning psychomotor domain, then first determine the skill level to be achieved, if only at the level of basic skills and the middle or to the high level of skills? What if only up to the level of basic and intermediate skills, it is recommended to use a



learning strategy of training model. Conversely, when a learning for high-level skills, it is recommended to use project-based learning strategies or problem-based learning.

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## LEARNING E-LEARNING IN HIGHER EDUCATION BASED LEARNING MANAGEMENT SYSTEM ( LMS )

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**ABSTRACT :** *The development of information technology is a digital age required human resources to increase the membership of the College demanded to construct knowledge independently for students learning under the rules specified by educators (faculty) as facilitator with all the amenities available at this time. Learning innovation by leveraging ICT media can be used information technology as one way of spreading the material independently. E-learning is very effective to improve the competence of students in the learning process because students interact opportunities, friends and lecturers and study materials would be opened wider. Students can access the course materials through the Internet. Another benefit with their E-Learning is a forum that can be used as a means of discussion between students and lecturers. Various models of learning with E-Learning through the use of information and communication technology (ICT) and the implementation with the paradigm of online supported by the application of E-Learning system learning model based LMS (Learning Management System) with a software development Moodle (Modular Object-Oriented Dynamic Learning Environment ) LMS (learning Management System) with e-campus effectively and efficiently in order to improve performance, interest and learning outcomes as well as the skills and abilities of students and faculty in the use of information technology devices.*

**Kata Kunci :** College, E-Learning, ICT dan LMS

### I. INTRODUCTION

Technological developments in the digital age is also a special attention by the college , because it will be the educational challenge how to enhance natural resources for the college is able to construct knowledge independently and how to use technology to improve the quality of learning for strengthening governance, accountability and public image institutions of higher education will lead to the improved performance of higher education institutions and the quality of the product . This policy will be meaningful when linked with efforts to comply with the service quality management of educational institutions , teaching quality programs , quality education facilities.

One innovation in improving the quality of higher education is how to create learning by using ICT media as one way of spreading the material independently. E-learning is very effective to improve the competence of students in the learning process because students interact opportunities, friends and lecturers and study materials would be opened wider. Students can access the course materials through the Internet. Another benefit with their E-Learning is a forum that can be used as a means of discussion between students and lecturers. Various models of learning with E-Learning through the use of information and communication technology (ICT) and the implementation with the paradigm of online supported by the application of E-Learning system learning model based LMS (Learning Management System) with the development softwaree-campus besebagai implementation of e-learning-based LMS (learning Management System) with the application of e-campus will be carried



out effectively and efficiently in order to improve performance, interest and learning outcomes as well as the skills and abilities of students and lecturers in using technological devices informas.

Currently e-learning ranging widely accepted by the world community, it is already beginning to be seen with a proven widespread implementation of e-Learning, including on in educational institutions (schools, training and universities) and industry (Cisco Systems, IBM, HP, Oracle, and others ). E-Learning is a type of learning system that allows tersampainya teaching materials for students to use media Internet, Intranet or other computer network media. E-Learning is the process of learning (learning) use / exploit Information and Communication Technology (ICT) as tools that can be available whenever and wherever needed, so as to overcome the constraints of time and space. E-Learning provides new hope as an alternative solution to most of the problems of education in Indonesia, with functions that can be adjusted to needs, either as a supplement (extra), complement (complement), or substitution (replacement) on learning activities in the classroom during this is used

## **II. E-LEARNING**

E-learning is distance learning using computer technology and the Internet, e-learning enables learning system to get the material from the internet or from places learners without having to do face to face with the teacher in the classroom. E-learning is a web-based learning (which can be accessed via the internet). However, the interactive learning process can still be executed directly or with some time lag. Thus, the learning can be through a computer and internet at work or at home connected to the Internet. In this way, the learning process can set its own time to study, and where learners access the knowledge they have acquired. E-learning is a method of learning which is now being developed by utilizing the computer as a medium of learning, besides giving an innovation that has contributed greatly to changes in teaching and learning, the learning process is no longer just listen to the description of the material from professors but teaching materials can be visualized in various formats and forms a more dynamic and interactive (file, video, music, animation, etc.) (Ruli, 2009) System and application of e-learning has been widely applied in some universities and in companies in Indonesia, with the concept of e -learning is growing because it has advantages compared to conventional systems, namely: saving time learning process, reduce travel costs, saving the cost of education as a whole (infrastructure, equipment, books), reach a wider geographical area, and train learners more independent in getting science. (Romi, 2007). E-learning has a very broad sense. Many researchers take the topic of e-learning, they elaborate on the definition of e-learning from a variety of viewpoints. One definition is quite acceptable by many parties.

Darin E. Hartley stating: e-learning is a type of learning that allows tersampainya teaching materials to students using the medium of the Internet, Intranet or other computer network media (Darin, 2001). E-learning or electronic learning method of learning is delivered using electronic media (internet) either formally or informally. E-learning is done formally, for example learning with the curriculum, syllabus, subjects and tests are set and organized according to the schedule agreed upon relevant parties (manager of e-learning and learners). E-learning is done in a way that is informal with



the interaction of learners with teachers through the means mailing list, e-newsletter, or personal web. In the delivery of e-learning using electronic technology that mediation has learning objectives, lesson here include pembelajaran online, web-based learning and computer-based learning. In learning education e-learning has changed the perspective of learning, namely: from training to performance, from the room to where and anytime, from kerta to the "on line", from the physical facilities to network facilities, and of the cycle time to realtime (Livo, 2007). The development of e-learning is a necessity for all universities so that the standards of education quality can be improved. E-learning is the use of Internet technology in the delivery of learning in a wide range. By using learning media by using the computer as a tool can economize on preparation time, and increase the motivation of student learning, and reduce misunderstandings students terhadap explanation given lecturers (Ali M, 2009).

Jaya Kumar C. Koran (2002), defines e-learning as any teaching and learning using electronic circuits (LAN, WAN, or the Internet) to deliver learning content, interaction, or guidance. There also interpret e-learning as a form of distance education is done via the Internet. While Dong (in Kamarga, 2002) defines e-learning as asynchronous learning activities via computer electronic devices that obtain learning materials that fit their needs. Or e-learning is defined as follows: e-Learning is a generic term for all technologically supported learning using an array of teaching and learning tools as phone bridging, audio and videotapes, teleconferencing, satellite transmissions, and the more Recognized web-based training or computer aided instruction Also commonly Referred to as online courses (Soekartawi, Haryono and Librero, 2002). Rosenberg (2001) emphasizes that e-learning refers to the use of Internet technology to transmit a series of solutions that can improve their knowledge and skills. This is in line with the Cambell (2002), Kamarga (2002) which essentially emphasizes the use of the Internet in education as the essence of e-learning. Even Onno W. Purbo (2002) explains that the term "e" stands for electronic or in e-learning is used as a term for any technology used to support the efforts of teaching via the internet electronic technology. Internet, Intranet, satellite, tape audio / video, interactive TV and CD-ROM is part of the electronic media used may be submitted Teaching "synchronously" (at different times). Teaching and learning materials are delivered through this medium has the text, graphics, animations, simulations, audio and video. He must also provide

#### **A. Fungsi E-Learning**

E-learning function of the learning activities in the classroom (classroom instruction), namely ( Siahhaan , 2004) ::

1. Supplements ( extra ), ie when students have the freedom to choose whether to take advantage of electronic learning materials or not . In this case there is no obligation for students to access learning materials electronically. Even is optional, students who use it would be to have additional knowledge or insight
2. Complement ( complementary ) ie when programmed electronic learning material to supplement teaching materials accepted students in the classroom . As a complementary means of learning



materials electronically programmed to complement the material enrichment or remedial . Told as enrichment (enrichment ) , if the students can quickly master / understand the subject matter presented at the time of face to face given the opportunity to access the electronic learning material that was specifically developed for them . The goal is that further strengthen the level of mastery of the subject matter that has been received in the classroom . Told as a remedial program , when students are having difficulty understanding the subject matter at the time of face to face given the opportunity to take advantage of electronic learning material that was specifically designed for them . The goal is to enable students to more easily understand the subject matter presented in class.

3. Substitution ( replacement ) , ie if e-learning is done instead of learning activities , for example by using models of learning activities . There are three ( 3 ) alternative models to choose from, namely:
  - a. Fully face-to- face ( conventional )
  - b. Some face to face and partly through the Internet
  - c. The content delivery system in e-learning into two directions permits communication one direction and a second two-way communication or interaction between instructors and students in the process.

#### **B. Learning Management System (LMS)**

One of the devices LMS e-learning a very important role is the Learning Management System (LMS). LMS is a package solution designed for the delivery, tracking, reporting and management of learning materials, as well as monitor progress and interaction of learners. Learning Management System is a software application (software) for the purposes of teaching and learning activities and activities online (connected to the Internet), for example, administration, documentation, report generation from a teaching and learning process, the material being taught provided online web based and can be accessed via the internet. Bottom line LMS is an application that automates and to virtualize the learning process electronically (Romi, 2008). LMS also provides features that can meet all the needs of users in terms of the learning process. Today there are many types of LMS are offered, each type of LMS has its features correspond respectively to the facilities already granted. LMS can contain materials that dikemas in the form of multimedia (text, animation, video, sound), which is given as a supplement for pengembangan dan enrichment learner competence. LMS offers a learning system that includes innovations in the field of information technology, especially the web-based virtual through online learning, multimedia and video conferencing. LMS Web-based learning developed dynamically.

General functions that must be possessed Learning Management System ( LMS ), among others:

1. Upluploading and sharing material: LMS provides services to simplify the process of publishing material pembelajaran process. The instructor will upload teaching materials in accordance with the syllabus that has been made, could be material notes, articles, quizzes, assessments and more.



2. Forum and chat: online forums and chats are two-way communication between the instructor / lecturer with students, whether done synchronously (chat), or asynchronous (forums, email). With existing facilities enables students to write a response, and discuss them with other friends.
3. Quizzes and surveys: secara online quizzes and surveys can provide instant grade for students. This is an excellent tool to use to get a response (feedback) directly from learners according to their ability and their absorption.
4. Gathering and reviewing assignment: the results obtained from the evaluation / monitoring keberhasilan learning that is giving grades or scores to students performed automatically and online.
- e. Recording grades: for evaluation of learners in LMS has no facilities for monitoring of learners automatically dan perekaman data gradedari..

### **C. Strengths and weakness Application of E-Learning**

Advantages and Disadvantages of E-Learning Implementation According to Effendi and Zhung (2005 ) e-learning has been acceptable and adopted quickly because users are motivated by profits , among others:

1. The cost efficiency, e -Learning is able to save costs to be incurred by the organization because it does not need to pay for classroom equipment procurement , such as classrooms, whiteboard, projector, stationery and more .
2. Effectiveness learning, e-learning is an interesting new things to motivate students to try it, so the number of participants increases. E-learning is designed with an attractive design instruction and equipped multimedia-based materials to enhance understanding of lesson content.
3. Flexibility of time, e-learning makes the learner can adjust time to study because it can access the lessons anytime they want .
4. Flexibility place, e-learning makes students can access lessons anywhere, as long as the computer is connected to the Internet network .
5. Flexibility speed learning, e-learning can be tailored to the learning pace of each student.

The implementation of e-learning based learning is also still facing problems, including:

1. The problem of institutional readiness, implementation of e-Learning requires readiness institutions for the consequences. Institutions must set up the equipment policies and regulations for the implementation of e -Learning includes the cost of use.
2. Problems readiness instructor, instructor problems not only lies in the readiness to change the conventional learning system to e-Learning. The instructor must be prepared to work harder because they have to manage and maintain e-Learning. Another issue is the ability to use ICT is not evenly distributed.
3. Problems readiness of students, students are required to be able to motivate yourself to want to learn self (self -learning ). Meanwhile, most of the students in Indonesia have motivation to learn more depending on the instructor. The ability to use ICT is still a constraint, especially to students in remote areas.



## D. System Design

Robert J.Varzelo / John Reuter III in Jogiyanto stated system design is the stage after the analysis of the development cycle system, definition of functional requirements and preparation for design implementation and describe how the system was established. Agreeing with the opinion of Robert J.Varzelo / John Reuter III, Nugroho (2005) states the design of the system is the steps being taken after analysis of the system. The design of the system is the initial stage in which the initial approach to solve the problem and develop the best solutions for the problems that exist and according to Joe Valacich( 2012) development of the system was to develop a new system to replace the old system as a whole or improve existing systems.

From the explanation above, the writer sum up that the design of the system is one part of the system development phase conducted after analysis of the system, which aims to define and describe the system or software, or software that is formed

### III. DRAFT APPLICATION LEARNING MANAGEMENT SYSTEM LMS IN LEARNING

#### A. Context Diagram

In the context diagram information distribution system consists of four entities, namely : lecturers, students, course and admin. For more details the relationship between the entity and the entity in the data processing system can be seen from the context diagram that will be described in greater detail.

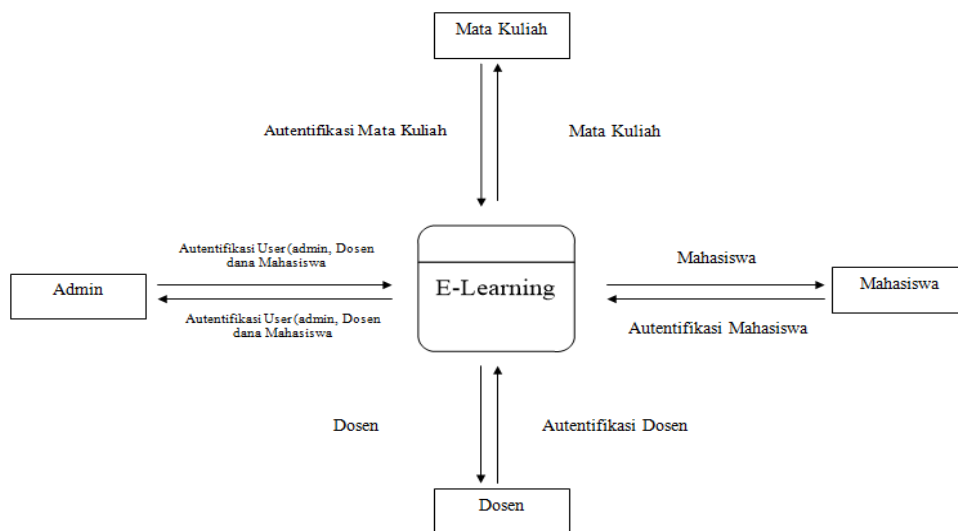


Figure 1. Context Diagram

#### B. Data Flow Diagram (DFD)

Data Flow Diagram is a system design tools that can describe the flow of data on a system in a structured and clear. DFD is a translation of Context Diagram Here is illustrated Data Flow Diagram E-Learning in:

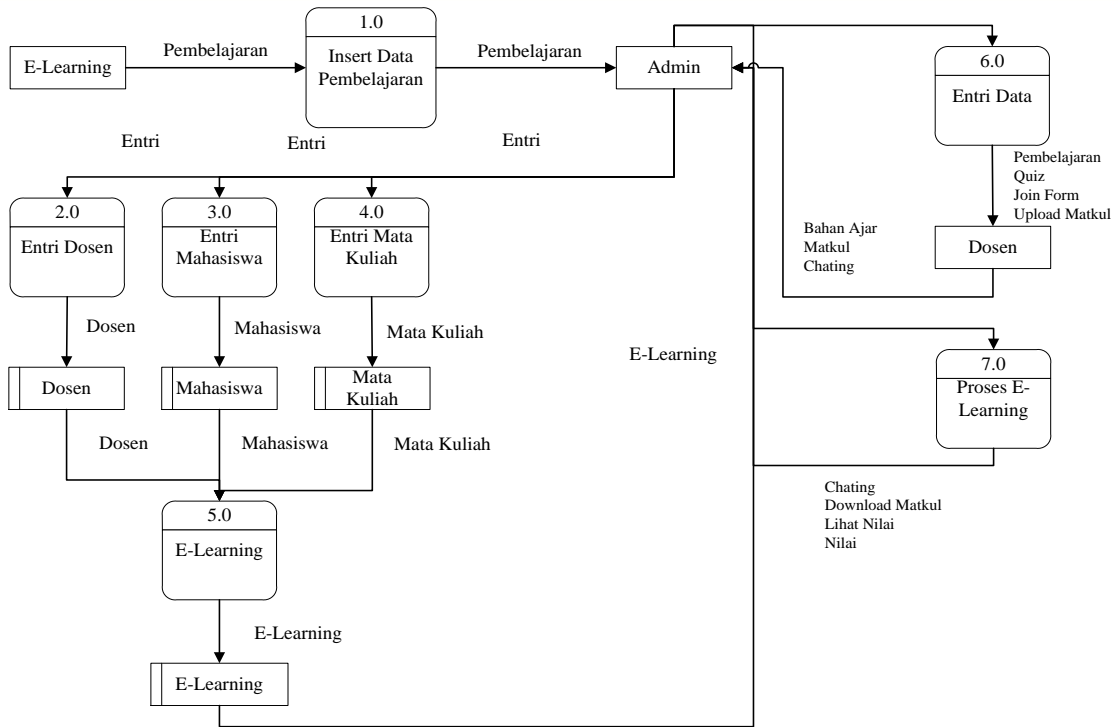


Figure 2 : Data Flow Diagram

### C. Entity Relationship Diagram

Entity Relationship Diagram ( ERD ) is a documentation of data to identify the entity data and shows the relationship that exists between the entity. In the e-learning system consists of four entities, namely e-learning, lecturers, students and admin.

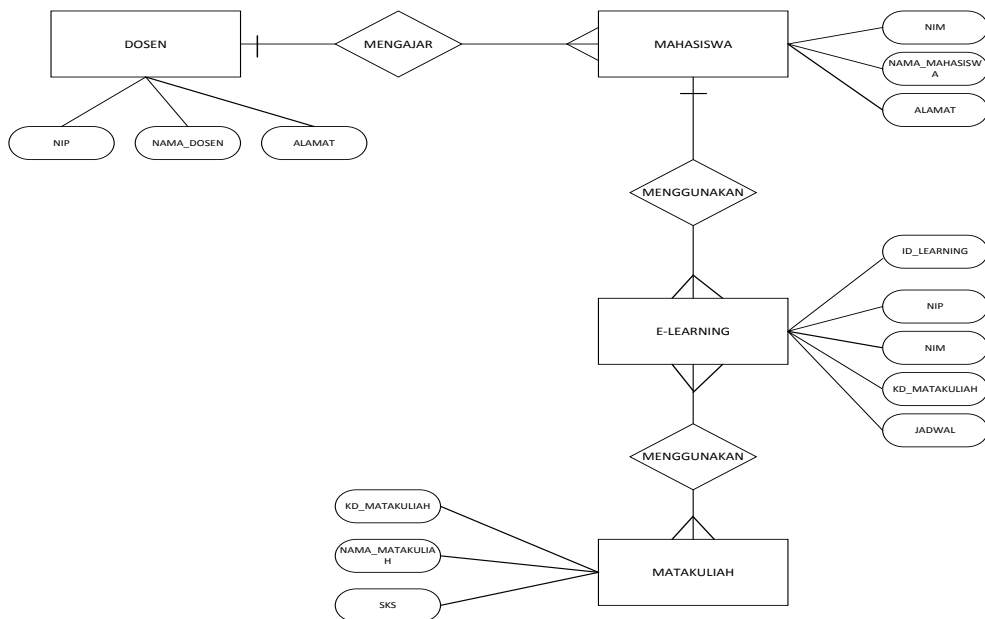


Figure 4. Entity Relationship Diagram

## D. Design of E-learning.

### 1. Login

Login is enter a username and password, which the access rights granted to administrators, faculty and students, with a view can be seen in Figure 5.

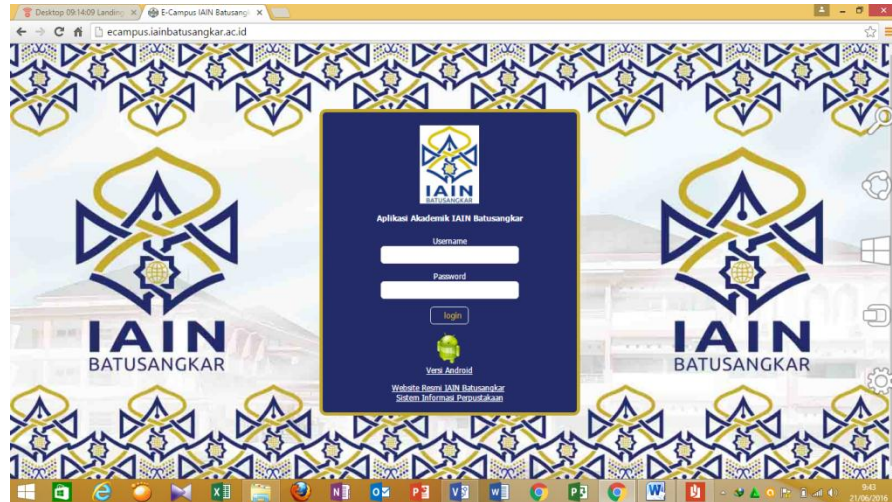
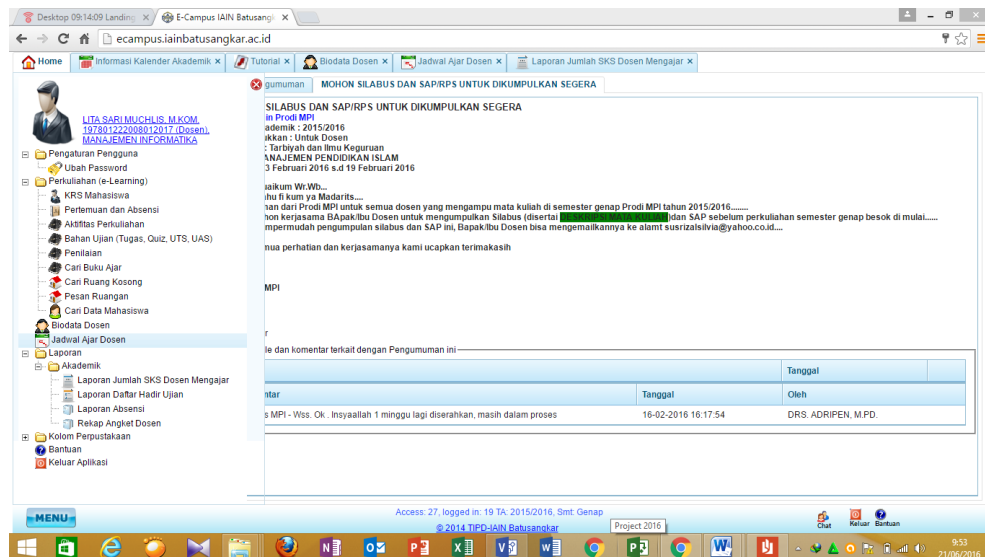


Figure 5. Login (administrators , faculty and students)

### 2. The E-Leaning

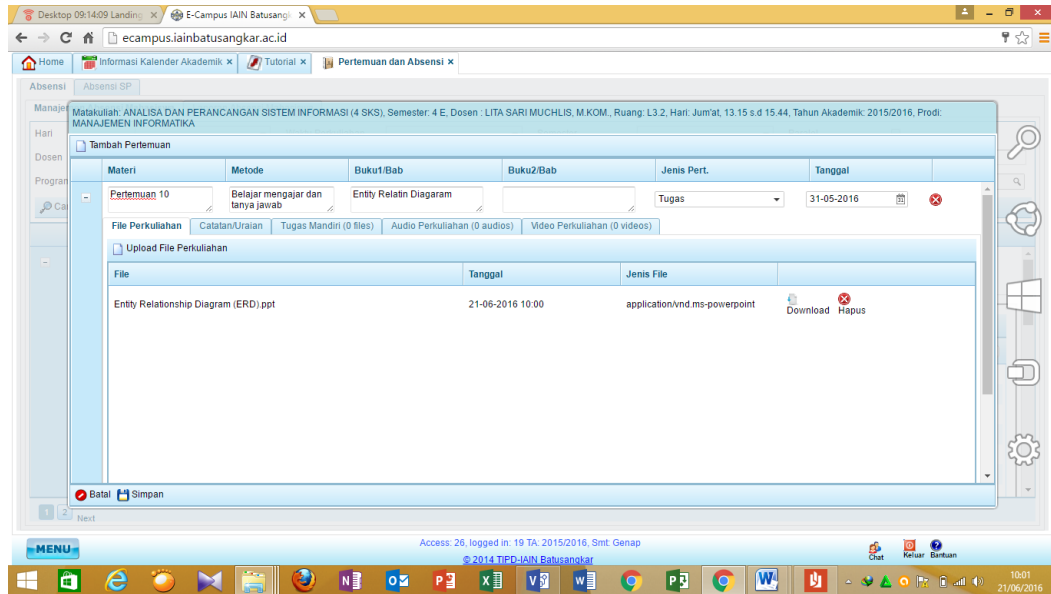
The e-leaning used for activities in which the students in this system there are processes such pembelajaran upload learning materials, assignments, quizzes and final exams as well as the discussions held by students and professors online.



Gambar 6. Aplikasi e-learning

### 3. Teaching materials

When it entered the e-learning applications , the menu of teaching materials that offer the facility subject of teaching faculty uploads which then can be accessed by students in conditions anytime, on this menu also provides the facility of learning activities every meeting, task and consultation learning In the menu ingredients there instructional interactive menu between lecturers and students. Figure 7 is a menu authoring and interaction for the.



**Figure 7.** Teaching materials

4. Discussions between lecturers and students

On the application of online discussion as a supplement benambahan teaching materials and this is a platform of interaction between faculty and students that discusses issues by providing enrichment lectures to the students so that the learning process in line with expectations.



**Figure 8.** Discussions between lecturers and students

**IV. CONCLUSION :**

1. Universities are supposedly able to independently construct knowledge for students learning under the rules specified by educators (faculty) as facilitator with all the amenities available at this time.
2. E-learning is very effective to improve the competence of students in the learning process because students interact opportunities, friends and lecturers and study materials would be opened wider.
3. Softwaree-campus development besebagai implementation of e-learning-based LMS (Learning Management System) with the application of e-campus will be carried out effectively and efficiently in order to improve performance, interest and learning outcomes as well as the skills and abilities of students and lecturers in using technological devices information.
4. The design of elearning applications implemented to assist in the learning process so that their supplements are granted outside of the face by faculty and students.



5. The application of e-learning needs to the implementation of the faculty and students, so the benefits of perceived benefits and as a means of alternate forms of online learning.

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## MEDIA DEVELOPMENT BASED LEARNING INTERACTIVE MULTIMEDIA SKILLS SUBJECT CRAFTS

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**ABSTRACT :** *This study aims to develop interactive multimedia-based learning media using Macromedia Flash Professional 8 at SMP Negeri 5 Percut Sei Tuan, using the stage of Research and Development. Development of interactive multimedia based learning media using Macromedia Flash Professional 8 with 7 steps as follows: (1) Analysis of needs; (2) To develop the initial product; (3) The expert validation and revision; (4) Trial Small groups; (5) The test groups were; (6) Trial major groups; (7) The final products. Prior to trial first be validated by media experts and subject matter experts to determine the feasibility of the media developed. Media development is said to be effective after a small group trial, trials moderate group and large group trial to determine efektif. Validasi experts composed of subject matter experts Craft Skills and learning media experts. The field trials carried through to trial small group, the group is and testing large groups. The results showed; (1) results in the media expert validation criteria very well (89.1%); (2) the results of the validation subject matter experts on the criteria of excellent skills (94%); (3) Results The test product on a small group with sufficient criteria (60.9%); (4) The results of product testing criteria for the group is moderate (74.6%); (5) the results of trials with a large group of criteria strongly agree (97.3%). Thus, development of instructional media craft skills feasible and effective use in teaching eighth grade students of SMP Negeri 5 Percut Sei Tuan.*

**Keywords:** Media Development Learning and Skills Craft.

### I. INTRODUCTION

Education is very influential for the advancement of a country, through education dignity of the nation can be improved, so that the goal to advance towards a better state can be realized. National educational purposes as stated in Article 3 of the Law of the Republic of Indonesia Number 20 Year 2003 on National Education System is rooted in the Indonesian culture, based on Pancasila and develop skills and character as well as the civilization of the nation's dignity in the context of the intellectual life of the nation.

Based on the functions and objectives of the National Education, it is clear that education at all levels, including Junior High School (SMP) should be conducted systematically in order to achieve these objectives. This relates to the character formation of the students so that they can compete, ethics, morals, manners and interacting with the community, so that potential students can develop into a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable. But the fact that not all junior high school graduates can go on to higher education some of them have to enter the working world. Therefore, the curriculum includes subjects junior level skills. These subjects should be given to the junior high school level students, so if they do not proceed to higher education they already have a stock of skills that will be useful for future lives.

Junior High School (SMP) is a formal education which aims to improve intelligence, knowledge, personality, character, and skills to live independently. Lessons meaningful skills to develop the



knowledge, skills, creativity, and attitudes in the work of students and the local content subjects to be taken in SMP Negeri 5 Percut Sei Tuan, with the allocation of lesson time of 90 minutes. Learning skills oriented on creating work that is supported by the knowledge, attitudes, and skills and creativity of the students. Make crafts embroidery tape is a matter of competence surpassed students with the aim that students have the ability and skills in decorating objects by using ribbon embroidery techniques according their individual creativity.

According to interviews with teachers of craft skills in SMP Negeri 5 Percut Sei Tuan, concluded that the work of students who have studied the craft skills assessed to be less varied, less creative and less still beautiful so that the acquisition value of students less than the maximum. It also complained of by some students that states are still confused in making a variation of craft skills, bored as often repeated on the job has the same. In line with student achievement data competence of the academic year 2013/2014 is still low category, out of 104 students only 40 students (38.4%) who meet the minimum completeness criteria and 64 students (61.5%) who do not meet the criteria of completeness, thus requiring remedial, Material skills too much with the demands of the curriculum lead to less meaningful learning, unfocused, thus learning skills that should attract into subjects that bore students, less than helpful, not even included in the National Exam. Society considers craft skills is not something that can be promising even called the science of derivatives that can be acquired in the community, this is the cause of students' lack of interest in learning.

To increase student competence in working on craft skills cannot be separated from all the components supporting the learning process in the classroom, in addition to the readiness of the teacher, the way teachers teach and the use of media that is primarily a means to convey the material in order to be well received. However the reality of media used by teachers when teaching is not maximized and only using media images, objects so even just using the media module only at the time of learning. Position of instructional media in teaching component as part of efforts to enhance the process of interaction teacher and student interaction and learning environments. The role of media-based interactive multimedia learning has great potential to stimulate students in order to respond to the learning materials are delivered. Sanjaya (2010) suggested that the media interpreted as a learning tool to facilitate the achievement of learning objectives.

While learning resource is anything containing messages that must be studied according to the subject matter. For the determination of instructional media, must be adapted to the characteristics of the area, because not all media according to the needs of students. Sudjana and Rival (2002) argued the benefits of learning media: (1) learning will be more attractive in order to motivate learning, (2) learning materials will be quite vague so it is easier to understand and enable the achievement of learning, (3) methods of teaching will be more varied, (4) students can more learning activities because not only listen to the description of the teacher, but other activities such as observing, doing, and demonstrate. Further Arsyad (2005) suggested that the characteristics of the media that the media have hardware, ie objects that can be seen, heard, or touched with the five senses, (2) the media has a



sense of nonphysical (software), the content of the message contained in the hardware, (3) the emphasis media in visual and audio, (4) is a tool in the learning process both inside and outside the classroom, (5) the media used in the context of communication and interaction of teachers and students in the learning process, (6) the media can used en masse (eg, radio and television), large groups and small groups (eg, films, slides, video OHP), individual (eg, modules, computer) and attitudes, actions, organization, strategy and management of which relate to the application of knowledge.

Role-based instructional media interactive multimedia has great potential to stimulate students in order to respond to the learning materials are delivered, but, in fact learning in SMP Negeri 5 Percut Sei Tuan, the use of the computer as a medium of learning, especially handy craft is still rarely applied, because not many teachers determine the type of media-based interactive multimedia computer that can be used in learning craft skills. Teachers when teaching use only the modules and image media. Computer utilization is very dependent on the teacher as a facilitator in designing computer as a medium of learning craft skills, for example the use of interactive multimedia based learning media, so some concepts craft skills such as embroidery ribbon can be easily visualized and can be presented more attractively.

Media interactive computer-based learning can be made with the help of software (Software). One software that can be used to develop learning media is Macromedia Flash. According Jayadi (2008), Macromedia Flash either a software program that is able to present the message of audiovisual clearly to students and materials that are real, so it can dilustrasikan more attractive to students with a variety of animated images that can stimulate student interest in learning to achieve learning objectives.

According to Sanjaya (2010), audiovisual media is a media intermediary or use of the materials through sight and hearing so as to establish the conditions that can make students become more active in learning and learning through the media can simplify and streamline the learning process. Appropriate learning media and innovative greatly affect the quality of teaching due to the use of the students' learning media becomes easier to accept the information submitted. The use of instructional media in the learning process should be tailored to the conditions and needs of students. Instructional media used in learning skills, including multimedia media types in the form of software. Instructional media must be designed and made in such a way that can be acquired competence craft skills, and can provide lots of ideas and creativity in the work, to the media that used to be able to attract the attention of students in order to stimulate inspiration in the creation of ideas and creativity in making variations craft.

Learning curriculum for junior high skills in 2006, learning the skills of the craft contains a collection of study materials that provide insight about the skills and scope, knowledge of materials and tools, work, and presenting the work and entrepreneurial insight. Directed learning craft skills so that students can develop life skills which includes personal skills, social, and academic, with





consideration of the interests and talents of students, as well as the potential for local, cultural, economic, and regional requirements.

Academic skills for students who will continue higher education, skills useful for those who will enter the workforce. Thus the craft skills were carried out in SMP are expected to provide food for a higher level or to enter the workforce, taking into account the needs of the community by supporting cultural traditions throughout Indonesia.

Implementation of learning skills need to pay attention to the signs as follows: learning skills include craft skills and technologies, skills performed by starting from the knowledge, materials, tools, and engineering work, learning materials craft skills and technology tailored to the interests and abilities of students as well as the ability of schools or areas, schools have more than one skill area teachers, each teacher provide learning skills in accordance with the field, the subject matter that are theoretical. Learning that are more process-oriented practices of the results, emphasizing mastery of skills work experience, leading to the mastery of professional expertise to be supported by the Program is carried out in accordance with the capabilities extracurricular school, district, talents and interests of students.

Learning media is something that can be used to deliver messages from the sender to the receiver in the learning process as an intermediary for the effective and efficient to achieve the learning objectives are set so as to stimulate the mind, feelings, interests and concerns of students in such a way. The media type of learning is visual media, image media, audio media, audiovisual media, multimedia.

Learning media has functions to: 1) as a source of learning, 2) as a tool. While the benefits of learning media to: 1) improve the quality of education, 2) provide broader educational presentation, 3) planning the teaching program in a logical and systematic. Multimedia is the combination of various media such as text, images, sound, animation, video by utilizing a computer program to deliver messages to users. Benefits of multimedia in learning is attracting the attention of students, the introduction of technology and communication for students, a new experience for teachers, motivated students. Macromedia Flash Professional 8 in learning is an instructional animation software to make it more attractive and easy to understand students and their application on a computer and projector imager.

Maswin (2010), suggests that multimedia is a combination of media or file format such as text, images (vector or bitmap), graphics, sound, animation, video interaction and others, while Niken and Haryano (2010) conclude that multimedia is the combination of various media (file format) in the form of text, images, animations, video, interaction, and others that had been packed into a digital file (computerization), is used to convey messages to the public. Daryanto (2010) describes the learning multimedia is a multimedia application that is used in the process of learning, ie learning multimedia useful to channel messages (knowledge, skills and attitudes) and can stimulate choices, feelings, concerns and the willingness of students to deliberately learning occurs, aims and control. In carrying



out the process of learning the teacher should use the media complete, according to the needs. To fulfill this purpose, the use of multimedia become a good alternative for teaching. Further Daryanto (2010), write down the benefits that can be taken in the use of multimedia for learning, namely: (a) Increase the attractiveness and attention of students, (b) introduction of information and communication technology to students, (c) Provide new experiences and fun both for teachers and students, (d) Pursuing dropping knowledge about science and technology in the field of education, (e) the use of multimedia can evoke motivation to learn the learners, because with the multimedia making instructional presentations more interesting, (f) Multimedia can be used to assist the learning mental models will make it easier to understand a concept, so concluded the benefits of multimedia in learning to draw the attention of students, the introduction of technology and communication for students, a new experience for teachers, motivated students.

To overcome these problems, teachers should be able to design and present a more interesting learning media so that the learning process can increase interest, more interactive, more effective awakens the desire, the motivation and stimulation of learning. With the development of instructional media can enhance learning craft skills.

Interactive multimedia-based learning is learning using multimedia or information and communication technology in which the learning process, students are more innovative, creative, motivation during the learning process. Because the media is able to combine text, pictures, audio, music, animated pictures and video in a single unit that supports in order to achieve learning objectives. One software that can be used is Macromedia Flash.

The role of the teacher becomes a facilitator of learning information by providing a variety of instructional media needed, to stimulate enthusiasm for learning, provide opportunities to practice the study results, provide feedback on the progress of learning, and it helps that what has been learned will be useful in life. That's necessary ribbon embroidery instructional media based interactive multimedia using Macromedia Flash professional 8 as a medium of learning in the activities of the learning process.

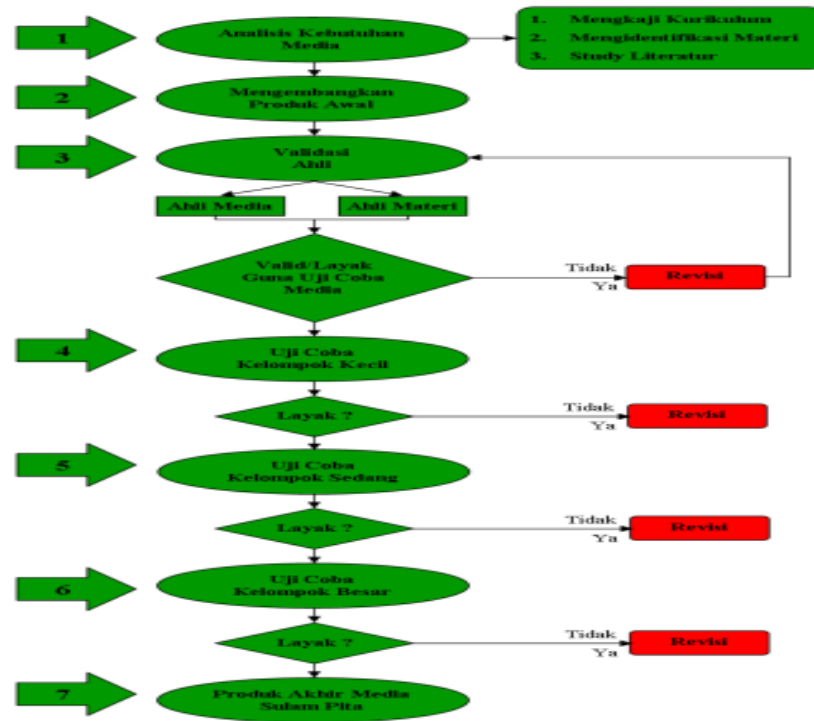
In this study, in addition to arouse motivation and interest in learning skills of the students also want to see the development of Interactive Multimedia Learning Media Based on Using Macromedia Flash Subjects Craft Skills in SMP Negeri 5 Percut Sei Tuan.

Based on the background of the problem, formulated objectives of this study: (1) Develop a learning medium ribbon-based interactive multimedia using Macromedia Flash Professional 8 on the subjects of craft skills class VIII SMP Negeri 5 Percut Sei Tuan, (2) Determine the effectiveness of instructional media ribbon-based interactive multimedia using Macromedia Flash Professional 8 on the subjects of craft skills SMP Negeri 5 Percut Sei Tuan.

## **II. RESEARCH METHODS**

This study is a research and development (Research and Development), which aims to develop learning media products to improve and develop the quality of education and learning effectively and

efficiently. The study was conducted in class VIII SMP Negeri Odd Semester 5 Percut Sei Tuan academic year 2015/2016. Subjects in this study were students of class VIII SMP Negeri 5 Percut Sei Tuan, with the object of the research is media literacy classes ribbon embroidery craft materials using Macromedia Flash Propessional 8. Procedure development and research suggested Borg & Gall (1983), simplified namely: Conducting a needs analysis of media, develop initial product, expert validation and revision, a small group trials, trials moderate group, large group trials, the final product. Application Procedure Research and Media Development Ribbon Embroidery:



**Figure 1** Stages of Research and Development

Stages of research started from the needs analysis that examines the curriculum, identify the material, study of literature. Product develop early is to establish a medium of learning, develop a media that has been designed. Making ribbon embroidery media include: the home menu, navigation instructions, profile, motivational menu, the menu description, the destination menu, menu ribbon embroidery materials, video menus, menu tests. Validation of the expert is an activity undertaken by experts to examine and evaluate systematically the instruments and media products that will be developed in accordance with the objectives undertaken by subject matter experts, and media experts. Data collection techniques in this research is done by using a questionnaire. Aims to determine whether the development of the media can be accepted or not learning in SMP Negeri 5 Percut Sei Tuan. Questionnaire on this research that closed questionnaire where the respondents give an answer choice by providing checklist to mark answers provided. Once the data is obtained, then analyze the data and look at the effectiveness of the products designed.



$$P_{(s)} = \frac{S}{N} \times 100\%$$

Where:

P= Presentation Sub Variables

S= Total score of each of each variable

N= Number of maximum scores

**Table 1.** Interval acquisition score

No	Interval	Criteria	Nilai
1.	81% ≤ skor ≤ 100%	Very Good or Strongly Agree	5
2.	61% ≤ skor ≤ 80%	Good or Disagree Enough	4
3.	41% ≤ skor ≤ 60%	Less Good	3
4.	21% ≤ skor ≤ 40%	Less Agree	2
5.	0% ≤ skor ≤ 20%	Not Good or Disagree	1

### III. RESULTS AND DISCUSSION

The implementation process of the development of Interactive Multimedia based learning media using Macromedia Flash Professional 8 on the subjects of Crafts Skills done gradually. The initial process research and development conduct a needs analysis. The activity was conducted to obtain data on the learning process, learning characteristics of students, and the development of media required during the process of learning and teaching.

Activity of needs analysis was conducted to obtain data on the learning process, learning characteristics of students, and the development of media required during the process of learning and teaching. Activity needs analysis conducted in SMP Negeri 5 Percut Sei Tuan by distributing questionnaires to one craft skills of teachers and 35 students is class VIII1 SMP Negeri 5 Percut Sei Tuan.

The results of the questionnaire research needs of teachers are 100% stated-based learning media animation, images, video has never been. While the results of a questionnaire research needs of students is 100% said the media have never seen animation, images, video learning craft skills. Accordingly, because it required the development of interactive multimedia based learning media using Macromedia Flash Professional 8 on the subjects of craft skills. After conducting a needs analysis, the next step is the initial product development.

#### A. Description Initial Product Development

Basically, the purpose of learning media using Macromedia Flash Professional 8 is for the creation of interactive learning conditions, effective, and engaging between students and teachers so that creativity, interest in learning, motivation and learning outcomes in learning craft skills ribbon



embroidery materials increased. Learning media products using Macromedia Flash Professional 8 and other support programs that assist in making background, backsound, effectsound, animated text or animated images.

#### **B. Data Validation Results Media Experts**

Tests performed four stages: (1) The media expert validation and validation of subject matter experts, (2) Trial small groups, (3) the trial group was, (4) Trial big group. Media specialists validate the product in the aspect of guidelines, indicators, content /materials, individual student interests, feedback, learning environment, the principles of computer components. Ratings do know the feasibility of the development of interactive multimedia based learning media using Macromedia Flash Professional 8 subjects craft skills ribbon embroidery materials class VIII SMP Negeri 5 Percut Sei Tuan.

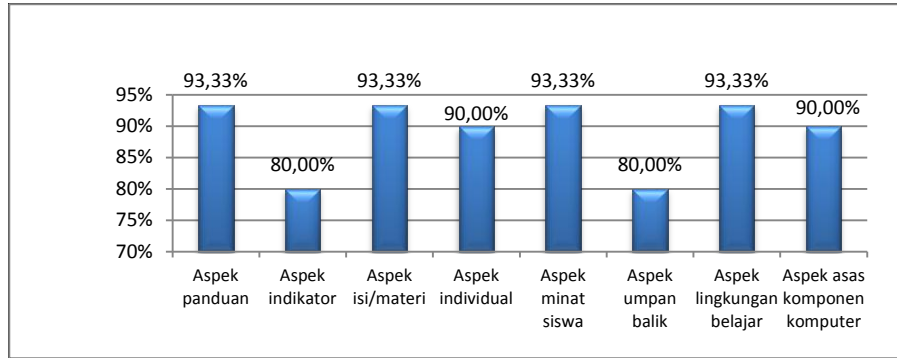
Overall the average total score of aspects of the guide was 93.3% in the criteria very well, aspects of the indicator was 80% in both criteria, the aspects of the content/ materials was 93.3% in the criteria very well, the individual aspect is 90% in criteria very well, aspects of the student's interest is 93.3% in the criteria very well, aspects of the feedback is 80% in both criteria, aspects of the learning environment was 93.3% in the criteria very well, the principle aspects of the computer component is 90% in the very good criteria.

#### **C. Data Validation Results Matter Expert**

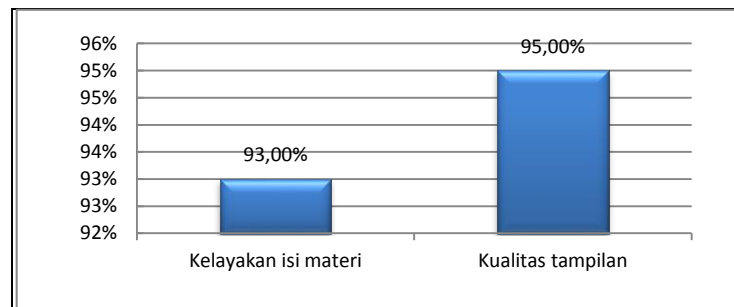
Ratings used feasibility of developing interactive multimedia-based learning media using Macromedia Flash Professional 8 grade students of SMP Negeri 5 Percut Sei Tuan. The results of the validation in the form of a score rating of the component-based development of instructional media interactive multimedia using Macromedia Flah Professional 8 on the overall aspects include: the feasibility of the content / materials, the quality of the display. Overall the feasibility aspect contents with a total score of 93% in the criteria very well. Aspect display quality is 95% in the criteria very well.

#### **D. Data Field Trial Small Group**

The trial results in the form of a score rating of the product development of Flash Professional 8 media that aspect of the appeal, the difficulty level, the view and the beneficial aspects. Results of the assessment student responses on aspects of appeal in small group trial overall was, in the aspect of the level of difficulty in the small group trial overall was, on aspects of the display in a small group trial as a whole is considered to agree, on the beneficial aspects in trials small group try's overall agree.

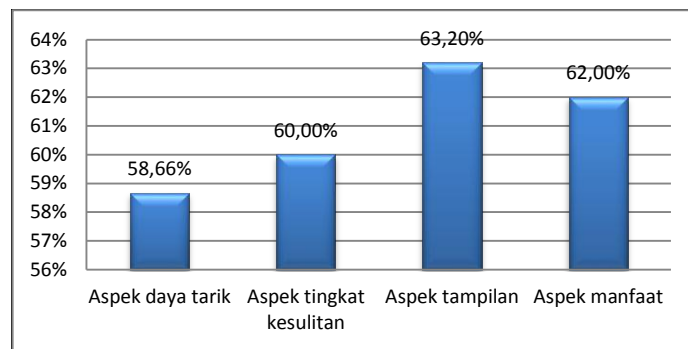


**Figure 1.** Acquisition By Score Media Experts.



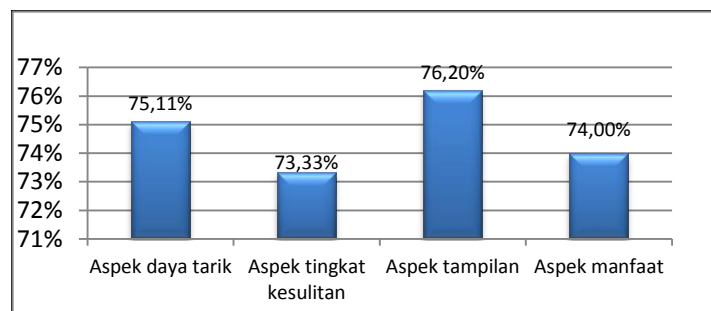
**Figure 2.** Diagram rod acquisition score by Expert Matter.

#### Data Analysis Results from Pilot Small Group



**Figure 3.** The bar chart on the acquisition of a score of small group trial.

#### Data Analysis Results Try Group Medium



**Figure 4.** The bar chart on the acquisition of empirical score group trial being.

Data Analysis Results of Trial Large Group / Field.

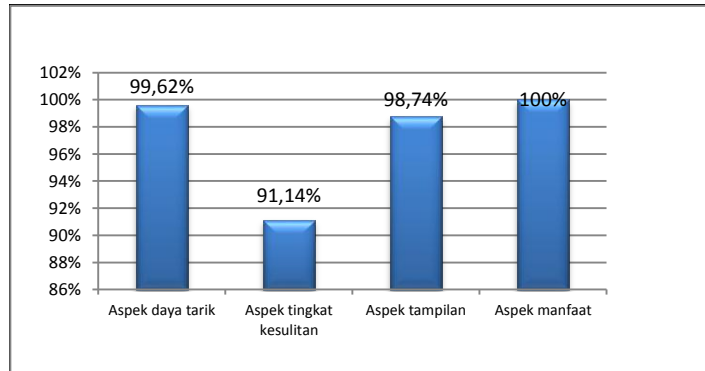


Figure 5. The bar chart on the acquisition of scores of empirical testing large groups

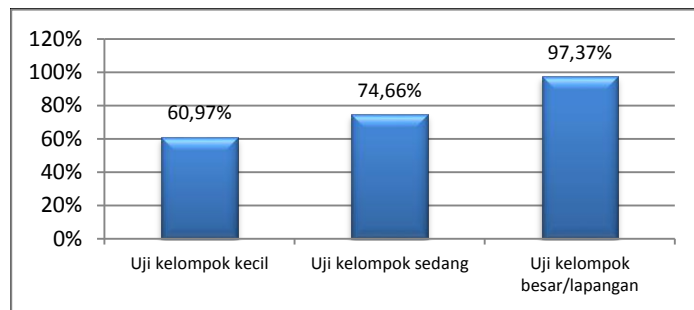


Figure 6. Diagram rod small group test, test and test groups were large groups

Development of interactive multimedia based learning media using the main software Macromedia Flash Professional 8 and is supported by Sony Vegas Pro 9.0 software on the making of the video. With the ever using Macromedia Flash Professional 8 makes the display more attractive and interactive. In Sony Vegas Pro 9.0 software in the video creates a back sound and sound effects so that the video attracted the attention and interest of the students.

**IV. CONCLUSION**

Based on the results of the study concluded that the development of instructional media research craft skills to do a seven-stage. Based on the results of the study and a review of media learning craft skills assessment of media experts as a whole of 89.1% in the criteria very well. Assessment of subject matter experts an overall 94% in the criteria of "very good", fit for use as a medium of learning craft skills.

Based on the results of questionnaire responses of students who have done, got 97.37% responses in the criteria of "strongly agree" that the learning media attract attention, increase interest in learning, motivate students and media declared it looks interesting so effectively used as a medium of learning craft skills for the classroom VIII.



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**THE INFLUENCE OF LEARNING STRATEGY AND THE TYPE OF PERSONALITY AGAINST LEARN RESULT IN THE FIELD OF MATHEMATICS IN LESSON YEAR OF 2013-2014  
(Experiment Study at SMK II Manado)**

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**ABSTRACT :** *This research is aimed to find: 1) The differences of learn result among students who teachable with learning strategies of Team Accelerated Instruction and Expository on mathematics learn at SMK. 2) The influence of interaction between SMK's students mathematics learn. 3) The differences of the influence of mathematics learn result of the students who have introvert personality which taught by learning strategies of Team Accelerated Instruction and expository. and 4) the differences of the influence of mathematics learn result of the students who have introvert personality who taught by learning strategies of Team Accelerated Instruction and expository. The research was carried out at SMK II in 2014. This research uses factorial experiment method 2 X 2, with number of sample are 36 students, which is consisted of the groups of experiment and control. This research concludes that: (1) There are differences of learn result among students who teachable with learning strategies of Team Accelerated Instruction and expository on mathematics learn at SMK II. 2) There are interactions between learning strategy based on personality type against learn result on mathematics learn at SMK's students. 3) There are differences of mathematics learn result of students who have extrovert personality which is taught by learning strategies of Team Accelerated Instruction and expository, and 4) There are no differences of mathematics learn result of students who have introvert personality which is taught by learning strategies of Team Accelerated Instruction and Expository. Based on this research, the mathematics learn result of SMK's studens can be developed through implementation of learning strategies.*

**Kata kunci:** strategy, Team, Accelerated, Instruction, learn, mathematics, student.

## I. INTRODUCTION

Education is an important factor for the live of a nation, because through education, man can develop various knowledge and technology which can be usefull for the life of the nation themselves. Through education process, a nation can achieve their goals needed to improve the live and prosperity of the nation in many factors of life.

Human resources can be said high or low can be seen from the successful of education process. One of the successful indicator of education process is pointed by the high value of students learn result, both the evaluation value in each semester or the value of national final test.

Mathematics in education world is one of the basic science that can be used for supporting the existency of others sciences such as physic, chemistry, computer, and others. Mathematics is an art of numeral, relation between numeral and operating procedure which is used in resolving numeral problems.<sup>i</sup>

James and James as quoted by Karso<sup>ii</sup>, said that mathematics is an art of logic, concerning of shape, formation, mulberry, and concepts which is related to one another with numbers that most divided into three sectors, namely algebra, analysis, and geometry. According to the definition, it can be concluded that mathematics is an art which learns numbers which is known by calculating and measuring process stated by numerals or symbols



The reality in the field shows that most of SMK's students experiences difficulties in operating the formula of mathematics. Based on students learn results on odd semester at SMK Negeri II Manado, apparently the mathematics learn result is still low. The average value is only 67. Of course, this is very unhappy condition, because it is still under stated KKM namely 75.

Relating to the problem above, a teacher is strived for being professional, can develop his own potency and can choose the effective mathematic learning strategy that can help students to communicate using good mathematics logic.

In the context of teaching , the strategy is intended as teachers' efforts in creating an environment that allows the system of teaching and learning process , so that the learning objectives that have been formulated to be achieved and successfully. Suparman<sup>iii</sup> define instructional strategies as an approach in managing the content and instructional process in a comprehensive manner to achieve one or a group of instructional objectives.

Gagne, Wager Colas and Keller<sup>iv</sup>, explained the meaning strategy in terms instructional strategies are tools or techniques available to educators and instructional designers for designing and facilitating learning. The same thing also described Ngalimun<sup>v</sup>, where learning strategy is a plan that contains a series of activities designed to achieve specific educational objectives.

Thus, to carry out tasks in a professional manner, the teacher requires insight steady on possible strategies of teaching and learning in accordance with the purpose of teaching and learning that has been formulated, both in terms of the effects of instructional, learning objectives are formulated explicitly in the learning process, and in terms of the effect for example, the ability of critical thinking, creativity, openness after students attend small group discussions in their learning.

More explicitly Sanjaya<sup>vi</sup> explained that the strategy refers to a plan to achieve something while the method is a method that can be used to implement the strategy.

In connection with learning strategies, Dick and Carey explains : "Instruksional strategy is used generally to cover the various aspects of choosing a delivery sistem, sequencing and grouping clusters of content, describing learning components that will be included in the instruction, specifying how students will he grouped during instruction, establishing lesson structures, and selecting media for delivering instruction.

Starting from various arguments above, one thing that needs to be noted is that not all the steps in the learning strategies have to be followed in one learn process, but teachers are demanded to have ability in developing learning strategies by inquiry and expository approaches.

Hitherto, there are few opinions differences concerning the definition of inquiry strategy by education experts. This is shown by the use of terminology such as "problem solving", "discovery learning", or "inquiry training", which is considered as the same in grouping the learn situation.



## II. THEORY

### A. Inquiry Approach

The essence of inquiry according to Beyer<sup>vii</sup> consists of three main aspects, namely (1) knowledge, (2) attitude and value, and (3) process. The essence of knowledge has changeable characteristic, taken by interpretation way and tentative feature. Attitude and value, consists of: sceptical, curiosity, respect on reason, respect on evidence as a tool in testing accuracy, objective, the willingness to accept temporary decision and tolerant against ambiguity. Meanwhile, the processes include: determine the goals, develop hypothesis, take conclusion, and get conclusion on new data.

The main goal of the using of inquiry strategy is to develop student capabilities in manipulating and processing information from various sources. In the strategy, the role of teacher is as guide to assist students in indentifying problems, resulting possible answers, testing all conclusions against new data, against new problems, or new situations. In other word, the main attention is on the student skills in finding and processing informations, than learning others work results.<sup>viii</sup>

Inquiry approach, according to Michael and Abraham,<sup>ix</sup> consists of two differentiation, namely guided inquiry and free inquiry strategies. In guided inquiry approach, teacher can provide a wide guidance or direction. Determination of problem is stated by teacher in form of question or statement. Meanwhile, the concept or principle must be found by students Furthermore, trial or inquiry activities totally carried out by students, both with expository or group. To accelerate the teaching and learning activities, teacher must have records about what must be observed and the direction about must be given to the students.

While on the free inquiry strategy, the research activities are carried out thoroughly. In this way, the most important thing for students is must be brave to start with their own initiative. In this strategy the activity started from formulating problem, preparing tool or material needed, experiment planning, data analysis till on data interpretation totally carried out by students. Through this way, the task of the teacher is to assist in increasing students capabilities in connecting data with clarity or principle as material target that is found.

Departing from explanation above, that inquiry approach is an optimum strategy used in teaching. As pointed out by Oliner<sup>x</sup> consists of: (1) give conviction to students that knowledge has tentative characteristic, cause the conclusion withdrawal is carried out over supporting evidences; (2) give conviction to students that the inquiry process must be started with identification issues as temporary conclusion; (3) give conviction to students that activities being carried out in the inquiry process is an interactive feature, one activity is related to other; for instance in withdrawing conclusion, needs to consider the possibility to form new hypothesis; (4) give conviction to students that the activities carried out that so is a high level thinking activity.

One of the most famous inquiry strategy model is the model developed by Massialas and Cox which is quoted by Dahlan,<sup>xi</sup> In this model of inquiry strategy, to learn a lesson material follows some phases which are called as "Syntax Inquiry:, namely; first phase is orientation in searching and



clarifying a situation or problem; Second phase is formulating the hypothesis from where the exploration started; Third phase is defining and clarifying hypothesis; Fourth phase is inquiring hypothesis accordance with the assumption, implication, and logic; Fifth phase is collecting data and evidence to support hypothesis, and Sixth phase is making conclusion and generalisation.

With this strategy can help the students to develop skills needed in able to present the questions and able to find their own answer over the facing problems. As well as stated by Suchman, that the use of inquiry strategy based on: (1) the students can carry out inquiry at facing on some problems, (2) can grow the students's awareness, because they learn to analysis and think strategically, (3) push the growing of students learn independency, (4) grow the way of adaptive thinking against new things in students themselves

Even though this inquiry strategy is very positive if implemented on students, but in the operation needed teacher's skill in maximum way. And teacher is demanded to be able giving response properly.

### **B. Expository Approach**

Expository approach in principally is the same with what is called as Lapp namely "traditional" or "classical" or what is called as Stallings namely "Fundamental school model". This strategy in principally is a strategy with characteristic to wit: (1) Based on material analysis with traditional feature or specific feature; (2) Subject or material choosen is focused on the skill of basic teaching; (3) Teaching and learning activities tends to be carried out in total teaching; teaching method used is more teacher directed than pupil initiated; interaction carried out tend to be only between teacher and students, not between student – student, the achievement result constantly can be evaluated with the role of teacher as instructor and director and evaluation result determined by teacher.<sup>xii</sup>

Another opinion about expository strategy is stated by Romiszowski,<sup>xiii</sup> carried out by some stages, namely: demonstration, practice and evaluation. Lesson material divided into the three stages. Furthermore, said that the three stages in series are:

1. *Basic knowledge concerning job evaluation in general and the system used in this organization in particular*
2. *The basic skill of applying a five-point evaluation scale*
3. *The practical skill of operating the job performance evaluation system of the company.*

According to Merrill and Twitcheil<sup>xiv</sup>; expository or "expository way" is a general teaching strategy in which presentation of teaching material carried out by the way in analyzing and telling, give illustrating or showing to the students. This strategy by Merrill and Twitchell is opposited with the strategy which is named inquisitory or inquisitory fashion. At inquisity strategy the students not only play the role in response completely the questions given or use it in specific cases. Furthermore, said that expository is the way to deliver information with static feature. Meanwhile, the students learn



in the class situation which is the teacher as center or teacher-centered classroom, with whole class teaching system and verbal interaction between teacher and students.

Based on conceptual framework above, so expository strategy is defined as strategy which the center is on teacher as teaching model, that is focused on the method as well: (1) narration; (2) explanation; (3) exercise, and (4) evaluation, which is directed to consolidate the learning. This thing can be analysis through: (a) verbal information; (b) intellectual skill; (c) cognitive strategy; and (d) attitude.

On the other side, because of teacher's task in the class is not only to deliver information in achieving learning goal, but also can observe the student's learn attitude, teacher must effort to know the students personality, so as the teaching and learning activities can be carried out effectively.

Muchlas,<sup>xv</sup> states that the personality is a set of equipment of self picture which is integrated and part of total equipment from intra psychological power, that makes ourself be one, with specific attitude. Personality according to Pervin,<sup>xvi</sup> is a complex organization from cognitive which influences and directs the attitude into the pattern in someone life. Personality covers the structure and process which exposes the basic characteristics and experience. Personality is influenced by the past and the present. Larsen and Buss<sup>xvii</sup> consider the personality as collection of characteristic and psychological mechanism in the self of expository which is organized and adapted intra-physically and physically against its social environment. According to Michael and Ronald<sup>xviii</sup>, personality is one thing specific and relative stay in the thinking way, to feel and to conduct, which all the three things are expository personality to response the facing situation. That so, the personality mentioned is the unity of self organization with dynamic feature which represents expository personality in thinking, feeling, behaving, that determines the ability to assimilate in the way of unique feature to its environment.

This personality consists of introvert and extrovert personalities. Introvert is an orientation inside the self. The introvert's person tends to pull off his self from social contact. The introvert's attitude as uncommunicative person pull away the self from outside occurrence, does not want to involve with objective world, not happy if existing in the center of crowd of much people.<sup>xix</sup> Larsen<sup>xx</sup>, states that extrovert personality is much talking, hospitality, like to see people, eager to visit new place, active, follow the feeling, like adventure, easy boring, and does not like routine things and monotonous. Introvert personality is uncommunicative, pull of the self, be alone, or few friends when stay in the crowd, like routine things and on schedule. Both extrovert or introvert expositories do not different in the level of intellectual activities.

According to Lawrence<sup>xxi</sup>, the extrovert personality: like to be active in socialization, eager to take a risk. The introvert person aims his orientation into his self, introvert personality is doubt, like to be wistful, and more careful. Departing from the theory study, the implementation of learning strategy needs to consider students characteristic factors as the learn subject. This consideration refers to the students orientation in envisaging their study environment which is related to the students personality types one another is different. So that, the students with introvert or extrovert personality



have different influence between implementation of inquiry and expository learning approaches against mathematics learn results of the class XI students of SMK II Manado.

### III. METHODOLOGY

This research uses experiment method with planning group factorial  $2 \times 2$ . Population is totally students included in research object or total expository which will be researched. Target population in this research is the students of SMK II Manado. Achievable population is class 2, and experiment class of 18 students and control class of 18 students.

### IV. RESULT AND DISCUSSION

Students Learn Result Data who taught with Learning Strategy with inquiry approach (A1) of 20 respondent is gained about 9 (45%) students enter into category those have high learn result. While the rest namely 2 (10%) the students who have moderate learn result, and 9 (45%) the students who have low learn result. This score achievement in totally gives a picture that achievement level of students learn results who teachable with inquiry learning strategy is quite high.

Student learn result data uses expository strategy (A2) of 20 respondent is about 7 (35%) students enter into category who have high learn result. About 7 students (35%) have moderate learn result (average), and 6 students (30%) have low learn result. Based on those percentages, these scores give the picture that achievement level of students learn result who are taught with expository learning strategy is moderate category.

Furthermore, from data analysis of students learn result with extrovert personality type is quite high, because the empirical average score is bigger than teoritical average score namely 20,25. While the students learn result data of SMK Negeri .....with introvert personality type is gained the average value about 18,80.

In first hypothesis test, that mathematics learn results of the students who are taught with inquiry approach shows the F quantification value is 7.84. Value F table that is gained from distribution table F with  $n = 36$  and significant level  $\alpha = 0,05$  is 3,03. This result shows that F quantification is bigger than F table (F quantification =  $7,84 > 3,03 = F$  table). In that so, can be said that in totally there is differentiation of mathematics learn result of the students through inquiry and expository approaches. In the second hypothesis shows that there is interaction between learning strategy with personality type against mathematics learn result which is gained F quantification 35,49, while F table with  $n = 36$  and significant level = 0,05, is 3,03. This result shows that F quantification is bigger than F table ( $F_q = 35,49 > 3,03 = F_t$ ). The research shows that implementation of inquiry approach strategy or expository approach strategy give difference mathematics learn result if implemented to the students who have certain personality type. Third hypothesis shows that mathematics learn result of the students who have extrovert personality who are taught with inquiry approach is 23,30 and standard deviation is 2,21. While, the average score of mathematics learn result of the students who have extrovert personality who are taught with expository approach is 17,20 and standard deviation is 2,30. This means that mathematics learn result of the students who have extrovert



personality who are taught with inquiry approach is higher in the score than students learn result of extrovert personality who are taught with expository approach, from calculation result of Tukey test is gained Q quantification = 5,57, and Q table = 2,92 at significant level  $\alpha = 0,05$ . The result shows that Q quantification is bigger than Q table ( $Q_t = 5,57 > 2,92 = Q \text{ table}$ ). In that so, can be concluded that mathematics learn result for students who have extrovert personality is better through inquiry approach than through expository learning. While the analysis result against fourth hypothesis, shows that mathematics learn result of the students who have introvert personality who are taught with inquiry approach is 19,90 and the students learn result who have introvert personality who are taught with expository approach is 17,70. This means that mathematics learn result of the students who have introvert personality who are taught with inquiry approach is higher in score than the students learn result with introvert personality who are taught with expository approach. Furthermore at calculation result of Tukey test is gained Q quantification = 3,15, and Q table = 2,92 at significant level  $\alpha = 0,05$ . The result shows that Q quantification is bigger than Q table ( $Q_t = 3,15 > 2,92 = Q \text{ table}$ ). In that so, can be concluded that mathematics learn result for the students with introvert personality is better through expository approach than through inquiry learning.

## V. CONCLUSION

The test result of first hypothesis shows that in totally there is a contradiction of mathematics learn result of the students through inquiry approach and through expository approach. It's mean that both learning strategies have different characteristics, each of them has their superiority and weakness. Second hypothesis shows that there is interaction between learning strategy with personality types against mathematics learn result. It's mean, the implementation of inquiry approach and expository approach strategies, both for the students with extrovert personality or the students with introvert personality can give influence to mathematics learn result of the students. Third hypothesis shows that the achievement of students learn result who are taught with inquiry learning strategy is quite high than with expository learning strategy for students with extrovert personality type. And the last hypothesis shows that the achievement of students learn result who taught with expository learning strategy is quite high than the inquiry learning strategy for the students with extrovert personality type.



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EI-02-107

## COMPLAINT SYSTEM IMPLEMENTATION OF PATIENTS HOSPITAL TREATMENT OF SERVICE USING SMS GATEWAY GAMMU

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**ABSTRACT:** *SMS Gateway is a platform that provides a mechanism to send and receive SMS from mobile devices (mobile phones, PDA, etc.) via short code SMS Gateway, as well as a mix between a mobile phone service with a computer, where the computer will respond automatically every request obtained via SMS, and the computer will send an answer to the request via SMS. Associated with these technologies, many agencies, institutions and organizations that use them. In this study, the SMS Gateway technology is used to accommodate complaints from patients to medical care and services faced by patients. Data were collected through observation and interviews with patients relating to complaints and their expectations of the service they receive at the time of treatment in hospital. The object of research is the Government General Hospital M.Djamil Padang. The development of systems using prototype models. The system was developed using the programming language PHP with a MySQL database, engine Gammu as sms gateway and modem as a medium to send and receive text messages. This study is expected to report complaints on target and can be responded to quickly by policy makers in order to improve the quality of medical services for patients.*

**Keywords:** SMSGateway, Pengaduan Pelayanan Rumah Sakit

### I. INTRODUCTION

The development of information and communication technology it will never "die". A wide assortment of technologies present to enliven the world of information technology and communications today, one of which is the technology of SMS (Short Message Service) or short message service, SMS technology allows people to send each other or exchanging information (such as text) via mobile devices, for example mobile phones.

Along with the rapid flow of information and communication and the increasing demand for these two things, the more the media or means of information providers that have sprung up. Starting from SMS technology, there is an interesting idea that is currently being adopted and developed, namely SMS Gateway. SMS Gateway comes as media or means of SMS-based information providers. To see progress, SMS Gateway is now increasingly being used by many agencies as one of the information management tool.

One form is the use of SMS technology to improve services to the public, which in this case is the medical services at the hospital. There are times when some patients abandoned for reasons that are not clear when the treatment let alone an emergency nature should be addressed first. This causes them to complain without having to know where to place the complaint and if there is a complaint only at lower levels without any meaningful follow-up. There are also some practices appropriate drug treatment procedures are fatal for the patient. Something like the above often experienced by patients, so they expect a more practical solution than the state

## II. Research Methodology

### A. Research Methods

The research method is basically a scientific way to obtain information for the purpose and usefulness. In this study, the method used is the method development research (Research Development). According to Tarin et al, 2012, research and development is research used to produce a specific product and test the effectiveness of these products is already in line with the expected.

### B. Research Sites

The research was conducted at the Hospital M.Djamil Padang. Election due Hospital Government Hospital M.Djamil is Type A as the reference treatment for the entire community.

### C. Data collection

Data collected through interviews and observation in a hospital medical service that is part of outpatient and inpatient

### D. Data analysis method

#### 1. Needs analysis

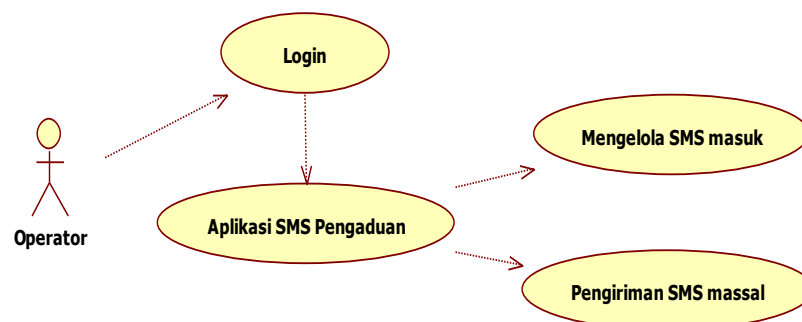
System requirements analysis aims to identify the problems-problems that exist on the system where the applications built include hardware (hardware), software (software) and users. This analysis is needed as the basis for the system design stage and to observe how the system will be run in accordance with the requirements of the system follows the basic concept of the needs of the information therein

#### 2. Desingn Analysis

For easy to understand the flow of the system, the authors use UML in the design application. Here is the Use Case Diagram to see how the user interacts with the system.

##### a. Use Case System Operator

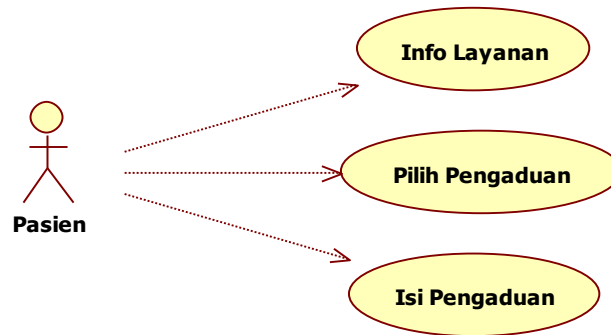
Here could have been admin or special officer in charge to manage the system from managing incoming sms to sending bulk sms. Here is a picture of the interaction between the actors and the system;



**Gambar 1.** Use Case Diagram System Operator

b. Use Case Patients

Pasien bisa siapa saja yang melakukan interaksi dengan sistem, interaksi yang dilakukan dalam bentuk meminta info layanan, memilih pengaduan dan mengirimkan pengaduan. Berikut adalah gambar interaksi pasien(aktor) dengan sistem ;



Gambar 2. Patients Use Case Diagram

### III. RESULTS AND DISCUSSION

#### A. Testing and Implementation

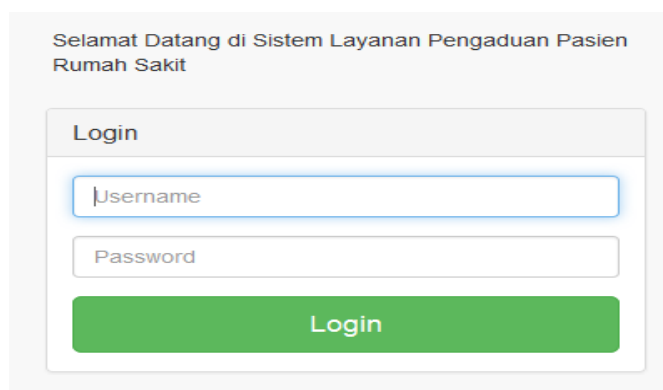
1. Implementing of Application

Once the design is done, then the application is built will do the testing and implementation.

Layout of the application is built as follows;

a. Login Menu

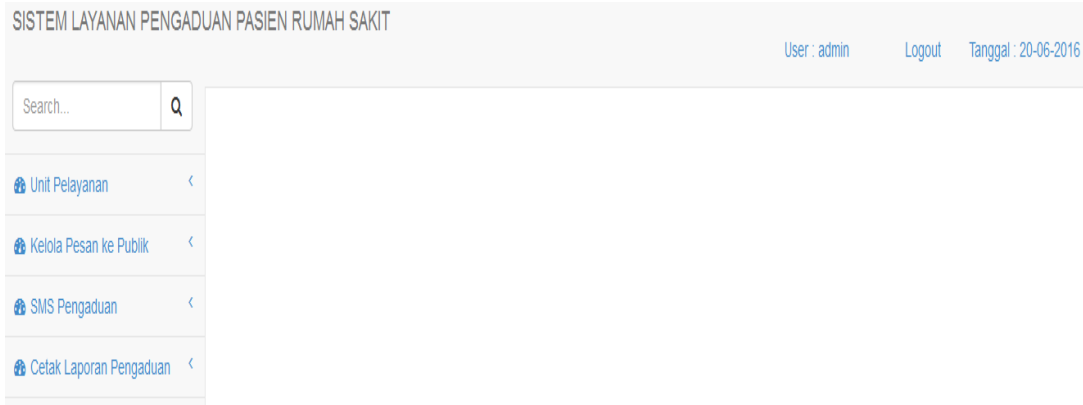
Login menu is a menu that will appear when the hospital management will access the application, with the following picture ;



Gambar 3. Login Menu

b. Main Menu

The main menu will appear after the user (admin / manager application) has successfully logged into the application system, as shown in the following figure;



**Gambar 4.** Main Menu

c. View Menu of patient complaints

View menu of complaints function to display sms complaints of patients to treatment, as shown in the following figure;

**SMS Pengaduan**

Tanggal	Pengirim	Unit Pengaduan	Keterangan
2016-06-21 23:03:55	+6285274741981	Poli Penyakit Dalam	Tolong perbaiki fasilitas, terlalu minim fasilitas.
2016-06-21 23:03:55	+6285274741981	Poli Mata	Manajemen antrian tidak efektif, masih dijumpai antrian yang lama.
2016-06-21 23:03:55	+6285274741981	Poli Anak	Dokter tidak informatif
2016-06-21 23:10:16	+6285274741981	Poli Mata	Petugas terlalu sedikit, tolong ditambah agar pelayanan cepat.
2016-06-21 23:24:35	+6285274741981	Poli Mata	Pelayanan lambat
2016-06-21 23:39:21	+6285274741981	Poli Penyakit Dalam	Pelayanan sdh baik, tp minim fasilitas.

**Gambar 5.** View Menu of Patients Complaints

Of the application system developed as in the view menu above, then the user (admin / manager applications) can perform on the incoming sms governance of the patient so that the system worked well.

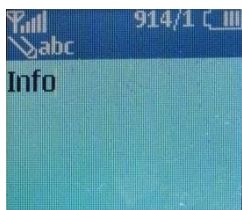
**B. SMS implementation**

Testing is done by sending an sms to the number of service complaints after it was responded to by the server system. Then patients choose a service unit that will be done and the last complaint charging the complaint is to be conveyed to the hospital. Testing is done with the message format as seen from the image below;

**Tabel 1.** SMS Delivery Format

Kode	Format Pesan	Contoh
Info	<b>Step 1 :</b> Info	Info
1-10	<b>Step 2 :</b> Pilih 1-10	1 --- > For this type of service Poli Children
	<b>Step 3 :</b> Message content	Concierge services uninformative, please evaluated.

Here is the implementation of the use of SMS to the SMS gateway application systems are built;

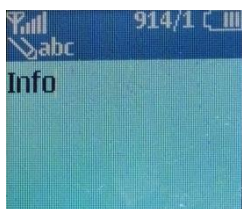


a. SMS from patients

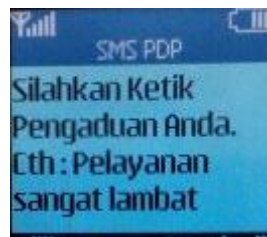


b. Replies from the system

**Picture .** Step 1 to see what kind of service



a. SMS from patients

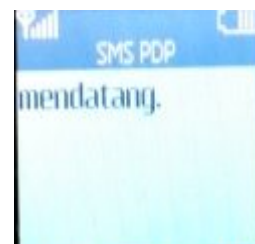
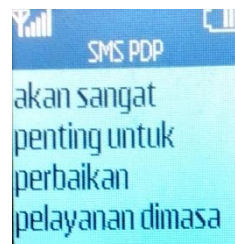


b. Replies from the system

**Picture.** Step2 to choose complaints



a. SMS from patients



b. Replies from the system

**Picture.** Step 3 charging complaint





#### IV. CONCLUSION

Based on the results of the testing and implementation of the system, then a number of conclusions that :

1. Users can submit a complaint without being limited by time and place as well as low cost.
2. Implementation of SMS Gateway as a service complaint can be used effectively and appropriately targeted.
3. PHP programming language and MySQL database can be used in building the system SMS Gateway

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EI-02-087

## THE COMPABILITY LEVEL OF FACILITIES AND INFRASTRUCTURE OF LABORATORIUM TO STUDENTS' MANUAL ENGINEERING DRAWING IN SMK NEGERI 2 PURWODADI

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**ABSTRACT :** *Educational facilities and infrastructure have paramount roles to be fulfilled by every institution. The needs of educational facilities for students' practicum are intended to anticipate the dynamics of the curriculum and the demands of the business/industry. Sufficient facilities and infrastructure significantly influence the ability of students according to their competency which in turn lead to reliable and employable graduates in industrial world. The study was aimed at determine how significant the influence of the use of Engineering drawing laboratory to the results of the student manual engineering drawing capabilities. The focus of this study is to figure out how significant the influence of the use of Engineering drawing laboratory of Engineering Drawing Program in SMK Negeri 2 Purwodadi to the students' manual Engineering Drawing capabilities. The study employed quantitative research, with a sample of 56 students. The results of this study showed that the compatibility of laboratory infrastructure to the minimum standard Engineering Drawing laboratory was 85.47% of the requirements has been met, which means that the manual engineering drawing laboratory is feasible to use. While the students' skills in using the manual engineering drawing lab of the teaching material presented indicated 78.94% of students' mastery which means that the teaching and learning activities supported by the availability of facilities and infrastructure that result in good learning outcome.*

**Keywords:** *facilities and infrastructure, manual engineering drawing laboratory, the ability to draw*

### I. INTRODUCTION

Vocational High School later in this study is called SMK was mandated by law to prepare human resources to enter the job market and become a productive workforce. Ideally vocational school graduates are employable workforce in industry. The current problems in vocational education generally are related to equipment limitations, the low cost of the practices, and the learning environment that does not conform to the atmosphere of the industry.

SMK basically has the objective to prepare a workforce which possesses the knowledge, skills and attitudes appropriate to the characteristics of vocational specialization and requirements of the industry and the job market. Facing the era of free competition requires workforce which is productive, effective, disciplined and responsible. Therefore, they are employable and able to create employment.

SMK Negeri 2 Purwodadi is a vocational school which organizes vocational learning process to achieve quality in accordance with the needs of job market / industry. Vocational High School (SMK) is not only demanded for their intellectuality, but also their skills. Consequently, producing competitive vocational graduates requires the lab / workshop which are appropriate for each student.



Based on the preliminary survey at SMK Negeri 2 Purwodadi, the learning process in SMK Negeri 2 Purwodadi consists of 30% theory and 70% practice. The needs for adequate infrastructure for the practice is very high. Since the expertise of SMK Negeri 2 Purwodadi which is Engineering Drawing, it means that this school should be able to provide the facilities in terms of drawing infrastructure as the manual drawing lab, the manual drawing equipment, and the manual drawing room along with computer. The manual drawing infrastructure must have a separate room that is placed on the manual drawing lab. The function of the laboratory is to facilitate students' practices during learning process in accordance with the requirements in Appendix National Education Minister Regulation No. 40 Year 2008.

The needs of educational facilities for the students' lab work is intended to anticipate the dynamics of the curriculum and the demands of the Job market / industry. However, in SMK Negeri 2 Purwodadi, the procurement of facilities and infrastructure for the students' lab work from the government has not yet been free from problems such as usage schedules, operational costs, maintenance costs, relatively short lifespan and limited amounts. Adequate facilities and infrastructure results in a significant impact on the ability of students of SMK Negeri 2 Purwodadi according to their competency which in turn can produce graduates who are reliable and ready to enter the job market that would suit the needs of the industrial world.

### **Statements of Problems**

From the description of the background of the above, the research problems can be formulated as how the influence of the use of laboratory technical drawings of Engineering Drawing Program in SMK Negeri 2 Purwodadi on the ability of manual drawing students.

## **II. RESEARCH PURPOSES**

The purpose of this study is to figure out how influential the use of engineering drawing laboratory of engineering drawing department in SMK Negeri 2 Purwodadi on the ability of manual drawing students.

### **A. Definition Of Laboratory**

Based on The Dictionary of Indonesian Language (KBBI), Laboratory can be defined as a place or a specific room which is equipped to conduct the experiment or investigation. Based on the regulation of the Minister of Administrative Reform and reform the state bureaucracy No. 3 In 2010, Laboratory is a Academic support unit in educational institutions, in the form of a closed or open room, permanent or mobile, managed systematically for the purpose of testing, calibration, and / or production on a limited scale, with the use of equipment and materials by the scientific method, for the implementation of education, research, and / or community service.

In Government Regulation of Republic of Indonesia Number 5 Year 1980 About the Principles of Organization University / State Institute, the definition of laboratory is described in Article 27 and Article 28 (Act 1980: 7). Article 27 describes the definition of laboratory, while Article 28 describes the personal right to manage the laboratory. Both the article reads, among others; Article 27 states that,





"the laboratory / studio is a means of supporting departments in one or more of the science branches, technology or specific art in accordance with the purposes of the relevant field of study. "Furthermore, Article 28 explains, laboratory / studio is led by a teacher or a faculty whose expertise has met the requirements according to the branch of science, technology, and art and directly responsible to the Head of Department.

From some of the definitions above, laboratory can be defined as a closed or open room which can be permanent or mobile equipped to conduct experiments, managed systematically to testing, calibration, and / or production on a limited scale, using equipment and materials based certain scientific methods, in the framework of the implementation of education and research.

## **B. Definition of Engineering Drawing**

OemarHamalik (1986: 43) argues that "Image is everything which is manifested visually in the form of two-dimensional as the outpouring of feelings or thoughts". While in the Dictionary of Indonesian Language (2001: 329) "Pictures are imitations of goods, animals, plants and so forth". Since a long time ago, the image has been used to communicate between human individuals and up to now how to communicate with images is still used even developed with the application as a standard communication for engineering people. Image is a tool to make the point, especially for engineering people. Therefore, the image is often also referred to as the language of Engineering. As the language of engineering, an image can be expected to describe engineering information accurately and objectively.

From the various opinions above, engineering drawing can be defined as a form of expression of an idea or thought about a system, processes, ways of working, construction, diagram, circuit and guidance which aims to provide instruction and information expressed in the form of a picture, or technical painting.

In the industry, engineering drawing is one of the tools which support production activities because during the production process, engineering drawings are required as a means of communication between planners and implementers in the form of pictorial language expressed in a practical, clear, easily understood by both parties. For that reason, planners should give a complete image in accordance with applicable regulations and which is easily learned by implementers. Therefore, implementers can provide a correct conclusion about the shape and size of the workpiece to be made.

Engineering drawing is one of the main elements in the planning and a method of brainstorming whose results must be readable by other parties concerned. Basic skills possessed by a technician with regard to the ability of engineering drawing should be able to choose, use and maintain drawing equipment properly. As a consequence, obtaining a good engineering drawing requires good equipment.

### C. Infrastructures and Laboratory of Engineering Drawing

Ministry of Education Regulation no. 40, 2008 contains various rules on the standard of facilities and infrastructure that must be met in each department within each educational institution SMK / MAK in general. Standard infrastructure for Laboratory Building at SMK Negeri 2 Purwodadi. This regulation contains minimum standards for Drawing Laboratory: (1) the area of construction drawing laboratory; (2) the ratio of per-students; (3) the capacity of the room; (4) the area of storage room and instructors; (5) the furniture of construction drawing laboratory; (6) the teaching medium in construction drawing laboratory; and (7) the equipment of the construction drawing laboratory. The followings are standard infrastructure data by construction drawing laboratory according to Ministry of Education Regulation 2008 40: 30 a. a laboratory of construction drawing department serves as the venue for learning activities: practicing engineering drawing using drawing machine, engineering drawing, calculating materials and costs with a computer program. b. Minimum acreage of laboratory in construction drawing department is 176 m<sup>2</sup> to accommodate 32 students, which include: the engineering drawing practice room at least 64 m<sup>2</sup>, computer – aided drawing practice room of 64 m<sup>2</sup>, storage and instructors room at least 48 m<sup>2</sup>. c. infrastructures of laboratory in construction drawing department are listed in the following table.

**Table 1.** Standard Infrastructure on laboratory in construction drawing department

No	Kinds of furniture	Ratio	Description
1	<b>Furniture</b> a. Drafting table b. Stool c. Cupboard for saving tools and materials	1 Set / room	For 16 students minimum on engineering drawing, material and budget calculation.
2	<b>Equipment</b> Basic engineering drawing equipment, material calculation, and budget calculation	1 Set / room	For 16 students minimum on engineering drawing, material and budget calculation.
3	<b>Teaching Media</b> Whiteboard	1 Set / room	For 16 students minimum on engineering drawing, material and budget calculation.
4	<b>Other Supplies</b> a. Contact-Contact b. Clock c. Dustbin	1 piece / room	Minimum 1 piece / room. To support the operation of equipment that requires electrical power.

Source : Ministry of Education Regulation No 40, 2008

### D. The Function of Engineering Laboratory

According to the minister of national education regulation no. 40, 2008 issued on July 31<sup>st</sup>, 2008 about the standard of facilities and infrastructure of vocational schools / madrasah aliyah vocational (SMK / MAK). The functions of engineering drawing laboratory are as follows:



1. The engineering drawing laboratory serves as the venue for learning activities such as engineering drawing, material calculation, and the budget calculation.
2. The practice of engineering drawing laboratory can accommodate a minimum of half the classes.
3. The minimum ratio of laboratory is 3 m / learner. Minimum area of engineering drawing room is 64 m. The minimum width of engineering drawing laboratory is 8 m.

#### **E. The Characteristics of Students' Manual Drawing Capability**

According to the Graduate Competency Standards (SKL) of productive subject on construction engineering drawing department, the characteristics of construction engineering department students' skills include:

- a. Students are able to draw buildings
- b. Being able to calculate the statics of the building
- c. Explains the basics of engineering drawing
- d. Identify engineering drawing equipment
- e. Draw a shape and form three-dimensional field
- f. Draw object projection.

### **III. RESEARCH METHODOLOGY**

#### **A. Approach and Types of Research**

The study aims to determine the effect of the use of engineering drawing laboratory on the ability of manual drawing of students in SMK Negeri 2 Purwodadi, clearly and thoroughly. From these objectives, this study employed a quantitative approach to figure out the effect of the use of laboratory on the students' manual drawing ability based on the calculation results of data analysis using some statistical formulas.

#### **B. Place and Time Research**

The study took place in SMK Negeri 2 Purwodadi Grobogan. The reasons of choosing the research location was that it saved time, effort and cost as well as the school has never become a subject of a similar study. Consequently, the researcher considered that SMK Negeri 2 Purwodadi was the proper research location. The research was conducted at the time of the semester by taking the data of the school year 2014/2015, with research time approximately 3 months, on January until March 2015.

#### **C. Population, Sample and Sampling Technique**

The research population was the 65 eleventh graders of SMK N 2 Purwodadi, Grobogan of the year 2014 / 2015. The sampling technique was based on Krejcie resulted in 56 students as the sample. The sampling technique was proportional random sampling. Proportional random sampling means that the sample was taken randomly so that each unit from the population has the chance to be sample. The amount of the sample was determined by the Krejcie table (Sugiono, 2002 : 63).



#### **IV. RESULTS AND DISCUSSION**

##### **A. The acreage of drawing laboratory**

The results created a conducive atmosphere with a percentage of 80.80% with high criteria. This means that the area has met the standard of BNSP (national agency standard of education). Consequently, it was able to accommodate many students according to a predetermined schedule. It indirectly helped the students gain the proportional right in the learning process, especially the use of the laboratory that aided students' concentration during manual drawing practicum and maximized the existing facilities in the school.

##### **B. The ratio of the room with learners**

The ratio of the room with students of SMK Negeri 2 Purwodadi was in very high criteria or by 85.27%. This means that the ratio of manual drawing laboratory use with the number of students majoring in construction engineering was influential on student learning outcomes that need to use the lab to the fullest with extracurricular and other activities. This is evident from data showing the ratio of space laboratory meet learners get the results the percentage of 87.05% and the percentage for the number 3 in the implementation of the practice of drawing is not jammed insistence with another friend showed a yield of 83.48%, so that helps students in learning to concentrate that will make students more able to excel.

##### **C. Laboratory room Capacity**

Indicators of the laboratory capacity in learning about each day with the number 4. The score was 195, with a maximum score of 224. The results of the percentage to Question 4 is  $= 195/224 \times 100\% = 87.05\%$  with a very high criteria. With a large capacity, the laboratory allows all students accommodated in the laboratory.

##### **D. Equipment and Instructor**

The results of laboratory equipment and instructor indicator, from the tabulation of data obtained by the average percentage indicator, was  $= 84.15\%$  with a very high criteria. Equipment and instructors is an important factor to develop students' ability to draw students and motivate themselves to learn because of the complete set of drawing tools supports the ability of students and instructors direct and guide the student in the learning process.

##### **E. The complete furniture of drawing laboratory**

The indicator of furniture in the laboratory was 85.27% with a very high criteria.

##### **F. Educational Media in the construction drawing laboratory**

The results of the processing of data on educational media in the laboratory was 86, 905% with very high criteria.

##### **G. First Aid Kit and hygiene supplies**

The results of data calculations of first aid kit supplies and hygiene indicators in construction drawing laboratory building was 86.91%. The result of first aid kit and hygiene indicator was high because the completeness of the laboratory such as safety equipment, health and hygiene which make



students feel comfortable and indirectly make students learn more conveniently and more concentrated.

#### **H. The use of drawing laboratory**

The result of the calculation of the drawing laboratory use indicator, the acreage of laboratory was 82.095% with the criteria of very high, the ratio of the room with the learners was 84.628% with the criteria is very high, the capacity of the laboratory was 85.023%, equipment and instructors at 84.403%, Completeness furniture of drawing laboratory was 88.176 %, educationalmedia in drawing laboratory and equipment was 87.106%. The first aid kit and hygiene was 86.91% with a very high criteria.

The overall result of drawing laboratory use variable was 78.942% with high criteria. The manual drawing skill of the students of SMK Negeri 2 Purwodadi is in fact affected by many factors. Manual drawing skill of each student is various. However, adequate facilities and infrastructure can optimize and develop the students' manual drawing skill.

#### **I. The students' manual drawing skill**

The percentage of students' manual construction drawing of SMK Negeri 2 Purwodadi was to 80.357% with high criteria. This means that students' ability to draw during practicum and in the learning process was good. Students are able to do construction drawing with the percentage of 76.339%, with the average on this indicator was 78.348%.

The percentage of the ability of students in reading engineering drawings was 70.535% with a very high criteria, the student's ability to calculate statics pictures was 76.785%. This occurs because as the students are already accustomed to using calculators in drawing laboratory, as supported by the data showing that the average student's ability to calculate statics image was 73.66% with high criteria. The calculation of data showed 78.348 % with high criteria on the indicator of being able to explain the basics of engineering drawing. It means the students were able to explain the basics of engineering drawing and the symbols contained in the manual drawing.

The results of identifying engineering drawing equipment showed 79.240% with high criteria. 78.571% showed that the students were able to explain the equipment used in the manual drawing. 79.910% of students stated that they were able to explain the use of the manual drawing equipment. The indicator of students are able to draw shapes and dimensional forms was 83.035% with very high criteria. 82.589% of students stated that they were able to make or draw lines and divided the line. 83.482% of students stated that they were able to make many regular angles.

The percentage of students can draw object projection was 81.026% with a very high criteria. 84.375% of students stated that they were able to identify kinds of projections. 77.678% of students stated that they were capable of drawing projections.

The percentage of manual drawing capabilities of students: Students were able to draw a building was 78.348% with the high criteria, the ability to calculate the statics of the building was 73.66% with the high criteria, the ability to explain the basics of engineering drawing was 78.348%



with the high criteria, the ability to identify drawing equipment was 79.240% with high criteria, the ability to draw shapes and three-dimensional form was 83.035% with a very high criteria, the ability to draw object projection was 81.026% with a very high criteria. While the overall percentage per variable of manual drawing capabilities of students was 78.492% with a very high criteria. This means that students had good ability to do manual drawing, since the students during their learning process students have expertise in accordance with their talents, interests and abilities and supported with a complete school infrastructure that can support their learning process.

#### **J. Correlational analysis**

From the statistical analysis, the correlation coefficient was 0.291 or  $r_{empirical}$ ,  $r$  was greater than the theoretical was 0,266 at confidence level of 5%. It can be written mathematically  $r_t(5\%) < r$ . Consequently, the working hypothesis which is "There is a significant correlation between laboratory use with the manual drawing ability eleventh graders student majoring construction engineering in SMK Negeri 2 Purwodadi", is accepted.

#### **V. CONCLUSION**

Based on the analysis and discussion in the previous chapter, it can be concluded that:

1. The results of laboratory use on eleventh graders majoring in construction engineering in SMK Negeri 2 Purwodadi was 85.11% (the status of drawing laboratory use variable criteria) with very high criteria. This means that laboratory use on eleventh graders majoring in construction engineering in SMK Negeri 2 Purwodadi was very positive.
2. The manual drawing ability of eleventh graders students majoring in construction engineering in SMK Negeri 2 Purwodadi was 78.943% (the Status of students' manual drawing abilities of variable criteria) was very high criteria. This means that students have the excellent ability to draw picture after using drawing laboratory.
3. There is a significant correlation between the manual drawing laboratory use with manual drawing capabilities of the eleventh majoring in construction engineering in SMK Negeri 2 Purwodadi. It can be seen from the correlation coefficient 0.291 which was greater than 5% confidence level (0,266).
4. The correlation coefficient 0.291 means that more complete infrastructure and laboratory use lead to better students' manual drawing ability in SMK Negeri 2 Purwodadi.



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EI-02-086

## COMPETENCE IMPROVEMENT BY ASSIGNMENT METHOD ASSISTANCE GROUP BASED ON COURSE OF WOODEN STRUCTURE II IN STUDY PROGRAM S1 PTB

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**ABSTRACT :** *The aim of this research was to determine how the assignment method based assistance group can explain the increased activity of learning and competence of students in the course structure of wood II. Variables that will be revealed in this study is that student competence will be measured through the learning outcomes. The design of the research done through action research. Research shows that in the first cycle mind majority 80% of student learning activities in the category and 20% less in the moderate category. Meanwhile, overall learning competencies in mind that the values obtained are below standard with a value above 70 only  $\geq 21\%$  and most of the 79% get the value of  $<70$ . The results of the first cycle is made clear that the results do not meet the employment indicators. Therefore the results of the reflection will be used as the basis for the implementation of the second cycle. The results of the second cycle showed that the indicator meets the employment rate of 83% competency mastery scores  $\geq 70$  and only a fraction is equal to 17% that scored  $<70$ . This is supported by a change in the learning activities, with 40% in the moderate category and 60% in both categories. Learning to use the assistance of a group-based assignment method could explain the increased activity of a better learning and increased mastery learning that meet the learning success indicators as defined by the implementation of the two cycles are cycles I and II. This model can be applied to courses that have the same characteristics with the course of teaching and learning strategies.*

**Keywords:** Assignment Method-based assistance group, Competence

### I. INTRODUCTION

The process of learning in instructional activities is an integrated process between lecturer-student and its supports factor. Good communication between students and lecturers greatly assist the process of learning and understanding the material in lectures. Learning in lectures conducted in the framework for comprehensively realizing student competency. With an emphasis on competency means that the orientation of the learning activities in the classroom must be given to the students to be more active learning, active search for information themselves and explore alone or with friends in learning activities in pairs or in groups, learn to use a variety of learning resources and printed materials, media electronics, and the environment (Depdiknas, 2003).

Wooden Structures II courses are part of the curriculum unit provided to students of S1 PTB Department of Civil Engineering. Subject wooden structure II is a continuation of the courses I Wood structures that have to be possessed by the students. It is a comprehensive understanding of cognition in analyzing the real problems in the field of wood construction. The realization of this competence is the final task of planning the building of a wooden frame structure. This is a comprehensive task from the learning material given in the course. Therefore, the implementation of this assignment, students should be able to apply the material given in the course in the overall planning tasks. Based on the reflection of learning that has been done in the subject of the wooden structure, it can be explained that





the competence of students in the learning of the wooden structure II are less than the maximum. This is apparent from the results of tests that have been conducted mostly not achieve the desire level.

Learning the wooden structure is aimed to allow students to understand the various aspects related to the calculation of wood ranging from nature, type, quality, class strong, durable class, size and connection cross section of wood as a base to plan the structure frame of wooden buildings. Between each of the learning materials with the others are interrelated and support each other to make a good building plan. Students are able to understand the learning materials partially, but when the tasks is given at the stage of applicative in planning a building structure using wooden frame, many students are not able to apply aspects of the calculation of wood frame structure. Other conditions that lead to inaccuracy in the collection of tasks are that most of the students are hesitant and lazy to have assistance. This is likely due to factors that the learning materials are less understood and there is a tendency of fear to have a meeting to get assistance with the lecturers.

Based on the orientation it appears that the student's understandings are less than the maximum as the individual assistance methods which have been applied are less effective. There is a tendency that the students are waiting another student to have assistance. Meanwhile, on the stages of doing the tasks there is also a tendency among students that they are not openly discussed with others. In fact the task of designing given a consequences that student need to communicate each other. Based on the above considerations, it is necessary to develop a learning method which is able to involve the participation of the students thoroughly so that learning and teaching is not only dominated by certain students only. One of the methods that are able to involve the participation of the student is cooperative learning. Based on the background of the problems mentioned above, the formulation of the problem that will be revealed in this study is: How do the assignment methods based on group assistance is able to explain the increased activity of learning and competence of students in the subject of wooden structures II?

Learning is an activity which is a process that brings about changes in the individual. A person's learning activities requiring a person's learning achievements, as stated by Roestiyah (1986) that learning achievement is a result achieved by a person experiencing a learning process in the form of habituation, knowledge or attitudes. These achievements can be declared or reported both qualitatively and quantitatively. Assessment is an activity of collecting data or information on an ongoing basis and a thorough review of the results of the learning process of students after participating in learning activities. Thus the absorption of the students can be understood.

Learning in practice requires creativity and innovation in learning. These innovations require changes in paradigm of Teaching into Learning; a change in a productive thinking becomes reflective thinking. This is due to the understanding that competence is not just knowledge (demonstrating the knowledge) but rather the ability / willingness to do (ability to do). It is also based on the principle of learning by the four principles, namely learning to know, learning to do, learning to life together and



learning to be. In this case implies that learning should implement learning to know, learning to be able to do, learn to work together to get something and learn to be something that I learned.

Cooperative learning model is a method that is done in a way that students can cooperate with each other to understand the significance of the content and actively cooperate in completing the task. Cooperative method is expected to improve the quality of learning, because the tasks together, share it with friends who have more capabilities, solve problems together, instilling responsibility together and develop social life. Learning activity is expected to be further improved through learning in small groups to develop social skills, individual skills and improve learning.

Learning assistance is a peer learning methods, it is based on the idea that the learning process is more effective if it is done between lecturer and protégé are both having common perception and mental. The conditions of assistance learning do not vary much with a discussion in the classroom. Thus, they are not reluctant to ask their questions. The learning process becomes more comfortable because they are already familiar to have any discussions. During the learning process, students are holding an active role.

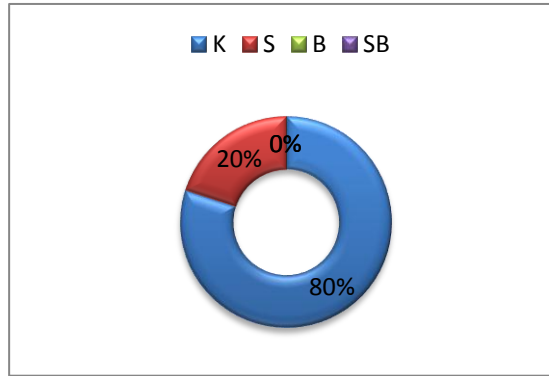
## **II. METHOD**

This research was conducted in Universitas Negeri Semarang of Civil Engineering. The subject of research is the students of Pendidikan Teknik Bangunan who is taking courses in Wood Structure II. Variables that will be revealed through this research is the competence of the students in the subject of Wooden Structures II with the assignment method based on learning assistance.

The study design used is Action Research (PTK). Classroom Action Research (CAR) is one approach in research-based classroom or school to be used to solve problems in order to improve the quality of education (PGSM Project Training Team, 1999). As for the draft (design) Action Research (PTK) that is used in this research is to use the model Kemmis and McTaggart. According Kemmis and McTaggart (Depdiknas, 2004: 2), the implementation of measures in the Action Research (PTK) has four grooves (measures): (1) the action planning; (2) implementation of the action; (3) observation; and (4) reflection.

## **III. RESULTS AND DISCUSSION**

The results of learning activities in the first cycle explains that a majority of 80 % of learning activities of students in the category less and 20 % in the middle category as shown in Figure 1. Cruising less including the capabilities, learn more positive attitude both on time assistance ( compact , happy , enthusiastic , pay attention ) as well as learn more positive attitude in the classroom ( happy , enthusiastic , pay attention). Meanwhile the results of learning competencies in the first cycle are shown in Table 1.

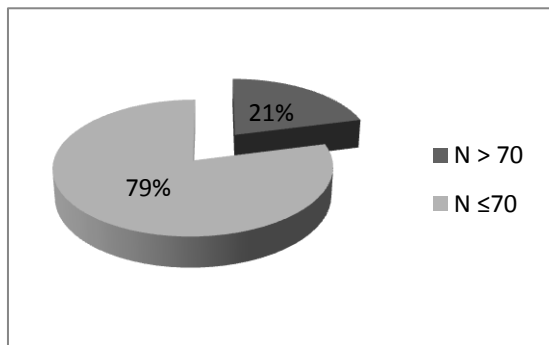


**Figure 1.** Summary of Student Learning (Cycle I)

**Table 1.** Competence Students cycle I

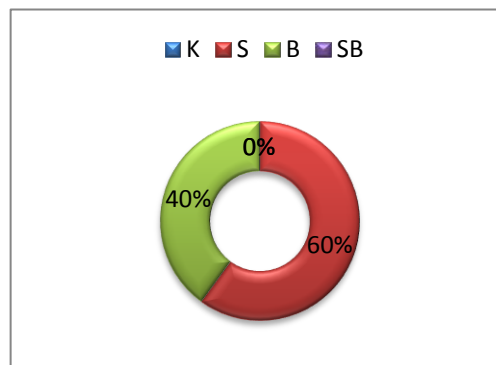
No.	Aspects investigated	Grade	score	Numbers of students	%
1.	Results of study on the ability to understand the learning material	A	86 – 100	0	0
		AB	81 – 85	2	7
		B	71 – 80	4	14
		BC	66 – 70	9	31
		C	61 – 65	10	34
		CD	51 – 60	4	14
		D	55 – 59	0	0
		E	≤ 54	0	0
	amount	29		29	100

Based on data from the learning outcomes in the first cycle, it is known that the overall value obtained is still below standard, namely that scored above 70 only 21%. The majority of 79% are getting value of less than 70 ( $\leq 70$ ) as shown in Figure 2. These results further is used as reflection to conduct the second cycle, as it is yet meet the indicators of mastery.



**Figure 2.** Mastery Learning Cycle I

In the cycle II of learning activities changed as shown in Figure 3 makes clear that a majority of 60 % in the category of being that is the aspect of accuracy assistance tasks according to schedule and in a positive frame of assistance . Learn more positive attitude at the time assistance (solid teamwork, happy, enthusiastic, attention) and a positive attitude in the classroom (happy, enthusiastic, attention). Ability to do the task in a group and the ability to participate in assisting the task group were included in the category by 40 % .

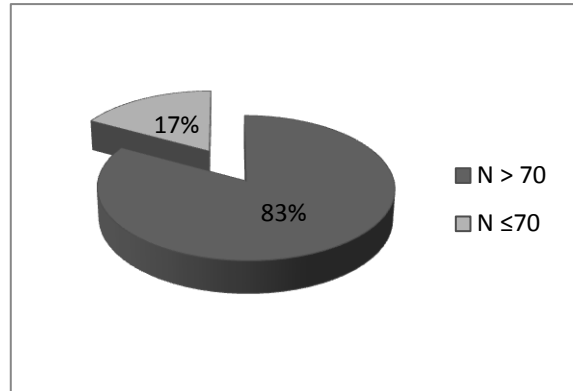


**Figure 3.** Summary of Student Learning (Cycle II)

**Table 2.** Competence Students cycle II

No.	Aspects investigated	Grade	score	Numbers of students	%
1.	Results of study on the ability to understand the learning material	A	86 – 100	5	17
		AB	81 – 85	8	28
		B	71 – 80	11	38
		BC	66 – 70	3	10
		C	61 – 65	2	7
		CD	51 – 60	0	0
		D	55 – 59	0	0
		E	≤ 54	0	0
	amount	29		29	100

According to the Table 2 it can be seen that the learning outcomes in the overall cycle II has shown the indicators of success where 83% gain value > 70 and only a small percentage that is equal to 17 % who get value ≤ 70 , as shown in Figure 4

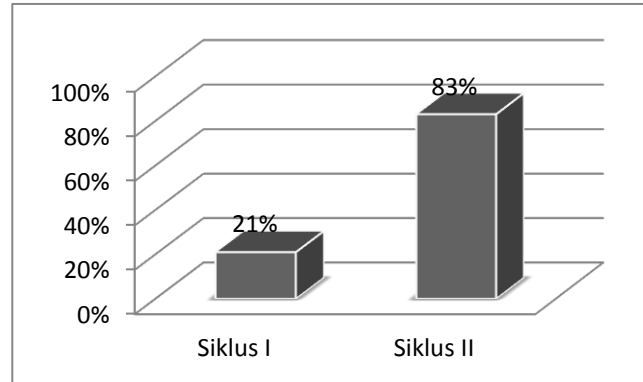


**Figure 4.** Mastery Learning Cycle II

Based on the results refleksi that has been done in the cycle I so the learning cycle II revamping for improvement, especially on the optimization of the working group. Approaches made during the implementation of assistance to a growing awareness and understanding of the importance of student orientation during the learning process and results . Methods This assistance will provide better information on the ability of students . To emphasis on aspects of the ability to do the task in the group , then during the implementation of the assistance given individual and group enrichment . With their enrichment capability is expected to individuals and groups of students will be increased .

Understanding and knowledge of the Wooden Structure II are better during the assistance will provide a conducive atmosphere for students and improve their self-confidence. It can be seen that the students give positive response at the time of assistance both to answer the questions and ask the learning material which has not understood. Students looked more enthusiastic to participate in the group, they are not just being nice but they've been trying to understand any matter and also trying to ask their friend in the group. These methods of assistance can foster better cooperation by trying to take responsibility together.

At the stage of learning in the classroom also showed better improvement that is the positive attitude of learning more. Students look more happy, enthusiastic and attentive in learning activities. Motivation is expected to be further enhanced with this method, so this extrinsic motivation gradually will turn into intrinsic motivation. This is indicated by an increase of the students who are scored > 70. In the cycle I, students who have scored > 70 are only 21%, it turn out to be equal to 83 % in cycle II and have met the learning success indicators, as shown in Figure 5.



**Figure 5.** Mastery Learning Cycle I and II (value > 70 )

#### IV. CONCLUSION

The results of research and discussion on learning by using the Assignment-based assistance to groups that have been implemented conclusions on their explanation of increased activity better learning and increased mastery learning to meet the learning success indicators as defined by the implementation of two cycles of the cycle I and II. Learning activities of students in the first cycle in the category of less than 80% and the category was 20% better on the second cycle in which the category was at 40% and by 60% in both categories. Success indicator of the learning are achieved on cycle II by 83%.

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EI-02-088

## RELATED BETWEEN VOCATIONAL SECONDARY SCHOOL (SMK) WITH JOB AVAILABILITY IN CENTRAL JAVA

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**ABSTRACT :** *This research aim to provide information concerning: (1) education management in SMK in area of Engineering (wooding, electronics, electricity, mechanic, and automotive); (2) policy implementation "link and match" which have been done by SMK in area of Engineering (wooding, electronics, electricity, machine, and automotive); (3) the number of and abilities of SMK's graduate in area of Engineering (wooding, electronics, electricity, mechanic, and automotive); (4) the condition of need and labour absorbtion in the industry which relate to SMK's graduate in area of Engineering (wooding, electronics, electricity, mechanic, and automotive); and (5) the execution of certification which is committed by SMK, industry and Lembaga Sertifikasi Profesi (LSP). This research uses qualitative method. This research data Source in the form of people, document, or laboratory. Data Source which in the form of people are head of school, the head of BKK, the representative of school head, the teacher of theory and also the practice, and industrial staff HRD. Document are in the form of text, picture, film, imprint, and or sketch. Laboratory which in the form of workshop, room in laboratory with and equipment which is in it. Laboratory which stays in the school, industry, or workshop which is used PRAKERIN by student. The result of this research indicate that (1) prakerin done by SMK in Central Java in average uses block system. But system used was not fully block model or can be told as modification block system. Industry as a rule is not able to execute competence test. Industry is only capable gives certificate as signal completing it, nevertheless in it have been equiped by values of student skill; (2) the number of graduates SMK in Central Java between 95% up to 100%, of spread of pass absorbent to employment which fitt in with programme its expertise is 30% up to 50%.; waiting time gets first job in average is 1-6 months; (3) SMK's graduate required by industry is manual tool mechanic operator, CNC's machine operator, electric welding, argon weld, metal moulding and ICT, despite in requiring soft skill is in the form of assidinity, commitment, discipline, and ability of team working; (4) student expertise certificate SMK in Central Java is obtained through three ways, that are Prakerin , PTA, and competence test carried out by LSP or BNSP. Certificate obtained of execution of Prakerin and certificate obtained of PTA is used as UN complement. Meanwhile, certificate obtained of LSP is additional supply of student for the agenda of applying.*

**Key word:** vocational education, Prakerin, job availability.

### I. INTRODUCTION

Vocational education management, including Sekolah Menengah Kejuruan (SMK) now entering important phase, that is vocational training graduate phase will be at stake readiness of its, in labor chess in the Asian regional region, either in context Asean Free Trade Association (AFTA) and also Asean Free Labor Association (AFLA). Attempt which must be done is to do maximum settlement and correction it may be in vocational education sector, either settlement in pattern of recruitment, education program development and training or curriculum, process of innovation education and training, evaluation development and certification (Suryadi, 1999).

Important issue which must be always placed forward in this context is how big SMK in parallel and relevant with need of public, especially need of labour, corporate world and also industry. In popular language, how big and strong "link and match" between both of it. If these basic question answered, then in its bottomsides are form of any vocational training will very "matching" and support need of corporate world or industry, especially in the skillful graduate supply.



Fact in the field now indicates that vocational education management and training running with its own program, on the other side of world of industry and profession association often complain that quality of graduate does not fulfill expertise demand which expected. Phenomenon "mismatch" between vocational educational institutions and training with corporate world, in the end engender graduate "underqualified". The situation is getting worse like this it has been a long time happens, even till now (Samsudi, 2004).

Phenomenon "mismatch" between expertise programs SMK in Central Java with corporate world now still also felt, including wooding expertise program, electronics and electricity, mechanical, and automotive (PELMO). Phenomenon above showing existence of paradox between pre-eminent expertise program decidings with fact existence of "mismatch", so that coming up question how in fact quality of PELMO's expertise program education management SMK in Central Java?

Interrelationship between educations with need and availability of employment in the industry are combination of influence between regulator variables, the participant of education, education organizer and world of job. Interrelationship between that variables have the character of reciprocal, and individual influential to other variable. participation Iameness or Involvement actively in one of variables, for example education organizer variable can cause system does not work optimal which will be result relation between education and world of inharmonious job, its meaning in physical will happen unemployment in with continuation.

Based on description above, then the purpose of research is provide information concerning: (1) Management Prakerin in SMK in area of PELMO's study; (2) number of graduates SMK in area of PELMO's study; (3) the execution of certification which is committed by SMK, industry and Lembaga Sertifikasi Profesi (LSP); and (4) the condition of labour need in the industry which relate to graduate SMK in area of PELMO's study.

## **II. METHOD**

This research have the character of descriptive, inductive, the more obstrusive of process and meaning, and report is designed in the form of narration, and deep. However this research also uses its datas of character are quantitative, for example in the form of statistical values and crossed tables. So this research using qualitative method. This research data Source can be in the form of people, document, or laboratory. Document can be in the form of text, picture, film, imprint, and or sketch. Laboratory can be in the form of room practice of, in laboratory with and equipment which is in it. Laboratory can stay in the school, industry, atapun workshops which is used practicing apprentice by student and teacher of the practice.

Informan is data source which in the form of people, that is man who expected to can give description required to complement or clarify answer of research subject. At this research informan sometime also act as research subject. Information authenticity is not enough if only comes from an





informan, therefore, information is collected of some informans which understand widely and in research subject.

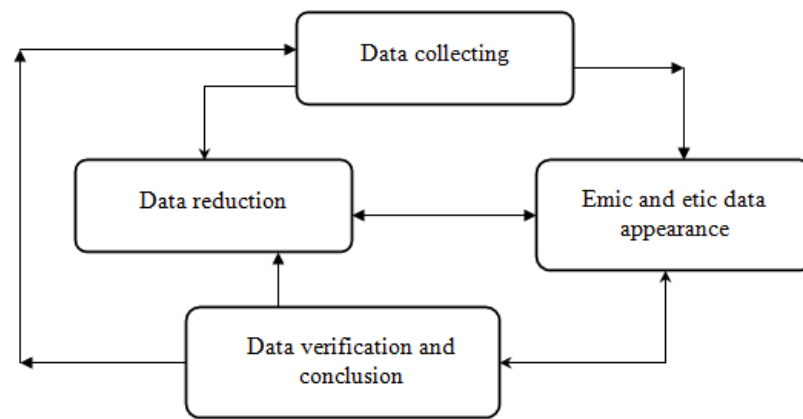
This research subject is interrelationship between educations with manpower. Therefore, this research subject is school and industry along with management are in it. If this research subject is curriculum then informan related to this thing is Principal, the deputy of scholl, the management of Bursa Kerja Khusus (BKK) and the teachers which there in the that going to school. If research subject is laboratory, then informan which competence is tehhead of workshop, teacher, foreman, and student. This research committed in the school, industry, and interconnected government agency directly with manpower. Going to school taken as population is SMK, especially PELMO. Location determination bases assumption that having SMK advanced and supported by existence of industries in harmony with programme PELMO's study, covering 10 locations in Central Java, that is Magelang, Surakarta, Salatiga. Klaten, Kudus, Banyumas, Cilacap, and Kendal. Industry taken as research population can stay in Central Java and also outside of Central Java. The Institute of government in this research are Disnakertrans and Dinas Pendidikan Provinsi and also Kabupaten/Kota.

Fact and data which will be collected in this research all kinds of, therefore required by method and instrument which varying also, for example is technique in and interview sheet, technique in and observation sheet, check list, and documentation.

Data authenticity fully supports in determining research end result, on that account, the technique to check data authenticity is utilize something else outside data for or comparison at data have been collected. Data authenticity in this research checked with using technique in source triangulation. Triangulation this means comparing and checking back of reliability of a information obtained through different time and equipment.

In process of data collecting, the involvement of researcher becomes a very important thing and determine in data collecting. The involvement of researcher required when which relatively old with a purpose that data collected becoming saturate. The extention of involvement means researcher to stay in the research field to data collecting saturation is reached. If this thing done then will limit (1) researcher trouble to context, (2) bias, (3) of atypical or errant events.

Data processing in this research committed through four phases, that is (1) data collecting, (2) reduction of data, (3) data menu, and (4) conclusion withdrawal or data verification. That those four steps explained in Figure 1.



**Figure 1.** The path of data analytical technique

### III. RESULTS AND DISCUSSION

#### A. The execution of Prakerin in Some SMK's in Central Java

In SMK Mikael, curriculum development is not done with industry outside campus. its meaning curriculum synchronization is done internally together with Akademi Teknik Mesin Industri (ATMI). In the this campus, school has company or industry, common called also as "production unit". production unit of its character has this manufacturing labored order from outside. SMK Mikael does not require input of industry outside its production unit. However, at recently, SMK Mikael performs synchronization indirectly is at time of them pay a visit in Pabrik Rokok Gudang Garam Kediri, that their students ought to learn also about industrial electricity. This input accommodated in curriculum, presently have been taught in SMK Mikael.

SMK Mikael Surakarta has production unit integrated with productive subject learning in the school. Since 2002 schools obtained ISO 9001-2000's certificate. going to school also believed to become Sister of Indonesian German Institute (IGI) for quality of development human resource in Indonesia through Program Pendidikan SMK and Social Grassroot Training Center (SGTC). Despite, school has guarantor team quality of, that is Academy Technique in Machine Industrial (atmi.) SMK which has cooperation with corporate world and industry, production unit, ISO.

SMK Mikael's student does not execute apprentice within reason of student other SMK. Now apprenticeship is called as activity of Prakerin. SMK Mikael's student executes Prakerin in the school production unit which its mechanism is 5 students is sent to production unit during the three weeks, then replaced next group 5 students also during the three weeks. The execution of Prakerin like this called as by block system, that is 3 weeks in the etcetera production unit in the theory class.

The execution of Prakerin at expertise technique in wood SMKN 2 Salatiga and SMKN 2 Kendal in doing at first semester in the class three for full three months in the industry. The execution of Prakerin is done in two phases that is first phase in July up to September; and phase of both months



of November up to January. day the arrangement and Office hours is accomodated with agreement between schools with industry.

Before execution of Prakerin in the industry, student obtained stock purchasing of school and industry. Usualy this activity committed in the school. Industry is invited to school to give understanding to student concerning their industrial profile, and image of student activity at time of is in the industry. Despite, is related also ethics, working safety and order during the execution of Prakerin. Stock purchasing is done for two days.

The execution of prakerin in SMK 2 Salatiga and SMKN 2 Kendal to expertise program technique in wood use block system. its meaning Student for three months staying in the wood industry, there is no activity of pembelajaran in the class, student staying around industry, as a rule is room rent. This system used in a hope that skill obtained in the industry is not annoyed by subject there in the school, so that expected by the obtained skill is comprehensive. After period of three months is fulfilled student is returned to school. In the folowing page presented by management model prakerin committed by expertise program technique in wood SMK 2 Salatiga and SMKN 2 Kendal.

The activity of monitoring which is committed going to school only done once for three months, this thing committed in a hope that school does not disturb process of learning in the industry. Despite guide of school usualy asks about resistance which is experienced by student in the industry. School can ask the thing to industry, does student of its school experiences problems, ethics, morale or spirit of job? The teacher does not have authority to give assessment to student. The activity of assessment is done fully by industry.

## **B. Number of and Abilities of Graduate SMK In Central Java**

In SMK Mikael Surakarta unsuccessful student is promoted to the next higher grade in 0,8% and happen to school year 2005/2006, while in school year 2004/2005 and 2006/2007 unsuccessful students are promoted to the next higher grade in are zero %s. Average UN Bahasa Inggris last three years (2004/2005, 2005/2006, and 2006/2007) successively 6,82; 8,04; and 8,29. Average UN for subject of Matematika last three years (2004/2005, 2005/2006, and 2006/2007) successively 7,75; 7,68; and 8,23. last Graduate percentage four years (2004, 2005, 2006, and 2007) successively 95%; 97,5%; 100%; and 100%.

In SMK Mikael Surakarta number of last graduates four years (2004, 2005, 2006, and 2007) which fills employment opportunities as according to its study program successively 43 people, 57 people, 59 people, 60 people. The rest more or less 50% graduates of year 2004, 2005, 2006, and 2007 continue to college. Majority to ATMI Surakarta, Universitas Sanata Dharma, Universitas Atmajaya Yogyakarta, and a number of country colleges. the waiting period to get first maximum job of 1-3 months. despite labour request by industry for last four years (2004, 2005, 2006, and 2007) successively 42 people, 50 people, 43 people, and 50 people. the request can only fulfilled 10 people, 16 people, 13 people, and 15 people, so that there is request surplus 32 people, 34 people, 30 people,



and 35 labour people. so, the many graduates absorbent by world of kerjaada is surplus. despite, waiting period gets job which relatively short is good practice management.

At UN year 2008 SMK 2 Salatiga successfully pass 100% with value which satisfying. The lesson of mathematics : its average value is 8,87. The lesson of Bahasa Indonesia average value the whole is 8,02, while for lesson of English, average value is 8,08. This news really proud and gladdening for all academic person civity SMK Negeri 2 Salatiga. So, in the year 2008, SMK 2 Salatiga having average number of students which pass above average number of students which pass in Central Java. This thing indicate that process of learning in SMK 2 Salatiga in good category. Shown also that in every year percentage of number of students channeled to place of job always increasing that is starting from 47%, 55% and final datas are 66%. This thing strengthens suspect that learning which running tend to lead to ability claimed by curriculum.

Expertise competence test year 2007 become part of UN for the SMK's students. in previous year, UN for SMK only covers three subjects, namely mathematicses, Bahasa Indonesia and Bahasa Inggris; while expertise competence test enters in general examination. so value of UN for SMK comes from value of mathematics is added with value of Bahasa Indonesia, the value of Bahasa Inggris and value of expertise competence test is divided by four. UNs expertise competence is carried out slowest one week before implementation of UN theory.

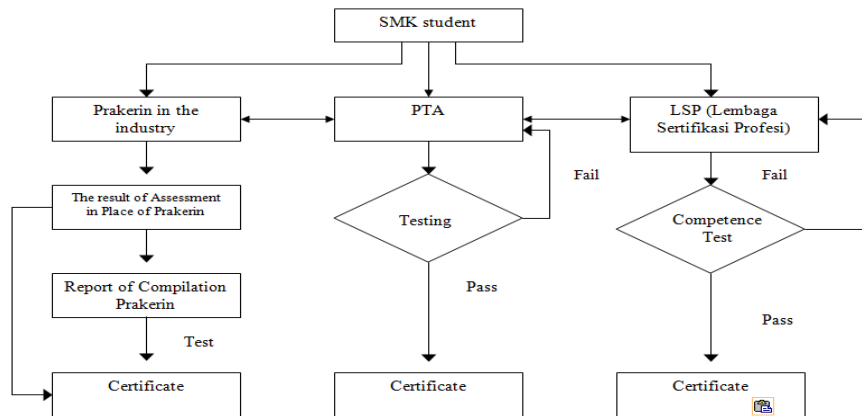
Technique in wooding in SMK 2 Salatiga gets believe of Pusat Pengembangan Penataran Guru (PPP-G) Teknologi Bandung as place of execution Uji Kompetensi Siswa (UKS). 18 students prove expertise in making furniture with industry standard. The result of their direct work assessed as by some furniture company management staff. "We are able to produce wood energy readily absorbent by industry. In Indonesia there's only five SMK's elected as this competence test executor, one of them this our school," said Kepala SMK 2 Salatiga, Drs Reza Pahlevi.

### **C. Certification Management SMK In Central Java**

Expertise certificate obtained by student SMK Telkom Sandhy Putra Purwokerto through three ways, that is through Pendidikan Sistem Ganda (PSG) or often called by Prakerin, through project of Tugas Akhir, and through competence test carried out by LSP BNSP. Certificate obtained of execution of PSG and certificate obtained of PTA is used as UN complement. its meaning both certificates enter in result of UN. Meanwhile certificate obtained of LSP is additional supply of student for the agenda of applying.

Certificate obtained of PSG through steps as follows: (1) student executes PSG in PT. TELKOM; (2) student obtains value of PT. TELKOM; (3) student compiles report of PSG; (4) student tested by schools relate to report of PSG; (5) student is expressed to pass report of test PSG; (6) assessing obtained of PT. TELKOM and report of test PSG is average; (7) student obtains certificate. the Letter of this description signed or legalized by head of Kandatel and head of school.

PTA is national productive test approach by the end of period of education in SMK, which is integerasi and actualization to acquisition of competence or sub competence which have been mastered. This strategy designed to increase efficiency and the relevant of. Testing this type competence come into internal category. through this PTA expected by student is able to create learning situation which kondusif to produce product as according to need of market, the requirements of standard quality of, and procedure operational standard (SOP).



**Figure 2.** Process and various certification SMK in Central Java

The product of PTA is accomodated with characteristic of package or expertise program, which can be in the form of: (1) the product of goods, for example Program Sistem Informasi Akademik based on Web, programme on-line PSB, in the area of agriculture, in the area of artistry, and others; (2) the product of service for example server installation, Mail server, Gateway, local network installation for internet booth, survey technical field and mapping, automotive, and others.

The execution of activity PTA through some individual steps are (1) proposal compilation; (2) the process of execution; (3) the activity of culmination; (4) the process of verification; and (5) certificate gift.

In phase of proposal compilation, the teacher and tester along with determining a title of PTA, then followed up with design compilation working of PTA. The process of execution is process of activity which is committed as according to fringes have been decided in proposal, with guidance and supervision. Processing this stresses at competence attainment proved with proof learning (learning evidence) and organized in portfolio as component of verification. The activity of culmination PTA by tester can be done by presentation, examination way, and display product. Processing internal and external verification to acquisition of tester competence is done by the end of process of project of execution al tasks to obtain an academic diploma by portfolio verification, proposal presentation way, interviewing, demonstrating and job performance. The final step is certificate gift that is activity after being committed by external verification. PTA's certificate legalized by external verification which usually is PT. TELKOM and Principal.



Expertise certificate obtained by SMK St. Mikael Surakarta through two ways, that is through prakerin and through project of PTA. Certificate obtained of execution of PSG and certificate obtained of PTA is used as Ujian Nasional's complement. its meaning, both certificates are input as value of UN.

Certificate obtained of prakerin through steps as follows: (1) student executes prakerin in the property of industry institution; (2) student obtains value of result of prakerin; (3) student compiles report of prakerin; (4) student tested by schools relate to report of prakerin; (5) student is expressed to pass report of test prakerin; (6) student obtains certificate.

PTA is approach UN productive lesson final period of SMK's education, which is integerasi and actualization to acquisition of competence or subkompetensi which have been mastered. this strategy designed to increase efficiency and the relevant of. testing this type competence come into internal category. through this PTA expected by student is able to create pleasing learning situation to produce product of matching with need of market, the requirements of standard quality of, and SOP.

The execution of activity PTA through some individual steps are (1) proposal compilation; (2) processing execution; (3) the activity of culmination; (4) processing verification; and (5) certificate gift.

In phase of proposal compilation, teacher and tester along with determining PTA's title followed up with design compilation working PTA. processing execution is process of activity which is committed as according to fringes have been decided in proposal, with guidance and supervision. processing this stresses at competence attainment proved with study result (learning evidence) and organized in portfolio as component of verification. the activity of culmination PTA by tester can be done by presentation, examination way, and display product. processing internal and external verification to acquisition of tester competence is done by the end of process of project of execution al tasks to obtain an academic diploma by portfolio verification, proposal presentation way, interviewing, demonstrating and job(activity short exchange. the final step is certificate gift that is activity after being committed by external verification.

#### **D. The condition of Need labour e PELMO Graduate In Industry**

According to Head of HRD PT. KOMATSU Jakarta that in the year 2014 and 2015 PT. KOMATSU have received heavy equipment order very big. The need of huge heavy equipment suspected as is not speculative consumer behavior, but is real need in the field. Staff HRD PT. KOMATSU tells that now happening problems 'Bottle Neck 'in the production, because area of labour production machine the numbers a few of so that its pekerjaas heap, he must soon do 'setting up 'labour to reached by job(activity effectivity. Heaping happens because components still harsh have many are produced, but area of mystical power production machine was not able to counterpoise its. Despite, important components of heavy equipment cannot be labored by hand of human, but must be labored mechanically, but skilled man power in the field of production machine still very limited



therefore happens heaping. Therefore, is required by manual tool machine operator energy and machine operator Computer Numerical Control (CNC) very big. On the other side, PT. KOMATSU requires also the skillful graduate energy in metal moulding.

According to staff HRD PT. Karya Hidup Santoso's (PT. KHS) Yogyakarta, number of graduate operator labours SMK 800 people. they spread over into various jobs for example weld, tool, metal moulding, and painting or finishing. the average of SMK's graduate job quality fulfills requirements of product, its meaning alumna has skill which is enough. all operators still just always given by training, before they worked to produce product, the duration two weeks up to two months. told hereinafter that the very required in job is personal quality, its meaning man which hold firmly commitment, discipline, and capable work along. based on this thing, pengalaman till now thus SMK's alumna which has categorizing ordinary run of the mill having better quality, this thing suspected by them trying harder to increase its job quality of earning.

Usualy PT. KHS receives employee every month up to 30 people of various skills. Huge need is in the metal moulding. Despite need for Computer Numerical Control (CNC)'s machine operator or weld robot and machine also very big. Metal moulding even does not require graduate of this expertise program, all expertise programs is received, after they become employee then educated in this skill in the company.

According to staff HRD's is told also that the especially of candidate of employee is personal quality or qualification. Employee character which has assidinity, commitment, discipline, and capable work along the more required. Skill which still rather low, by company will be improved through training. So in fact supply which comes from school is enough for supply work in PT. KHS.

According to Formulatrix Salatiga's director, monetary global crisis does not give impact to its corporate activity who moves in the field of industry telematika. According to Kepala Bidang Perindustrian , Commerce, and UKM Salatiga area of telematika still become industrial development good player in its city. Telematika the meant is integerasi between telecommunications systems and informatics recognized with Information and Communications Technology (ICT)'s. This industry relate to computer, telecommunications, or multimedia. The skill which still very required by it in harmony with curriculum at expertise program Teknik Komputer and Jaringan in SMK Telkom Shandy Putra Purwokerto.

#### **IV. CONCLUSIONS AND SUGGESTION**

##### **A. Conclusions**

Firstly, Prakerin done by SMK in Central Java in average uses block system. But system used was not fully block model or can be told as modification block system. At pure block system, the execution of prakerin for eight months, but in its practice many which executing for three months only. The execution of prakerin for three this monthes are minimum requirements, if it dilaksanakan



more than three months and suggested by curriculum. Some schools execute prakerin up to six-month there even exist which up to a year;

Second, number of graduates SMK Negeri and private sector in Central Java between 95% up to 100%, of spread of pass absorbent to employment which fitt in with programme its expertise is 30% up to 50%.; waiting period gets first job in average is 1-6 months; the rest continues to Perguruan Tinggi, and partly unknown its activities;

Third, Sertifikat student expertise SMK Negeri and private sector in Central Java is obtained through three ways, that is Prakerin / PSG, The project of Tugas Akhir (PTA), and competence test carried out by Lembaga Sertifikasi Profesi (LSP) Badan Nasional Sertifikasi Profesi (BNSP). Certificate obtained of execution of Prakerin/PSG and certificate obtained of PTA is used as Ujian Nasional's complement. Its meaning both certificates enter in result of UN. meanwhile certificate obtained of LSP is additional supply of student for the agenda of applying;

Fourth, SMK PELMO's graduate required by industry is manual tool machine operator, CNC's machine operator, electric welding, argon weld, metal moulding and telematika or ICT, despite in requiring soft skill is in the form of assidinity, commitment, discipline, and ability work along (team work).

## **B. Suggestion**

Firstly, model Prakerin for SMK can be used block release modification, that is performed to start class one by the end of even semester, for a month in three years, especially for skill does not claim systematic matter sequence, number of time of apprentice remain to be for three months;

Second, PTA compiled by student better come from industry where prakerin, student is asked to observe one of problems in the industry to be finalized in PTA, the next step is tester PTA one of them having to come from industry where student prakerin; be not like which till now done that is PTA does not relate to prakerin.





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## TASK INTERPRETATION TO IMPROVE THE STUDENTS' LEARNING OUTCOMES OF FAMILY WELFARE SCIENCE COURSE

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**Abstract :** *Students' engagement in learning is affected by the learning environment including assigned activities and tasks, ways to provide instructions, and assessment practices. It is implied that lecturers affect students' interpretation task (for better or worse) in what way they organize their learning. The present study aimed to analyze the influence of students' task interpretation on their learning outcomes. It was an experimental type of research with pretest and posttest control group design. The research subjects were 64 students of the Dressmaking Study Program of the Home Economics Department of Faculty of Engineering, of Universitas Negeri Surabaya (UNESA). They were taking Family Welfare Studies course. They were divided into an experimental class (29 students) and control group (35 students). The experimental class was given task-analysis sheet prior to pre-test, while the control class was not. Another similar treatment for both groups was guided group discussions with Student Activity Sheet (MFI), and posttest. The technique for data collection was tests. The data analysis used N-Gain and t-test. The result showed that: (1) The mean of N-Gain of the control class was .44 (medium category) and the mean of the experimental class was .73 (high category); (2) the result of t-test showed that with significance level of .05, the obtained value was .019. It means that there was a difference in the learning outcomes of the experimental and the control groups. In conclusion, the students' task interpretation affects their learning outcomes.*

**Key words:** task interpretation, students' learning outcomes, Family Welfare Studies course

### I. INTRODUCTION

In order to achieve a successful learning, each student must have a consistent approach (work habit) to complete academic tasks (Butler & Cartier, 2004), including the students' ability to interpret the demands of work to be accomplished. Therefore the task interpretation is crucial in determining the learning success. It is necessary to study what a lecturer can do to improve the task interpretation effectively.

In class, lecturers construct learning environments where students work. For instance, they choose instructional methods (e.g. lectures, small group discussions); objectives, forms and components of learning activities; and evaluation practices (which is the standard for evaluating the task). In a learning environment, lecturers have the potential to affect the formation of knowledge and competences of students. The learning environment forms the students' approach to learning. This will ultimately affect their learning (Entwistle & Tait, 1995).

When creating a learning environment, a lecturer conceptualizes and arranges academic tasks (academic work). As part of this process, he or she designs activities for students with the goal of fostering a particular academic work habit and learning outcomes.

The term "activity" generally refers to a task assigned by a lecturer. The term "task" refers to a specific and more coherent activity and internally requiring some other learning activities (such as reading, writing, learning, and problem solving).



Students' interpretation of assigned tasks describes their work habits. It is of importance as a basis of success in accomplishing the task. Some researchers define "engagement" as a very meaningful and thoughtful approach to complete a task (Paris & Paris, 2001). Referring to the model of metacognition and self-regulation (Butler & Winne, 1995; Zimmerman & Schunk, 2001), students engagement is defined as a student activity, coordinating reflective learning process (i.e. self-regulation) in improving the knowledge of metacognitive and beliefs of motivation in the context of academic tasks. Thus, student involvement is associated with self-regulation in the activities, because it lies in the context of learning (Zimmerman & Schunk, 2001). In connection with this definition, engagement in the task can be divided into two recursive phases: task interpretation (carefully defining the requirements of a specific task), planning (setting a destination, selecting approaches to manage tasks), implementation (implementing the chosen strategy), monitoring (continuously tracking the progress associated with the destination), and evaluation (generating feedbacks about things that have already occurred).

Explaining student engagement requires an analysis of the quality of their participation in that phase (Butler & Winne, 1995). It is because students gain experience through tasks, work repeatedly through these phases. By doing so, they begin to develop the work habits which they adopt whenever they are faced with academic work.

Task interpretation is very important for learners' success in their performance. Butler (1998) stated that "efficient learners are aware of the task requirements and direct their learning activities accordingly". During the first phase of engagement, namely the task interpretation, they interpret the requirements of a given task. Then, they self-regulate all future learning activities based on their interpretation of the demands of the task (Butler & Winne, 1995). The interpretation serves to direct duties (e.g. purpose for which they have set in advance), the strategy they choose and apply, and criteria for the assessment of their performance during the monitoring and self-evaluation.

In other words, if the interpretation of the task is missing or wrong, the learning will not succeed. A student can work diligently and hard, but their efforts would not be productive to focus on the learning objectives in question. Therefore the task successful interpretation will lead to engagement focused on the tasks and ultimately affect the students' success. Therefore, to be successful, the students must have an approach to academic work including their attention on the task interpretation.

As previously mentioned, the students' engagement in learning is influenced by the learning environment, including the activities and tasks assigned, how the instructions provided, and assessment practices. It is implied that the lecturer can affect the students' task interpretation in the way they organize the learning environment.

Family Welfare Studies is a compulsory course for the students majoring in Home Economics Education, including those of Dressmaking Study Program. This course is provided at the beginning of the semester (1st semester). The purpose of this course includes: 1) the students understand the basic



concepts of Family Welfare Science and its scope; and 2) the students master the Family Welfare Studies as the basis for the development of the Home Economics Education, as well as mastery of the welfare of the family, family life and their relation to the state life. The course materials are comprised of Family Welfare Science, Home Economics, education, family welfare (PKK), family life as part of science, theoretical perspectives on the family, the nature of the family, management of family resources as a system, the definition and scope of family resources, the concept of decision-making in the family, the allocation of time and housework, family financial management, gender roles, family welfare, and research methods in the family.

In this study, the role of gender was selected as a topic to be studied, because the topic was considered to be quite interesting and constituted many ill-defined problems. Practicing problem solving skills requires those ill-defined problems. The students' activities of creative and critical thinking can take place. The task analysis, pretest, posttest, and student activity sheets were developed to guide the activities.

The problems of this research raised are: 1) How are the students' learning outcomes; and 2) Does the students' task interpretation influence their learning outcomes?

## II. METHOD

The present study was a quasi-experimental research with a pretest-posttest control group design. The students' task interpretation was the independent variable and the students' learning outcomes was the dependent variable. The subjects were the students of Dressmaking Study Program who were taking the Family Welfare Studies course. They were divided into the experimental group (B Class) consisting of 29 students and the control class (A Class) totaling 35 students. The students in the experimental class were given a sheet of task-analysis prior to the pretest, while the control class was not given the task-analysis sheet before the pretest. The similar treatments for both groups were the pretest, guided group discussions with Student Activity Sheet (MFI), and the post-test. To gather the data, tests were used.

The students' learning outcomes were determined on the basis of the students' test results consisting of the pretests and posttests. The results of both tests were used to determine the N-gain score which accounted for the level of the students' understanding. The qualitative descriptive analysis was done to determine the learning outcome (Hake, 1999) with the following formula:

$$\langle g \rangle = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

Notes:

$\langle g \rangle$  = gain score (improvement of the students' learning outcomes)

$S_{post}$  = *post test* score

$S_{pre}$  = *pre test* score

$S_{max}$  = maximum score

The N-gain indicates the differences in understanding of the concepts before and after the treatment. The criteria for the N-gain according to Hake (1999) are divided into three levels. They are:

- (1) If  $\langle g \rangle \geq .7$ , it is categorized as 'high gain'.
- (2) If  $0.7 > \langle g \rangle \geq .3$ , it is categorized as 'fair/medium gain'.
- (3) If  $\langle g \rangle < .3$ , it is categorized as 'low gain'.

### III. RESULT AND DISCUSSION

#### A. The pretest results

Before conducting the study, the researchers administered a pretest to determine the students' initial ability. The pretest results can be seen in Table 1 as follows.

**Table 1** The pretest results

Data	Control Class	Experimental Class
Maximum score	16	26
Minimum score	58	55
Mean	40.74	47.10
Median	44	48
Modus	45.00	48.00
Standard Deviation	10.82	5.63

Based on the pretest results of the students in the control class, the class obtained the highest score of 58, the lowest score of 16, the average score of 40.74 with a standard deviation of 10.82, the median of 44, and the modus of 45.

From the results of the pretest of the experimental class, the scores earned included the highest score of 55, the lowest score of 26, the average score of 47.10 with a standard deviation of 5.63, the median of 48 and the modus of 48.

#### B. The posttest results

After the implementation of learning activities and the administration of the Student Worksheet and tests, the evaluation was performed to determine the students' learning outcomes in the form of post-test. The posttest results can be seen in Table 2 below.

**Table 2.** The posttest results

Data	Control Class	Experimental Class
Maximum score	78	87
Minimum score	53	77

Mean	66.8	85.5
Median	67	86
Modus	62	86
Standard Deviation	6.15	2.11

From Table 2, the results of the posttests showed that the control class obtained the highest score of 78, the lowest score of 53, the average score (mean) of 66.8 with a standard deviation of 2.11, the median of 86, and the modus of 86.

Whereas the posttest results of the experimental class showed that they obtained the highest score of 87, the lowest score of 77, the average score (mean) of 85.5 with a standard deviation of 6.15, the median of 67, and the modus of 62.

### C. The N-Gain scores

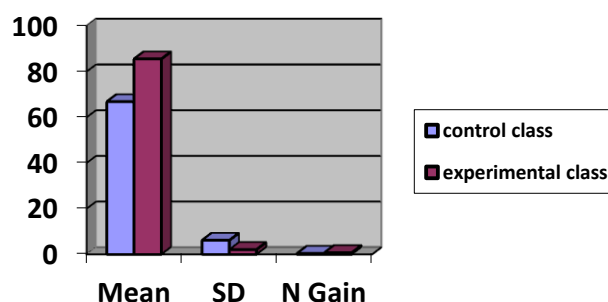
The improvement of the students' learning outcomes in the control class can be seen from the N-gain average score of 0.44 (included in the medium category); whereas the one of the experimental class was 0.73 (included in the high category). Table 3 below reveals the results of N-gain scores.

**Table 3.** The N-Gain scores

No	Class	N	Scores			
			Ideal scores	Minimum Scores	Maximum Scores	Average
1.	Control	35	100	.31	.56	.44
2.	Experimental	29	100	.63	.78	.73

Table 3 reveals that there are 10.34% or 3 students included in the low category, 13.79% or 4 students included in the medium category, and 75.86% or 22 students in the high category. This shows the significant increase in the students' learning results after having been given the task analysis.

From Table 3, the N-gain scores were included mostly in the category of medium and high. This suggests that there was a significant improvement in the students' learning outcomes. The task analysis assessed affected the learning outcomes. The increase in task analysis can be seen in Figure 1 below:



**Figure 1.** The increase of task analysis

**D. The t-test results**

The data analysis concerning the students' learning outcomes by using the t-test is presented in Table 4.

**Table 4.** Independent Samples t-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Values	Equal variances assumed	30.220	.000	-15.583	62	.019	-18.68	1.1927	-21.0858	16.29135
	Equal variances not assumed			-16.800	43.30	.035	-18.68	1.11239	-20.9316	16.44578

Table 4 shows that the obtained results of the analysis was the Sig. (2-tailed) of 0.019 < 0.05. On the basis for a decision in an independent sample t-test, it can be concluded that H0 was rejected and H1 was accepted. It means that there is influence of the students' task interpretation on the students' learning outcomes.

The task analysis is believed to lead the student to understand and resolve the tasks. From time to time and through studies at schools, the researchers describe how the students developed their knowledge of the academic context on which they base their approach to the academic work. As a part the students' built student knowledge, the students develop metacognitive knowledge (i. e. the knowledge of knowledge), that influence their approach to academic tasks.

At the beginning of the definition of metacognition, Flavel (1987) defined the three types of metacognitive knowledge, the person variable, task, and strategy, which affects the students' approach to academic work. The person variable reflects the students' knowledge about themselves as learners



and others, and about learning the strategies in general. The strategy variable reflects the students' knowledge about how, when, and where the specific learning strategies should be used. The task variable reflects the "students' understanding about relationships between characteristics and associated processing task demands" (Butler, 1998, p. 280). Flavel found that person, strategy, and task variables interact to shape how students are involved in the assigned tasks. The students build metacognitive knowledge all the time, from their continuous experience with academic work (Paris, Byrnes, & Paris, 2001). They juxtapose the metacognitive knowledge when performing the self-regulating in the context of any particular task (Zimmerman & Schunk, 2001).

In order to succeed in learning, the learners must know more than just the purposes of tasks. They also need to understand how the academic tasks are accomplished.

The students' task interpretation of the students lead their planning, (e. g. purpose for which they created), the strategy they choose and how they are applied, and the criteria for the assessment of their performance during the monitoring and self-evaluation. Thus, if the interpretation of the assignment is missing or incorrect, the learning will fail. A student can work diligently and hard, but their efforts would not be productive to focus on the learning objectives intended. Thus, the interpretation of a successful assignment is the basis for a focused engagement in the tasks and they will finally achieve the successful learning at schools. Therefore, to be successful, the students must adopt an approach to academic work which is usually included their attention to the task interpretation.

#### **IV. CONCLUSION AND SUGGESTION**

Based on the previous data analysis, some conclusions can be drawn as follows: 1) The mean N-Gain of the control class was .44 (medium category), and the mean of the experimental class was .73 (high category); 2) The result of t-test showed that with a significance level of .05, the obtained value was .019, which means that there is a difference between the learning outcomes of the experimental and the control groups. It therefore can be concluded that the students' task interpretation affects their learning results.

The suggestions that can be raised include the need to apply the task interpretation in giving each task to the students. The task Interpretation helps the students understand the task, plan to complete the task, and ultimately help them achieve the best academic achievements.





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**THE EFFECTIVENESS OF PROJECT-BASED LEARNING  
ON ENTREPRENEUR SUBJECT AT FASHION EDUCATION STUDY PROGRAM**  
(2<sup>nd</sup> Year Hibah Bersaing Research)

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**ABSTRACT:** *There are some components in instructional process such as: students, teachers, goal, instructional material, learning resources, media, teaching model and method, evaluation, school management and instructional development. One of those component, model of teaching, is believed, can increased the students' motivations in entrepreneurship. The lecturer have to choose the active, creative, innovative, and joyful instructional model. This model can developed the skill of students to create new product, self-confidence, and build a new enterprise in fashion, it was project-based leaning. The research aim to know the effectiveness of Project-based Learning in increasing students' achievement in Entrepreneur Subject. By using experimental method the research was conducted, and applied pre-test post-test design. Data was collected by using test, observation and questioner and analyzed by using gain-score. The research result, there was effectiveness of PBL in increasing students achievement in Entrepreneur Subject Matter, and the high of the effectiveness was 0.5, medium category. It means, that there were another aspects influence the students' achievement in Entrepreneur Subject, such as instructional media, student creativity, and learning facility.*

**Key words:** Project-Based Learning, Entrepreneurship, Fashion Education

## **I. INTRODUCTION**

Fashion Education Study Program, one of the program in Home Economic Department, has a vision as a center of academic education and professional in producing teacher or educator that have an ability in technology and service of fashion, adaptable and competeable. One of the Fashion Education Study Program missions is developing entrepreneurship to lead into independent community. To reach the mission's target, the student of Fashion Education Study Program are given some courses or subjects that support the target competency. The courses are given to the student, can be grouped into main courses that appropriate to the concentration of fashion, include: Fashion Design, Fashion Technology, Management of Children's Fashion to haute couture, Textile Science, Textile Design, Fashion Business Management, Tailoring, Product Exhibition. Moreover, there are some supporting competency courses, for example: Consumer Education and Entrepreneurship, and other subjects. Entrepreneurship subject is given in fourth semester, in two credit semester, and with a range of material, namely: (1) the basic concept of entrepreneurship provides definition and characteristics of entrepreneur, (2) the mental attitude of entrepreneur, include: attributes of entrepreneurship, entrepreneurship philosophy, and the mental attitude of entrepreneur, (3) Competence of entrepreneurship, contains: motivation, management, administration, business accounting, leadership (leadership types), (4) Business Planning, include: the scope of business, type of business clothing, kind of business, the selection of the business type (location, kind of business, type of business), strategic analysis (SWOT), financial cost analysis, marketing, (5) proposal and evaluation, include: business proposal, business execution, and business evaluation ( Home Economic Department, 2015).



Entrepreneurship subject in high education needs to be developed as an effort to increase students' entrepreneurial spirits. The effort to increase the entrepreneurship spirit in many levels of society should be done by educational institution, one of them is in Fashion Education Study Program of Home Economics Department. Therefore, it needs a program to train the student to become entrepreneur in the field of fashion by creating instructional model. Entrepreneurship education is needed to prepare student with the knowledge, skills and motivation to be success entrepreneur in every situation. The success of entrepreneurship education is influenced by several factors, such as: learning materials, instructional media, teaching methods, learning models, classroom management, evaluation system, teachers and the student. Student-oriented learning requires learning model that accordance with the student's condition. Therefore, in Entrepreneurship education, the learning model should be chosen which can increase students' entrepreneurial spirits, include interest, innovation and creativity. Entrepreneurship education at Fashion Education Study Program applied on Entrepreneurship Subject, which give in second semester, just service theory no practice anyway, that means that the students never create anything to show their ability and productivity.

Entrepreneurship subject is one of the program which educating people to start a business and increasing knowledge, skill, to engage in a more enterprising, innovative, flexible in changing workplace environment. According Pitts (2008), to succeed, entrepreneurs need to develop their own beliefs and ideas and create a viable action plan to move these ideas forwards. Entrepreneurship service only theory to the students, less than practice.

The graduated of the study program are prepared to become teacher at Fashion Study Program at Vocational High School. Besides as a teacher, it is possible for graduates become entrepreneur in the field of fashion. Some businesses in fashion are: business couturier, tailor, haute couture, atelier, boutique, mass production, fashion education, intermediaries between wholesalers and clothing stores (Jerusalem, 2011: 15-19).. Become an entrepreneur takes a variety of skills, but the important one is the source from individual, such as interest, creativity and business skills in the field of fashion. It is necessary to serve the Entrepreneur Subject to the students of Fashion Education Study Program.

### ***Entrepreneurship***

Entrepreneurship according Frederick, Kuratko and Hodgetts (2007: 29), is a dynamic process of vision, change and creation, It requires an application of energy and passion towards the creation and implementation of new ideas and creative solution. Entrepreneurship is the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risk, and receiving the resulting rewards of monetary and personal satisfaction in independence (Hisrich, Peter, and Shepherd,,2008: 8). Kao's opinion cited by Aliyah Rashid (2005), entrepreneurship is the practice of creating value by identifying business opportunities, managing risk-taking opportunities and skills through communication and mobilizing human, so that the plan can be well done (Kao cited by Aliyah Rashid, 2005) . Drucker quoted by Kashmir (2011: 17) argued that, entrepreneurship is the ability to create something new and different.



Entrepreneurship emerges through several stages. The model of the entrepreneurship process through several stages, as described by Bygrave (cited by Buchori Alma, 2009: 10), namely: innovation, triggers, execution and growth. The emergence of entrepreneurship is driven by several factors, namely: personal attributes and personal environment factors (Buchari Alma, 2009: 12). One of environment factor which can increase the students' achievement in entrepreneurship is instructional models.

### ***Model of teaching in Entrepreneurship Subject***

The variations in Instructional Model are important to skill for a future teacher to master. Students in a class will become bored quickly if only one instructional strategy is used. For this reason, it is important for future teachers and for current ones to read and observe new teaching methods. They must self-evaluation each instructional strategy and try to comprehend which would be good for their class. They must also see which strategy would be good for their lesson. When evaluating strategies, teachers must look at what their students will be getting out of the lesson. Will this instructional strategy teach them? Will the students be involved in their education? Will this keep the students attention the entire period? All of these are important questions to ask before a teacher begins their lesson each day (Bochert, 2008). Some models of teaching can be applied in the instructional strategy, such as: Contextual Teaching-Learning, Quantum Teaching and Learning, Project Based learning and Cooperative Learning

Project-based Learning (PBL) is a model that organized leaning around projects. According to the definitions found in PBL handbooks for teachers, projects are complex tasks, based on challenging question or problem, that involve students in design, problem-solving, decision making, or investigative activities, give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations (Jones was cheated by Thomas, 2000: 1).

According to Katz and Chard (cheated by Marsh, 2008:174) a project is an in-depth investigation of a topic worth learning more about, undertaken by a small group of students within a class, the whole class or individual students. The key feature of a project is to focus on finding out answer to questions posed by the teacher or by the students. It is typically undertaken by early childhood and primary school children. Project work complements the more formal aspects of teaching. Unlike the systematic instruction which concentrated children acquiring skill, project-work concentrate on children applying skills using intrinsic motivation. There are some stages on the PBL, such as: (1) Planning the Project, (2) Conducting the Project, and (3) Evaluating the Project (Herminarto Sofyan, 2007: 302-305).

Planning the Project, in this stage, students were divided in groups, and they have to discuss about the project, collecting data from the market. Based on marketing analysed the students create new product, especially fashion product. After the students have some data about the product in the market and create new design, they discuss about produce the new fashion products. It was included in second stage, we called Conducting the Project, and the last stages was Evaluating the Project. Evaluating project means to evaluate the students' achievement in Entrepreneur Subject, by using instruments such as cognitive test, questionnaire, checklist.



Activities that will be implemented, are: (1) initial test and final test of student entrepreneur spirit before and after participating in a PBL, (2) inviting successful entrepreneur, (3) preparing reports, (4) preparing the seminar results.

During the Project-Based Learning (PBL) process, students learn from these experiences and take them into account and apply them to their lives in the real world. PBL is a teaching technique that promotes and practices new learning habits. The students have to think in original ways to come up with the solutions to these real world problems. PBL can help with their creative thinking skill by showing that there are many ways to solve the problems.

## II. THE RESEARCH METHOD

The location of research was at Home Economics Department, especially Fashion Education Study Program. By using experimental method, which provides training to implement project-based learning model the activities carried out.

The instruments were used in this research: test, observation sheets, questionnaire, cognitive test, psychomotor test were used to collect the data in instructional process. Data collecting about the instructional process in Vocational School uses questionnaire.

Pre-test – Post Test experiment design were used to know the effectiveness of project-based model. Data analyze used gain score to know the effectiveness of project-based learning in Entrepreneurship subject.

Gain score analyzed were used in this research to know the increase of students' entrepreneur spirits. The formula of gain score is:  $(g) = \frac{[(Sf) - (Si)]}{[100 - (Si)]}$  (Hake 1998). Where: (1) g : Gain score, (2) Sf : final test (post), (3) Si : initial (pre) test

**Table 1.** Average Gain Criteria

No	Average Gain	Criteria
1	$\geq 0.7$	High-g
2	$0.7 > - \geq 0.3$	Medium-g
3	$< 0.3$	Low-g

(Hake, 1998: 65).

## III. RESULT AND DISCUSSION

The obtained result is the score of student entrepreneurship achievement, before and after joining the class of Entrepreneur Subject Matter. The data was analyzed using descriptive percentage, and gain score. The results of data analyzes was as follows on table 2.

Table 2. Descriptive analysis result of student entrepreneurship achievement in Entrepreneur Subject Matter in Fashion Education study program.

No	Entrepreneurship Aspect	Percentage	Criteria
1	Pre Test Entrepreneurship achievement	77.84 %	Good
2	Post Test Entrepreneurship achievement	89 %	Very Good

(Source: Research Result)



Based on the result of descriptive analysis, it can be seen that the entrepreneurial achievement pre-test was 77.84 % belong to good category, before the students joint the Entrepreneurship Subject Matter, and after joint the program, they got 89 % belong to good category. It is because the students who participated the Entrepreneurship Subject project –based learning in Fashion Education Study Program, had good passion. It can be interpreted that they already have the entrepreneurship spirit and the ability to create new products and worth selling. It can be seen, that the results of pre-test products, and products after the program had been sold. Thus the entrepreneurship products have a good selling power.

Then the data in Table 2 was analyzed by using gain score (Hake, 1999, to determine the difference of student entrepreneurship achievement, before and after participating the Entrepreneur Subject. To find the effectiveness of project-based learning in Entrepreneurship Subject, used gain average formula, and found the average gain score was 0.5 in medium-g criteria.

The students who participated in Entrepreneurship subject given brief training on entrepreneurship to revitalize the theory they have learned before. By giving credence to the students to learn their own products, then the creativity, innovation and courage to take risks had increased. The students can create some products which had been sold in the exhibition and door to door selling.

The steps taken in developing entrepreneurship product is surveying the market, by looking at the product around Semarang State University, then student are designing similar products but with its own uniqueness. Marketing is done by visiting the shops in Sekaran and Patemon Gunungpati, Semarang, and created an exhibition.

#### **IV. CONCLUSION AND SUGGESTION**

There was effectiveness of PBL in increasing students achievement in Entrepreneur Subject Matter, and the high of the effectiveness was 0.5, medium category. It means that, there are another aspects which influence the students' achievement in Entrepreneur Subject.

The suggestions relate to the implementation and results of the research, are;

1. Need a support from department and faculty to help the implementation of Project-based Learning on Entrepreneur Subject Matter in Fashion Design of Home Economics Study Program.
2. Need a simultaneous coordination from Home Economics Department, to give permit to the students who get the duty in Business Incubator Program.

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## Attachment



Students' product: Had bags



Student's product: shopping bags





EI-03-002

## THE ROLE OF VOCATIONAL SCHOOL TEACHERS TO GROW THE COMPETITIVENESS IN ENTREPRENEURSHIP OF VOCATIONAL SCHOOL STUDENTS STUDY PROGRAM OF BEAUTY MANNER

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**ABSTRACT:** *The development of a country would be more successful if it is supported by entrepreneurs who can create their own employment opportunities. In today's era, the amount of job seekers is not balance with the employment opportunities. This situation increases the rate of unemployment in Indonesia. One of the important alternative solutions which are related to the prevention of the above conditions is to develop the culture of entrepreneurship. Entrepreneurship referred to here is not just the ability to open your own business, but how to instill the entrepreneurship to the young educated work force, so that the younger generation can change their mindset from job seekers into creating their own employment. One of the educational paths which students' have the potential to be developed to support the growth of entrepreneurship is vocational education (Vocational High School). Education is one of the solutions to improve the quality of Human Resources (HR). Therefore, it is expected that graduates of vocational school have the competitiveness in entrepreneurship. One of the components in improving the quality of human resources in educational field is the teacher. With the competences and the role of teachers in learning process, teachers can prepare students from the cognitive, affective, psychomotor aspects and also help the students to have competitiveness, especially in entrepreneurship.*

**Keywords:** *the role of teachers, competitiveness, entrepreneurship*

### I. PREFACE

People nowadays are required to work hard in order to survive, especially in this highly competitive globalization era. This kind of situation has indirectly affected the national development process in Indonesia. There are some factors that affect the national development process. One of them is economic problems, such as the increasing number of unemployment and poverty. It also causes the increasing number of a job seeker. Unfortunately, the increasing number of job seeker does not coincide with the number of the available jobs. This condition adds the increasing level of unemployed youth in Indonesia.

Data from the Central Bureau of Statistics (BPS) showed that the number of unemployment in 2010 is 9.13 million; around 450.000 among of them are highly educated (<http://www.datastatistik-Indonesia.com>, 2010). In Semarang, the number of unemployment reached 88.000 people (<http://www.republika.co.id>, accessed on 11 November 2012). The problem of productive unemployment of young generation is not only because of limited job opportunities, but also the inability of job seekers who generally do not have the requirements demanded by the industry.

One of the alternative solutions to prevent the problem aforementioned is developing entrepreneurship culture. Entrepreneurship here is not just the ability to open your own business, but also how to instill the entrepreneurial spirit to the young educated labor force, so that the young generation could change the mindset of job seekers into creating their own job.

Vocational education is a unique and specific education. The uniqueness of vocational education can be seen from several areas of expertise. Vocational education institution specifically serves the diverse needs of learners and develops their interests, talents, and potential learners. Moreover, it



simultaneously prepares the students to enter the workforce and place them on the work in accordance with their expertise.

In preparing students for entrepreneurship in the beauty field can be done by the school. One of them is through their Vocational High School (SMK) teacher of Beauty Program, since the teacher is a key element of the education system, especially in school (National Education Department, 2008:1). The teacher has a role as the critical success factor of organizational goals besides the other educational personnel. The teacher has a direct contact with the students to provide guidance in order to produce expected graduates.

Thus, vocational education is the education system which is beneficial in providing knowledge and skills for the students as a provision for entering the workforce. Vocational education is very helpful for business and industry to get a skilled workforce in accordance with the needs of industry. This may have implications for the progress of the nation in general and the welfare of the community in particular.

Based on the aforementioned explanation, it can be concluded that the graduates of Beauty Program in SMK have a big opportunity for entrepreneurship. The taught competency can be directly applied in the real world, so it is equipped the students for entrepreneurship. Entrepreneurship areas of Beauty Program graduates include: 1) Beauty Salon, 2) SPA, 3) Bridal, 4) Makeup Person. It shows that the graduates from Beauty Program have an opportunity to do entrepreneurship.

## **II. DISCUSSION**

### **Teacher**

Competence is a combination of knowledge, skills, values and attitudes reflected in the habit of thinking and acting. Wirawan (2009: 9) suggests that competence is a characteristic of knowledge, skills, and experience to do a particular job or specific role effectively.

In this case, competence is defined as the knowledge, skills, and abilities controlled by someone who has been a part of himself. Moreover, competence is defined as an ability of someone to perform professional acts effectively and efficiently. Therefore, competence is not just knowledge and skills, but also a special complex ability (Wirawan, 2009: 10).

According to Finc&Crunkilton (1999: 259), competencies are those tasks, skill, attitudes, values, and appreciations that are deemed critical to success in life and/or in earning a living. Moreover, Mardapi, et al (Muslish 2007: 15) argues that competence is a combination of knowledge, ability and application of these two things in carrying out tasks in the field of employment.

Johnson (Sanjaya, 2007:17) suggests that competency as rational performance wich satisfactorily meet the objective for the desired condition. According to him, competence is rational behavior in order to achieve the objectives required in accordance with the expected condition. Thus, a competence is shown by the appearance or performance.

According to National Education Department (2006: 2), competence is unanimity mastery of knowledge, skills and attitude displayed through performance. Teacher competence can be interpreted as



the roundness of knowledge, skills and attitudes that tangible action intelligent and full responsibility in carrying out the tasks of a learning agent.

A competent professional should have the knowledge, abilities, skills and attitudes that can be displayed in his work. It is the indicator that can be used as a benchmark to measure a competency level of the teacher.

Teacher competence in teaching is something very important, because the teacher is a component that determines the success of the learning process in schools, including teaching hairstyling subject at SMK. So the competence of Beauty Program teacher is the ability in mastering the knowledge, skills, attitudes, and values about the basic of Beauty Program are reflected in daily life.

WinaSanjaya (2009: 144) argues that the professional teachers will always strive to achieve optimal results. They will not be easily satisfied with the results achieved. Therefore they will always learn to increase knowledge and improve the abilities and skills. The teacher should be in charge of good teaching material with clear illustrations and a foundation established, and can provide contextual examples.

Teachers should always update, master and prepare themselves for the material of subject presented. Preparation of the material can be done by looking for information through various sources such as reading the latest books, internet access, updating the latest advances in the materials presented, joining workshops, and doing some research.

### **Teacher's Role**

Teacher has a strong role in growing readiness, because the teacher is the one who communicate directly with the students and become a preference for students. Therefore, the quality of teachers, in terms of capabilities, breadth of knowledge, and mastery of theoretical and practical knowledge required. Here, the role of a teacher as facilitator, innovator, motivator, can be played.

Teacher as a facilitator. The teacher acts as someone who provides facilities for the students so that what is desired can be achieved. A teacher should be able to encourage, stimulate, and provide a stimulus to the student to be able to optimize the intelligence and skill, but still responsible.

Teacher as an innovator. Teacher translates past experience into a meaningful life for students. In this case, there is a wide gap between generations, so the experiences of our parents have more sense than our grandmothers' experiences. Nowadays, a learner is psychologically far away from the human experience that must be understood, digested and embodied in education. The task of the teacher is to translate policy and this valuable experience into modern terms or language that will be accepted by learners. As a bridge between the old and young generation, who is also the translator of experience, a teacher must be an educated person.

Teacher as a motivator. In learning, motivation is necessary because someone who is not motivated in learning will not be possible to do learning activities. The learning process will be successful when a learner is motivated to learn. Therefore, the teacher needs to motivate the learner. To obtain the optimum learning, teacher is required creative arouse students' motivation, thus it can be formed the



effective learning behavior of learner. In general, there are two kinds of motivation; intrinsic and extrinsic motivation.

The role of SMK teacher in this era is becoming very important. They are expected to develop all the existing potential to develop all aspects of learning. Related to the entrepreneurship readiness, a teacher is not only preparing student to be worker but also to be entrepreneurs.

### **Entrepreneurship**

In accordance with one of the SMK purposes, preparing student to become productive, to be able to work independently, to fill vacancies in the industrialized world as middle-level manpower, in accordance with competence in the chosen program (National Education Department, 2004). In the mission of SMK, it is noted that the students are prepared by the institution to become a productive human and to be able to work independently, creative and professional in accordance with the standards of competence.

The readiness of entrepreneurship is the spirit of a person (student) which expressed through creative and innovative behavior and attitude to perform an activity. The purpose of the readiness of entrepreneurship is how to transform spirit, attitude, and behavior of entrepreneur. Based on the definition and characteristics of an entrepreneur, the author assumes that the readiness of entrepreneurship in the field of hairstyling will be realized properly if a student is: (1) creative, (2) innovative, (3) having commitment and (4) competitive.

#### 1) Creative

Creative includes aspects of creating something new, the process of idea invention, thinking of something new and unusual, having a lot of ideas, etc. Manifestation of creativity in the field of hairdressing, for example, is different styles of the hairdressing from well-known hairdressers which always show certain characteristics.

#### 2) Innovative

A student of Beauty Program in SMK should have dreams and goals for entrepreneurship in the beauty field. They must be supported by the innovation, because innovation is a hard work, breakthrough, and continuous improvement. Examples of innovation behavior are laboratory medicine and cosmetics that continues to do research and experiment to find the latest medicine or cosmetic that gives benefits to society.

#### 3) Commitment

A student who wants to be successful in learning must be accompanied by a strong commitment to learning. For example, a student of Beauty Program prefers to drop out from school just because they could not follow the beauty practice. It is not committed to what has been attempted.

#### 4) Competitive

Everyone who wishes to become an entrepreneur should enrich themselves with a variety of personal skills. For example, an owner of a beauty salon should have the hairdressing ability.

Eugenia Petridou argues that women who what to start their own business face many obstacles economic and social, mainly due to the lack of support, information, knowledge, and skill. It shows that



an entrepreneur needs a support, information, knowledge, and skill. Moreover, Goldstein (2000: 7), states that technical skill, knowledge, and ability are those areas of expertise which workers must have in order to perform a given occupational task with excellence. A collection of skill, knowledge, abilities and tool make up competencies. skill refer to proficiency in an applied activity. This activity could be physical, mental or interpersonal in nature. Knowledge is a particular set of information. Ability is broad human characteristics that result from natural talent, training, or experience. Tools are materials, equipment and implement a worker must be able to use competently to meet the requirements of the job.

From the above opinion, it can be interpreted that the technical ability, knowledge, and ability is a set of skills that must be possessed by a worker, because it would refer to competence. Skill is an expertise in doing particular activity either physical or mental. Knowledge is a set of specific information. Ability is a wide human characteristic that can be obtained through talent, practice or experience. Tool is the implementation of a work-related competence.

Based on the experts' opinion, it can be concluded that the readiness of entrepreneurship in the field of hairstyling is a change of a student behavior that includes cognitive, affective and psychomotor in the field of hairstyling that can be used as an asset for entrepreneurship later.

#### a. Cognitive Aspect

Cognitive aspect is an ability to think, which includes the ability to remember, understand, apply, synthesize, analyze, evaluate, and be creative. The most important cognitive ability is applying concepts to solve existing problems. Therefore, each learning activity should have examples of using existing concepts or principles in practical subjects.

To determine the cognitive readiness of hairstyling subject student, the author makes an assessment. The assessment used is the written test which is arranged in the form of multiple choices. The preparation of this cognitive test questions is focused on the knowledge, understanding, and application of hairstyling that student got during the class.

As a provision for entrepreneurship, student should be able to understand and apply their knowledge of beauty hairdressing, such as hair shampoo, scalp and hair treatment, hair drying, haircut, hair styling, hair curling, hair coloring, hair piece, hair styling, up style, traditional up style, barber cutting, rebounding, and smoothing.

#### b. Affective Aspect

According to Krathwohl&Blomm (1973:95), affective domain is a domain that is associated with attitudes, values, interest, appreciation and adjustment of social feeling. Type of affective learning outcomes can be seen in a variety of student's behavior such as attention to the lessons, discipline, motivation to learn, appreciating teachers and classmates, study habits, and social relationships.

#### c. Psychomotor Aspect

In the beauty field, psychomotor aspect is a very important aspect. Here, student is not only required to have cognitive aspects, but also psychomotor aspect because it is a provision aspect for student entrepreneurship. The enterprises will not be good if student does not have skill of hairstyling.



Based on the description above, it can be concluded that the readiness is a unit that consists of cognitive, affective and psychomotor. It means that student is ready for doing entrepreneurship if they have beauty field competence in knowledge, self-confidence and cosmetology skills. The courage to open a beauty field business can not be separated from the role of the teacher.

### **III. CONCLUSION**

The teacher's role in growing the entrepreneurship readiness for the student is necessary, because with the help of the teacher, student will have a better understanding of the skills that support entrepreneurship. The role of Vocational High School (SMK) teacher in helping student in growing the entrepreneurship readiness can be done in the daily learning activities. It can be successfully done because of the teacher's role as a motivator, innovator, and facilitator.

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EI-03-003

## STUDY PROGRAM CURRICULUM DEVELOPMENT MODEL HOME ECONOMIC EDUCATION (PKK) CANDIDATE FOR SECONDARY SCHOOL

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**ABSTRACT** :Study Program PKK is the only study program in the FT UNNES achievers obtain the value of accreditation during the second period and is valid until 2019. Since the fall of the permit separation of Higher Education Prodi Prodi in 2014, S-1 PKK majors PKK is not allowed to accept students because of the unavailability of a specific curriculum for Prodi PKK. The many achievements of official study programs and their academic status and supported curriculum in 2013 in particular craft and entrepreneurial Prodi likely to remain open Prodi PKK is preparing prospective teachers in secondary schools in particular craft. It is necessary to the development of a model curriculum for prospective teachers Prodi PKK secondary schools with the aim to describe the PKK Prodi curriculum that exists today in other universities, in a model curriculum Prodi PKK which will be developed and determine the feasibility of the curriculum department of the PKK in the future. The research approach uses research and development (R & D). The method of collecting data by observation interviews, questionnaires and documentation and do the validation / assessment by the user and FGD. Results showed that the survival and development department of the PKK in UNJ and at UPI with the characteristics of each according to the vision, mission and objectives as well as the provision of competence and achievement of the intended learning. Prodi PKK UNNES curriculum model developed in 2015 with input alumni, user, Organizer, tailored to the needs of the curriculum in 2013 by targeting the chance to become a teacher SMP / MTS, SMA / MA for craft and entrepreneurship subjects, SBK, and mulok and empowering communities and entrepreneurs. Prodi PKK curriculum that was developed in 2015 and earned a decent used good judgment by 57.14%, and the excellent assessment of 7.14% by the users, especially of leaders and teachers as well as teachers' craft and entrepreneurial skills. Eligibility is measured based on the respondents' assessment of SMP (MTS) and SMA (MA) in Semarang and Pekalongan of rational aspects, specifications, benefits, effectiveness, prerequisites, practical and overall feasibility assessed the overall impression is good and fit for use. Based on the results FGD held in majors PKK curriculum model developed has the support of all parties including leaders of the Faculty (PD1) and the leadership of departments and lecturers to be realized admit students and there is some input in the form they need penyempurnaan subjects, the concentration, the content of the syllabus andeyes college.

**Keywords:** Development, Model Curriculum, Prodi PKK, Master craft and entrepreneurship, Secondary Schools

### I. INTRODUCTION

Study Program Educational Home Economic( PKK)Educational in departemen Edicational Home Economic (PKK) FT UNNES TJP is the only study program in the FT UNNES has scored achievements accreditation from BAN-PT during the second period in 2009-2014 and the PKK during this 2015-2019.Prodi klatur registered in the number of science courses in Higher Education. Several former University Teachers' Training College until now remain open and accept students study Program PKK is preparing prospective teachers in junior and senior high school or vocational social and art. In 2015, since the inauguration of two chief education courses dressmaking and education Catering Prodi S-1 PKK majors PKK is not allowed to accept students and no quota admissions due to the unavailability of a curriculum specific to Prodi PKK and has not provided the data base of the curriculum in SIM SIKADU.UNNES.ac.id.



The many achievements of the study program and their official status academically and supported the development of the curriculum in 2013 in particular craft and entrepreneurship as well as program development lifeskill in the field of food processing, textiles, handicrafts, batik, and so on to junior high school, high school, and in the community an opportunity majors and the PKK to immediately open Prodi Prodi PKK is preparing prospective teachers in secondary schools and high schools with lifeskill provision for it should follow a curriculum. Based on this background, the need to research on the development of a model curriculum Prodi PKK for prospective secondary school teachers with the aim to describe the curriculum department of the PKK, which exists today in other universities, in a model curriculum Prodi PKK which will be developed and determine the feasibility of the curriculum department of PKK future which will come.

## **II. LITERATURE REVIEW AND HYPOTHESES PEGEMBANGAN (IF ANY)**

Products are lulusan. Lulusan college to be accepted by the workforce must professional. Guru PKK in middle and high school is one result of PKK FT UNNES Prodi product. Teachers say if kompeten professional in his field, having basic competencies al: ndustry competence, competence issues / personality, ndust competence, and professional competence acquired through professional education. (UU.No.14 Th 2005 Art 8 and 10). Menuru Higher Education in the 2008 guide curriculum development curriculum development process starting from the level expected from the vision of the university, university of learning outcomes, learning outcomes Prodi, lectures learning outcomes and learning outcomes in class.

Step - step curriculum with competency-based approach in Higher Education (2013: 48) includes the preparation of the graduate profile, determining the competence of graduates / performance learning study programs (learning outcomes), the determination of the study materials, the determination of the depth and breadth of the study, stringing various study materials into the eye lectures, structuring the curriculum, develop a learning plan, and choose the method.

One way that is often used in the preparation of a curriculum based on curriculum-based content (content base curriculum) starts from the determination of educational objectives and then translated into a number of subjects organized into semesters based on the structure / logic sequence of a science that is studied according to the level of complexity and difficulty. Furthermore compiled syllabus / instructional materials each course

Based on the regulation of the minister of education and culture the number 68 in 2013 on the basic framework and structure of the secondary school curriculum / madrasah tsanawiyah. One of the basic competencies that must be achieved by students are covering the basic competence craft from grade 7 to grade 9 includes crafts, engineering, aquaculture, processing. Students are expected to have basic competencies of designing, creating, and capable of modifying and packing the various work products from materials provided local environment. Based modules for junior crafts include making batik, accessories and crafts from natural materials (soil, plants, animals) and artificial (straw, gisum, glass, fiberglass, wax), wicker, ceramic. Aquaculture involves planting medicinal herbs, vegetables, animal





husbandry students are expected to have the competence to practice the cultivation of vegetables and medicinal plants in accordance with plant media in the local area. Processing is expected to design, create, present, and pack a variety of food and drinks were fast and able to make processed food and non-food forms the basis of the craft.

Based on the Regulation of the Minister of Education and Culture No. 69 of 2013 on the structure of the curriculum, 2013 in High School students are required to take subjects craft and entrepreneurship of class X sampai XII class competencies expected is to have the basic competencies of designing business and making various handicraft products made from hard and soft appropriate potential and opportunities in the local area to develop local craft businesses. Designing and practicing cultivation of food crops according to the needs and approach to the local culture. Basic competence processing for high school students is to have the concept of entrepreneurship and able to design and make the work of processing vegetable and animal materials in the local area.

In this study, high school is focused on the junior high school and high school. Regulation of the Minister of Education and Culture No. 69 Year 2013 On Curriculum Structure 2013 In high school students are required to take subjects craft and entrepreneurship of class X sampai XII class competencies expected is to have the basic competencies of designing business and making various crafts products daribahan hardware and software according to the potential and opportunities in the local area to develop local craft businesses. Designing and practicing cultivation of food crops according to the needs and approach to the local culture. Basic competence processing for high school students is to have the concept of entrepreneurship and able to design and make the work of processing vegetable and animal materials in the local area

In 2014 by Asih et al, have done research needs PKK material development in middle and high school teachers with respondents PKK and FGDs indicate the need for material development is also required in addition to life skills and resilience of family welfare science. In 2008 and 2015 the PKK Prodi majors TJP FT UNNES received accreditation achievements with an A valid until 2019 it was a feat advantages and benefits of the majors and Prodi compared PKK

### **III. RESEARCH METHODS**

#### **3.1 Research Approach**

The approach used in this study using Reseach And Development (R & D) is to conduct preliminary research for development

#### **3.2 Location and Research Subjects**

This study is a research and development, conducted a needs analysis and then compiled a curriculum model with expert validation and PKK curriculum as well as through focus group discussions involving faculty PKK, led majors and Prodi and leaders of the Faculty

#### **3.3 Object Research Will be Investigated**

In accordance with the purpose of research which has been stated before, the object of research which will be examined as follows:



3.3.1 Overview Prodi PKK curriculum at UPI and UNJ current

3.3.2 Feasibility study program curriculum model developed PKK before being applied in the majors TJP UNNES

3.4 Data Collection Methods

Data were collected by interviews and observations as well as documentation and FGD .and through a structured questionnaire with four alternative answers, but does not rule out the possibility for alternative answers to open.

3.5 Data Analysis Techniques

Data analysis was done using two methods, namely 1) deskriptifkualitatif and descriptive-interpretative data from a structured questionnaire and open (Ali, 1993).

#### **IV. RESULTS AND DISCUSSION**

4.1.1 ANALYSIS OF DIFFERENCE IN UPI PKK Prodi CURRICULUM AND UNJ

Based on the description of the curriculum department of the PKK in the UPI and UNJ above, it can be analyzed that the General Courses (MKU) UPI or Personality Development Course (MPK) in UNJ have a common course structure. But in the course of expertise have some differences. Among the subjects of expertise required in UNJ has a charge courses Research Methods Family (Family Research Methods), Anatomy Physiology (Anatomy Phisiology), Nutrition and Growth (Nutrition and Growth), Planning Food and Nutrition (Food and Nutrition Planning), Basic bread and Cake (Basic Pastry and Bakery), Food Preservation, Construction Patterns Dress (Pattern Konstruction), Production Clothing (Clothing Productions), Gardening (Gardening), Grooming, Care and Makeup face and hair (face and Hair Treatment and Styling) , Character Education, Family Counselling, Gender and Family while in the UPI there are these courses. But in the UPI has several courses also are not contained in the curriculum structure in such UNJ Service Excellence, Entrepreneurship, Children's Apparel, Food Toddler, Family Communication, Obstetrics and Paediatrics and Family Counseling.

In the course membership options are also differences. In the structure of the curriculum at UNJ elective courses are offered only work related skills courses hidang governance and international food and course work berkehidupan KKN be elective courses. While the structure of the curriculum at the UPI has more elective courses variatif.Terdiri of: Social services (Drug Victim Services, Psychosocial Children and the Elderly, Social Therapy, Management Institute for Children's Services and the Elderly, Games Educational Tool Design, Education And Care Baby Sitter giver), Housekeeping (Houseman Section, Management Flax Graha, Structuring Guest Room, Funtion Room, Management Tools Graha Services House Keeping), Craftsmanship (Batik, Handicrafts Graphic, Craft Weaving, Weave, Crafts Knitting, Handicrafts Embroidery), family life education (Guidance Marriage, and the family Health Care, this Keluarga.Bagian Lifespan development presents the results of research

4.1.2 Model Curriculum Prodi PKK PKK in the Department of FT UNNES

Curriculum Development study Program PKK UNNES based on the existence study Program i PKK in UNJ and Upi, the effectiveness of the curriculum in 2013, input alumni, as well as realistic

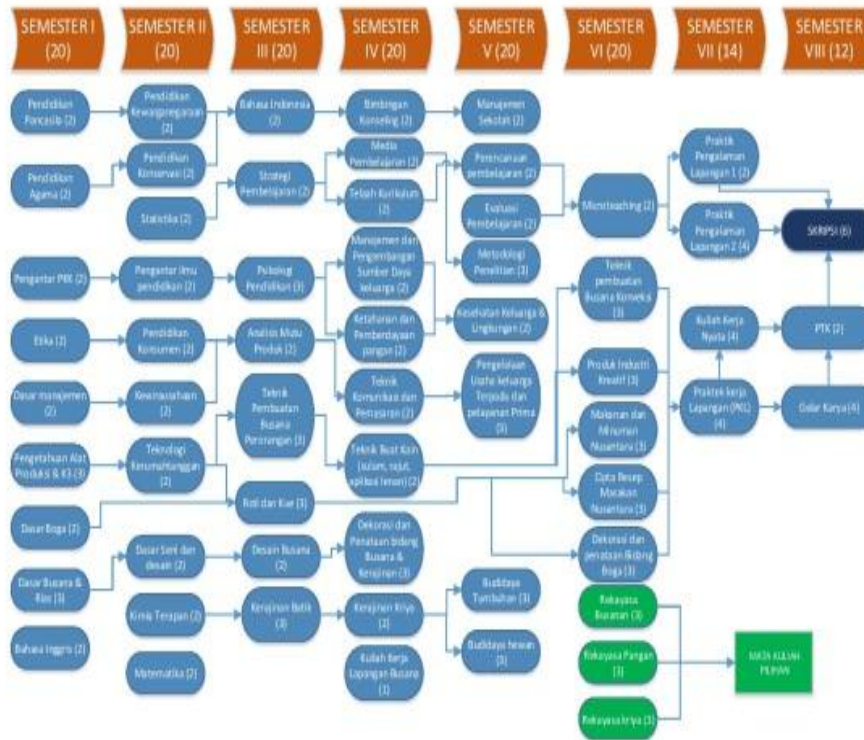


conditions Prodi, which until now legally obtain the value of accreditation in the second period until 2019 if it is left to the achievements that have been achieved will be lost and if in two years did not accept students then it will disappear itself permission to admit students. Judging from the Scientific, infrastructure and human resources have sufficient availability of lecturers Tata boga even load still slightly so that it becomes a solution. The results showed the high demand of users (SMP / MTS, SMA / MA) to meet teachers' craft and entrepreneurship, mulok, and skills

.Profil descripts in present study program PKK 2015

profiles	profile descriptions graduates
formal education teacher (junior high school)	teachers of subjects craft and entrepreneurship, Mulok, SBK, skills in secondary School (SMP / MTS, SMA )
Educators non-formal education channels	Instructor vocational education institutions, vocational training centers (LPK, BLK ) and the field of family welfare
Family consultant, educator , in agencies government and private	Konsultan, Pendamping dan pemberdaya masyarakat consultants, Facilitators and community empowerment
Researchers science Assessor family welfare problems in the field of family welfare covering	Study the problems in the field of family welfare covering education and community development, engineering, crafts, food, and aquaculture as well as publish scientific papers
Entrepreneurs in the field of handicrafts, clothing, food processing	Opening the business of production and services in the field of creative industries al: crafts, food and clothing

PETA SEBARAN MATA KULIAH PER SEMESTER PRODI PKK S1



#### 4.1.3 Description Feasibility By 13 Secondary School Curriculum

The respondents' assessment of the feasibility of the curriculum department of the PKK before being implemented include rational aspects with real needs, specific courses, benefits, effectively, the prerequisite condition, practical, feasible and overall impression.

Calculation of respondents describe that most gave the curriculum properly so unfit for use even though there are three schools that provide ratings quite that SMA 1 Semarang, SMA N 2 and High School Ungaran due to environmental conditions and input illustrating that learners prefer competence craft towards discipline physics, ICT and Biology not craft it is caused mindset of students who prefer products that are technologically and more concerned with entrepreneurial spirit. The description of the feasibility of the curriculum of 13 secondary schools in the below table:

**Table.** Description of the feasibility of curriculum

Category	F	%
Very Good	1	7,14%
Good	8	57,14%
Quite	5	35,71%
No Good	0	0,00%
Very Not Good	0	0,00%



## Description of the FGD Study Program PKK Development Curriculum Model 2015

FGD curriculum model Prodi PKK held in October involving leaders of the Faculty, Department, Development Team Prodi PKK and lecturer of the PKK in order to have a common view and provide feedback and provide support so that the curriculum developed more feasible accepted by users and as an organizer of similarity has work commitments strong and high. FGD was attended by 18 people comprising leaders of the faculty (Assistant Dean 1 (academic), Kaprodi, Kalab, lecturer Catering and Lecturers dressmaking. FGD results indicate the existence of an agreement to keep preserve continuity Prodi PKK and develop the curriculum department of the PKK under the conditions of the institution and the demands of the users. the curriculum department of the PKK, which is developed in general can be filed and disseminated in the leadership as the material receives students. some things are still of concern is the number of courses and course descriptions comments and input as well as the need for a strategy for academic qualification in accordance with the qualifications required in the system of acceptance CPNS. Some of these studies still need to be developed and need improvements subjects and descriptions include: first, the need to study materials structuring household appliance suitable opportunity, and course technology kerumahtangan fixed into TLRT (Procedure domestic), the second study materials cultivation of both plants and animals into one course 4SKS cultivation of crops and animals, all three need material / tourism studies. and four subjects craft into kriya.

## V. CONCLUSION

- 5.1 1. The existence of PKK in UNJ Prodi and UPI and their curriculum in 2013 into an opportunity and incentive to develop Prodi Prodi PKK PKK. The curriculum department of UPI and UNJ PKK has many advantages, equations and also differences into consideration the source and in establishing and developing the curriculum department of the PKK in UNNES.
- 6.1.2 Model Prodi PKK curriculum that was developed in 2015 had a load of 146 credits for 8 semesters with three elective courses and prepared especially for printing prospective educators in SMP / MTS, SMA / MA eye peajaran skills, mulok, craft and entrepreneurship refers to the guidelines drafted based curriculum in UNNES KKNi and conservation as well as referring to the outcome of the preparation LO in Jakarta and in UNY defined and developed by Prodi PKK se Indonesia.
- 6.1.3 Curriculum Prodi PKK developed in 2015 and earned a decent used good judgment by 57.14%, and the excellent assessment of 7.14% by the users, especially of leaders and teachers in school.



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**EI-03-004**

## **THE INTEGRATION OF ENTREPRENEURSHIP LEARNING INTO OTHER COURSES TO STABILIZE ENTREPRENEURSHIP SKILL**

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**ABSTRACT:** *Entrepreneur's role in the development of a country has been proven in some countries. For example in Japan after Hiroshima and Nagasaki's bombing which shattered the country. However, the Japanese did not give up and showed their spirit in building the country so that it became one of the developed countries in the world. There are at least 2% entrepreneur in the developed country, whereas, in Indonesia there are only 0.18% entrepreneur. The impact is that the national economy of Indonesia stays in low level. The education system in Indonesia has included entrepreneurship in the curriculum. However, the implementation has not been good enough in which most of the learning process focus on how to foster and improve entrepreneurship spirit, so that the result is not satisfying yet. Besides, Indonesia has implemented AFTA (ASEAN Free Trade Area) and AEC (ASEAN Economic Community), where one of the impacts is that labors are free to enter a country. If the human resources in Indonesia do not improve, Indonesians will suffer in their own country. One thing that can be done is by integrating entrepreneurship course with other courses. The spirit of entrepreneurship will not be the only thing that is improved. They will also know more about entrepreneurship that will be useful in the future.*

**Keywords:** *integration; course material; entrepreneurship.*

### **I. INTRODUCTION**

The future of a nation depends on the quality of human resources. Excellent human resources can be realized through an education in family, society, and educational institution or school. An education system which is responsive towards time changing is needed. It can be started from elementary education, intermediate education, and higher education. Therefore, Indonesia can be excellent in quality, able to compete, and does not left behind in this growing global era.

The number of unemployment in Indonesia every year is still high. It can not be denied that most of the unemployment is college's graduates. Why does it happen? It happens because there is a lack of job opportunity where the number of the labor force is high while the number of the job field is not enough. How do Indonesians face AEC in such condition?

ASEAN Economic Community (AEC) is an economic cooperation between ASEAN countries organization. AEC is an economic integration in ASEAN in the form of agreement to create a free trade area, where there is no tariff barrier (excise tax) for the member countries. It is resulted in a free competition of goods, services, investments, and labors in ASEAN countries. AEC is not a barrier to create Indonesia as a prosperous country, but as an encouragement to improve the competitiveness of Indonesia's human resources.

There are at least 2% entrepreneur in the developed country, whereas, in Indonesia there are only 0.18% entrepreneur. The impact is that the national economy of Indonesia stays in low level. The education system in Indonesia has included entrepreneurship in the curriculum. However, the



implementation has not been good enough in which most of the learning process focus on how to foster and improve entrepreneurship spirit.

Education is a tool to galvanize the human resources becomes the excellent one. However, the result of the implemented education is not satisfying yet. There are some inadequacies in the result; one of them is the high number of unemployment that comes from college's graduates. The process of improvement in education is happening continuously. For example is by fostering and improving the entrepreneurship spirit.

The material about entrepreneurship is stated in Presidential Instruction No.4 year of 1995. However, in its implementation, entrepreneurship is taught as a concept only or the material is not integrated with other materials. The values of entrepreneurship are implemented directly in the learning process of other courses. Therefore, hopefully entrepreneurship values can be internalized and attached to the students. A supporting system is needed to make it happen.

## **II. DISCUSSION**

### **A. Curriculum**

Curriculum is the core of an education. It determines the direction for the students. According to Law No. 20 year of 2003 about National Education System, curriculum is a set of plan and arrangement about purpose, content, learning material, and method as a manual of the implementation of learning activity to achieve certain goals.

The high number of unemployment shows that the on going education system in Indonesia is not satisfying yet. The process of improvement in education is happening continuously. Curriculum management is needed to be done in education process so that the planning, implementation, and evaluation can be effective, efficient, and gain optimum result.

According to Malayu S.P. Hasibuan (1995) in his book entitled "Manajemen Sumber Daya Manusia" stated that management is science and art in regulating the utilization process of human resources and other resources effectively and efficiently to achieve certain goals. Therefore, management is a need which eases the process of achieving goals in organization, also managing some organization resources such as infrastructure, time, human resources method, and others effectively, innovatively, creatively, and efficiently. It can be said that curriculum management is a comprehensive and systematic system of curriculum arrangement in order to achieve the goals of curriculum.

The functions of curriculum management are:

1. Improving the efficiency of the utilization of curriculum resources; the empowerment of resources and curriculum component can be improved through planned and effective management.
2. Improving the relevance and effectiveness of learning in accordance with the student and environment's need; curriculum which is managed effectively gives a chance and result that is relevant with student and environment's need.





3. Improving the effectiveness of the lecturer and student's performance in achieving the goals of learning. Curriculum which is managed professionally, effectively, and integrated motivates the lecturer and student's performance in learning.

The content of curriculum is courses of each semester according to student's needs and ability. The distribution of the courses is arranged to ease the integration of value or entrepreneurship character. For example in Family's Welfare Education Department (PKK), Continental Food Processing course is taught in the same semester as Dining Service course.

## **B. Entrepreneurship**

Entrepreneurship is an attitude, spirit, and ability to create something precious and useful for her/himself and others. Entrepreneurship is a stance which is active, creative, inventive, homely, and attempted to increase the revenue in business.

Entrepreneurship course is needed and important in order to realize Indonesia as a prosperous and tranquil country. The result of entrepreneurship learning hopefully can be an encouragement to strengthen the national economy of Indonesia.

Entrepreneurship is a translation from French which is then accepted by English and Bahasa Indonesia. Entrepreneur is translated into *wirausaha* or *wiraswasta* in Bahasa Indonesia. In some Indonesia literature, the terms *wirausaha* and *wiraswasta* have the same meaning. In Indonesia Dictionary, the two terms have no difference in meaning.

Entrepreneurship is not only used in private company, but also in cooperation, educational area, and Stated-Owned Enterprises (SOE). Therefore, entrepreneurship is not a monopoly of private company. As a result, the universal term of "entrepreneurship" is emerged.

The term "entrepreneur" according to Burch is someone who does not only run or lead a company well, but also someone who has initiative to develop his/her business by using or creating new job fields.

Entrepreneurship is a good ability to work with a spirit of independence, including courage to take risk in business and minimalize the risk into profit. John G. Burch translated *entrepreneoire* which means take a role and chance; fulfilling the needs and wishes through innovation. He/she should take into account of the risk carefully. Some entrepreneurship principles, according to Burch, namely the ability to think and act creatively and innovatively, work carefully, diligent, and productive. These characteristics are able to encourage the individual to take role and control his/her resources into a productive process.

An entrepreneur must be someone with a foresight, careful thinking, and able to choose from some alternative of problems and solutions. An entrepreneur has some characteristics as stated by Buchari Alma (2001:39). The characteristics and nature of an entrepreneur are explained as follow:

1. Confidence

Confidence is a belief to do something based on his/her ability and potential. With confidence, an entrepreneur will be able to do something to develop his/her business.

2. Task and Result-Oriented



Task and result-oriented means an entrepreneur needs to have excellent achievement. He/she always wants to be better to achieve his/her goals. Determination, perseverance, and fortitude are needed in business.

### 3. Risk Taker

A risk taker is someone who is able to make or take a decision in uncertainty situation, while considering the chance to be successful or fail. The development of a business requires an entrepreneur to be courageous in making decision and ready to take all the risks, also ready to face a failure.

### 4. Leadership

A successful entrepreneur is a successful leader. Essentially, an entrepreneur is a leader who finds opportunities, gathering human resources, and collecting funds for doing project. In addition, an entrepreneur also leads his members to reach the goal they want. Therefore, an entrepreneur should be able in motivating and maintaining a good communication with their employees, understanding the prior necessity of their employees, and involving the employees in reaching the missions and targets of the company.

### 5. Originality

Originality is related to creative and innovative ideas. In order to do that, an entrepreneur should have a wide knowledge and many networking.

### 6. Future-oriented

Future-oriented, is a motivation of improving capability and performance realized by doing an activity which results is needed in the future whether in a short, medium, or long term period.

There is a correlation of characteristic between one entrepreneur to the others. These characteristics should not be possessed by the entrepreneurs completely. This characteristics and nature is shown by entrepreneurs with behaving and doing something. These characteristics and nature can be identified in their daily live, for instance:

#### 1. Discipline

Discipline is the entrepreneurs' commitment accuracy in doing their job. This accuracy is completely related to timing, working quality, working system, etc.

#### 2. Honesty

Honesty is the basic morality which is frequently forgotten by entrepreneurs. Honesty is complex. Honesty are shown by entrepreneurs in portraying the product characteristics (service and goods) offered, in doing the promotion, in executing the post payment services promised, and in the whole transaction of product selling done by entrepreneurs.

#### 3. Creative and Innovative

Entrepreneurs should have high creativity in order to win the selling competition. This creativity should be based on futuristic mindset with new ideas that is different than the product existed in the current market by being market oriented.



#### 4. Independent

Someone is called “independent” if he/she is able to do something good without any dependency to other people or stakeholders in decision making, including independently financed and not depended to other people.

#### **C. The Integration of Entrepreneurship Values**

Learning process is an essential part of learning. By this statement, teachers are required to teach and empower their students. So, the knowledge given to the students is not only factual, conceptual, and rigid, but the knowledge is flexibly constructed by the students with the help of the lecturers. This thing is in line with the modern learning theory of Peter Sheal (Erman, 2004:7), saying that meaningful learning reach 90% of the learning goals by doing-experiencing and communicating approach.

Current entrepreneurship lesson is not enough to enter the value of entrepreneurship to the students. It is because of entrepreneurship lesson is limited under the conceptual teaching method. In order to make it realized by the students, entrepreneurship lesson should be integrated to other lessons, so, the entrepreneurship education can be fully internalized in all theory and practical lesson. The integration of entrepreneurship values is adapted with the material existed.

Entrepreneurship lesson is directed to three basic competences, the entrepreneurship characters' integration, understanding of the entrepreneur skill and concepts. The integration of entrepreneurship education is undergone in the steps of planning, executing, and evaluating, which is included into the syllabus and lesson plan made by the lecturers. The learning principles used in the development of entrepreneurship education is aimed on making students understand and accept the entrepreneurship value so that they can be responsible on every single decision they make. The process of the students understanding flows with thinking, behaving, and doing. These three process is developing the ability of the students in doing the activity related to entrepreneurship value.

Basically, the learning activity is projected to make the students able to master the material given and make the students understand, aware, and internalize the entrepreneurship value in their life. These steps is done by integrating the entrepreneurship values in other lessons. The integration of character or entrepreneurship values and skills can be executed in the learning process or in the evaluation. The integration process can be done if the current curriculum supports it.

Curriculum is arranged for placing lesson in each semester as what the students need and able to cope. For instance, Continental Food class and Plating class is given in the same semester. Before the lesson started, syllabus and lesson plan has been created with the integration of entrepreneurship values or characters. In the learning process, the students' food made in Continental Food class will be used as the menu in the Plating class. The students are required to make and serve a delicious continental food because this food will be sold to the students who attend the Plating class. The character or the values of entrepreneurship in the students of Continental Food class is creative and innovative in which the students is trying their best in serving their delicious food in the plating. Never giving up, it means the students will try their best to achieve a good result and redo it again if they are failed. In one group, each member



will work together to serve their most delicious dishes. Besides succeeding in internalizing those values and characteristics to the students, the students are able to become an entrepreneur by selling their product.

### III. CONCLUSION

Indonesia's economy is not really developed. It can be proved by the existence of many unemployment or people who are not maximizing their potentials. This is because the values and characteristics of entrepreneurship is not internalized to those people. They are stucked in the comfort zone of finding job and doing their job.

Globalization is always moving fast. If there is nothing change, Indonesia will be left by other countries. Therefore, Indonesia should fix their human resources through education whether in their family, society, or in any educational institution, too.

The working ages in Indonesia is high with limited job field. So, the mentality of finding job should be change by creating a job field instead. Entrepreneurship education really supports the increasing number of job field in the country. But, the current entrepreneurship education is not enough by its conceptual teachings.

The entrepreneurship materials should be integrated in the learning process to make students able to realize the value. The integration itself can be done in the other lessons. The values and characteristics of entrepreneurship will be attached and internalized in every single student. They will be creative and cooperative. Besides, these values are also projected in students' practical lesson which enables them to become entrepreneurs. Wherever they are working after graduated, they can perform their entrepreneurship skill well.

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## **ENTREPRENEURSHIP EDUCATION AT SENIOR EDUCATION SCHOOL AND CHALLENGES ENTREPRENEUR NEED IN INDONESIA**

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**ABSTRACT:** *The objective of this article is to contribution ideas on the implementation of entrepreneurship at Senior Vocational Education. The problems formulated are: 1) there aren't many students who are interested to become entrepreneurs; 2) has not been a lot of graduates who go directly into self-employment; 3) Schools have limitations in organizing entrepreneurship education. The result of analysis show that: 1) need special strategies to overcome the lack of graduates who become entrepreneurs; 2) the need for strong alumni network and the need for school to empower the alumni through activities related to Entrepreneurship Education.*

**Keywords:** *entrepreneurship education, senior vocational school, the alumni network, empowerment of alumni*

### **I. BACKGROUND**

Challenges Indonesia become a developed nation and a prosperous proper national principles that should always be sought and fought for. To realize this business sector needs to give both large, medium, small or micro enterprises.

There was no denying the role of business in the nation's progress is very large. In developed countries, there is always a large industrial company or a global scale that supports the country's progress. Entrepreneurship education is essentially encouraging create people who are creative, innovative and resilient in running a job or develop a business / company. The more people who have an entrepreneurial spirit, means more chances to reproduce and support the tough business world in a variety of scales.

The fact found in Indonesia the number of business and business scale has not been encouraging. By entering the informal sector, the number of businesses is not large when compared to the total population. The level of entrepreneurship has ever measured, by Muhammad (1992) in 1991 was 1.6% (or 16 companies per 1000 inhabitants). This figure is included in the informal sector enterprises. When calculated without informal sector, entrepreneurship rate is very low, at 0.01%, or 0.1 companies per thousand inhabitants. This is much lower when compared with Hong Kong (5.9), South Korea (3), Singapore (5.8) and Taiwan (3.5 companies per thousand inhabitants). In two decades later, the level of entrepreneurship does not increase significantly and remains far behind either the developed countries or neighboring countries. Kemenakertans mention the level of entrepreneurs in Indonesia in 2012 was 0.18%. For developed countries the level of entrepreneurs is above 5%.

Through education, the government is trying to create of new entrepreneurs, which would increase the level of entrepreneurship. The curriculum for both the higher education and secondary education included Entrepreneurship Education. The purpose of entrepreneurship education is to provide skills and equipped to work independently. Entrepreneurship Education in Vocational High School (SMK) has been done through the business 'production unit' in the various fields of study program.



Problems encountered with the implementation of Entrepreneurship Education at SMK according Subijanto (2012), are: (1) the implementation of entrepreneurship education is not yet supported by sufficient facilities and infrastructure of training/ practice; (2) collaboration model for the implementation of entrepreneurship education between Senior Vocation School and business or industry has not formulated operationally; and 3) the vocational education has not yet managed optimally, particularly in term of collaboration and sharing of various learning facilities. For that we need the right strategy to overcome the needs of the many entrepreneurs in the future and the conditions of the problems still facing today.

The purpose of this article is to contribute the Entrepreneurship Education in SMK with a correct development strategy, especially in the pursuit of increasing the number of entrepreneurs in Indonesia.

### **Entrepreneurship and Entrepreneur**

Entrepreneurship is the spirit, attitude, behavior, and ability to handle the business or activities that lead to efforts to find, create, and implement ways of working, new technologies and products to improve efficiency in order to provide better services and or gain greater (Keputusan Menteri Koperasi dan Pembinaan Pengusaha Kecil Nomor 961/KEP/M/XI/1995). Thus entrepreneurship is the ability to be creative and innovative which is used as the base, tips, and resources to find opportunities for success. The essence of entrepreneurship is the ability to create something new and different (create new and different) through creative thinking and innovative action to create opportunities in the face of life's challenges. In essence, entrepreneurship is the nature, characteristics, and the character of the person who has the will to realize innovative ideas into real world creatively. So the entrepreneur or entrepreneurship is the process of creating something different by devoting all his time and energy accompanied by financial risk, psychological, social, and receive remuneration in the form of money and personal.

The entrepreneur is a doer of entrepreneurship. According to some experts, that Schumpeter and Peter Drucker, self-employment is defined as a person who focuses on the opportunities and not at risk. According to Muhammad (1992), there are at least seven fundamental characteristics that are inherent in the identity of an entrepreneur. These characteristics are: 1) leadership, which has a personal relationship orientation and orientation towards high goals and objectives, as well as leadership effectiveness is also high. Entrepreneurial always appear warm, encouraging self-development of his subordinates, and always concentrate on objectives and targets to be achieved; 2) innovation, has the ability to solve problems by utilizing appropriate opportunities and potential capabilities that exist so as to get better results for communities and for themselves; 3) decision-making, more dominated by the right brain, which is the ability to perform the creation or creative thinking; 4) responsiveness to change, entrepreneurs will be more responsive to change than others. For an entrepreneur, any change will contain a potential opportunity that can be used as a reference-setting new goals and objectives; 5) working smart, how to work efficiently and effectively with other words to work economically by achieving maximum results; 6) vision of the future, the vision of an entrepreneur is a reflection of the commitment, competence and



consistency; 7) attitude towards risk, opportunity to be focused and not risk focused. Risks defined and limited, and reacts with the program and innovative actions so that the business is growing.

### **Kewirausahaan in vocational education**

Objective of the vocational education intended to make students into beings: 1) faith and devoted to God, noble, and noble personality; 2) knowledgeable, skilled, critical, creative, and innovative; 3) healthy, independent, and confident; and 4) tolerant, socially sensitive, democratic, and accountable (PP No.17/2010).

In preparing its graduates, the lesson material at SMK are more emphasis on certain skill to be better prepared to work in a particular field or live independently in the community. Policy improvements in vocational education provision has also been added in entrepreneurship education as a manifestation of the concept of the creative economy.

On development, entrepreneurship in vocational education has also led the program "production unit" which learners are conditioned to have competency in certain jobs and independent attitude to work. The production unit which has been developed in vocational, among others: a mini hotel, travel tickets, sales of supplies, photocopies, catering services and clothing, automotive services, furniture and mebeller services.

To support the creative economy program, in the year 2010-2014 has been assigned the development of economic activities based on the creativity, skills and individual talents to creating trust creation and creative individuals who have economic value and impact on public welfare. Policies that have been and will be done through: 1) review and revise its vocational curriculum to be more oriented to the formation of creativity and entrepreneurship in students as early as possible; 2) improve the quality of vocational supports the creation of creativity and entrepreneurship of learners; 3) creating access to information and knowledge exchange between education providers creative economy; 4) increasing the number and improving the quality of vocational supports the creation of creative people in the development of creative economy; 5) creating connectivity and integration between vocational graduates are associated with the need development of creative economy; 6) encourage successful entrepreneurs to share experiences and expertise in the SMK in the development of creative economy; and 7) to facilitate the development of networks and encourage cooperation between the Indonesian creative people at home and abroad (Direktorat Pembinaan SMK/ the Directorate of SMK Development, 2010).

### **Entrepreneurship Education Problems**

Implementation of Entrepreneurship Education at SMK still encountered several obstacles. According Subijanto (2012) the problem, are: (1) the implementation of entrepreneurship education is not yet supported by sufficient facilities and infrastructure of training/ practice; (2) collaboration model for the implementation of entrepreneurship education between Senior Vocation School and business or industry has not formulated operationally; and 3) the vocational education has not yet managed optimally, particularly in term of collaboration and sharing of various learning facilities.



## **Fulfillment Entrepreneur Challenge**

Indonesia still has problems in developing the business sector. The number of entrepreneurs is still very low. As mentioned above, in 2012 the number of new entrepreneurs is 0.18% of the population. The number of entrepreneurs will be very influential in the advancement of the organization or at the level of prosperity of society.

It is not denied education at the secondary level, especially SMK expected to have a significant contribution in the effort to produce entrepreneurs in Indonesia. But it is not necessarily consistent with what happens on the field. For example, data from Program Pinjaman Modal Kewira-usahaan (Enterprise Capital Loan Program) SMK 1 Cirebon in Nurfitri (2015) showed that out of 1682 students, only 0.6% are interested in entrepreneurship. Maybe this could have occurred in the majority of SMK in Indonesia.

The above conditions may be understandable considering the business is not easy for someone to start a new business. The Wall Street Journal in 1992, indicate where the business went bankrupt in the first two years was 23.7%, went bankrupt in the first four years was 51.7% and went bankrupt in the first six years is 62.7%. This condition can be more severe if continued in subsequent years. This means that the success of a new business is relatively small. People will think long to do business, because it could have been, the business will mean a futile activity because it will spend resources in the form of capital, time, energy, and mind, but the result is not clear.

Failure micro, small or medium, caused by various factors, both entrepreneur factors and outside actors.

According Alom (2016), some of the factors that influence the success or failure of micro-scale companies, among others: education or training of entrepreneurs, access to funding and availability of financial resources, as well as market conditions and growing enterprise environments. Education and training are key factors that determine the success of small businesses in Malaysia (Alom 2016).

## **Impact of Entrepreneurship Education in Vocational Graduates On Performance In Long Term**

Based on the Swedish study on the impact of entrepreneurship education in high school, known as the Junior Achievement Company Program (JACP), it can be concluded that entrepreneurship education has a long-term impact on the alumni (Elert, 2015). Entrepreneurship education is increasing the number of alumni to open their own business (long-term), and increase their income, but does not significantly affect the ability of graduates to sustain the company.

## **Entrepreneurial Network**

Entrepreneurial network can be a social networking or a good relationship with family, friends, acquaintances so get information and support, network support agents eg, banking, government, schools / colleges, cross-community and inter-company networks. Susilowati study (2013) showed that the higher or broad network of entrepreneurial-owned SMEs, the SME performance increase. This is in line with the findings Terziovski in Susilowati (2013) which states that the development of strong relationships and flexible with our customers, and also with members of the supply chain that would otherwise contribute





strong enough to company performance, such as cost efficiency, improved quality, reliability, and meeting the needs of input that is always available at any time.

### **Empowerment Alumni**

Hayness (2000) in Suwarsono (2002) suggests empowerment means bring awareness and skills necessary to be responsible, to encourage individuals and groups the ability to take initiative and be able to play a role in decision making. Thus empowerment can provide an opportunity for the group to participate according to their ability, skills and limitations of authority in the decision making process

Research Suwarsono (2002) in the Diklat Provinsi Jateng (Central Java Provincial Training) employees provides that the level of empowerment has a positive relationship with employee performance. Respondents who have a high empowerment will tend to have high performance, whereas those with a low empowerment it will tend to have lower performance anyway.

This can be attributed to the performance of the alumni or alumni association in terms of entrepreneurship. Empowerment of alumni will include increased capacity, and participation in entrepreneurship. Alumni can be involved in classroom teaching, both with regard to husbandry practice certain skills or motivation and knowledge in the field of entrepreneurship. This is also consistent with the results of research conducted on the alumni SMAK St. Albertus, which states that the established good cooperation between the alumni and the school, in terms of human resources schools can ask for help alumni to be the source in activities run by the school, the alumni can promote school because of alumni from various regions in Indonesia (Wiku2015).

## **II. Analysis and Discussion**

The policy of Directorate of SMK Development (Direktorat Pembinaan SMK) to conduct Entrepreneurship Education in SMK is right thing. SMK not only prepare students with certain skills or also to prepare himself to continue to higher education, but also developing vocational self-sufficiency, the formation of creativity and entrepreneurship in students as early as possible.

Already mentioned above, that the interests of students to open their own business (entrepreneurship) is low, or by 0.6% according Nurfitri study (2015) on SMK 1 Cirebon. This is also reinforced by the results of a survey on higher education. Handaru (2015) stating that only 22% of students who wish to open their own businesses after graduation. It is based on the results of a survey of students of the program Fashion Design (Tata Busana) Jakarta State University in 2015. In reality, after finish the college or vocational school, people with very young age, lack of experience, lack of capital, lack of access to resources related to the field of business and without the guidance of competent person will be vulnerable once established businesses. Pioneered efforts are still fragile and may be unable to survive in unfavorable conditions.

Based on the study Alom (2012) the success of micro-scale enterprises will depend on appropriate education and training, market demand, access to funding / adequate funds. The success of micro-businesses are also determined how the intense competition existing businesses. The more stringent, will be a lot of micro-businesses that it can not grow. So, successful implementation of



Entrepreneurship Education at SMK not only measured shortly after students leave school. Entrepreneurship education is a long term mission, not only affect the students' interest and knowledge in of entrepreneurship, but also relates to his mental attitude to do something.

Appropriate research Elert (2015), in the long term, school leavers who have an entrepreneurial program will still be more emerge from the new entrepreneurs. Once it was established that the company can grow well is necessary to create a business climate that supports, such as the level of competition that is not too tight, ease of access to funding, education and additional training appropriate for the entrepreneur.

## **Conclusions and recommendations**

### **III. CONCLUSION**

Based on the analysis it can be concluded that, in formulating policies relating to the development of Entrepreneurship Education at SMK to note the fact that: 1) Entrepreneurship Education forming attitudes in the long term, so it should not be seen immediately, when graduate students are required to open their own business; 2) The alumni network can be used to escort the entrepreneurial spirit of its members as well as a in the implementation of appropriate training; 3) Empowerment alumni of the school can be done through activities related to the school program, especially in the field of Entrepreneurship Education

### **IV. Suggestion**

Based on the conclusion, can be formulated some suggestions related to policy formulation development Entrepreneurship in vocational education, as: 1) to the Directorate of SMK Development , necessary to guide learning materials emphasize that Entrepreneurship Education has a long-term dimension; 2) to the leadership of SMK, the need for efforts to empower alumni who support strong alumni network, the involvement of alumni, and the role of alumni in the implementation of Entrepreneurship Education at SMK.



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## THE DEVELOPMENT VOCATIONAL STUDENTS INTENTION OF ENTREPRENEURSHIP AND ITS CONTRIBUTION TO THEIR READINESS TO BE ENTREPRENEURS

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**ABSTRACT:** The objective of this research are to: (1) examine the structure of causal relationship among to the entrepreneurial knowledge ( $X_1$ ), self-efficacy ( $X_2$ ), readiness instrumentation ( $X_3$ ), the intention of entrepreneurship ( $Y$ ), and readiness to become entrepreneurs ( $Z$ ); and (2) find the direct and indirect effects of a couple of variables of these five variables. This study uses *ex post facto* approach to which is conducted in both public and private vocational schools majuring mechanical engineering in Makassar. The population was all XII grade students totaling 366 students with a sample of 180 students. The data were collected by using questionnaires and documentation. The data was analyzed using descriptive and path analysis decomposition model. Based on the data analysis and discussion it is concluded that: (1)  $X_1$ ,  $X_2$ ,  $X_3$  contributed significantly to the  $Y$  and the impact on the  $Z$ ; (2) the results of the analysis of pathways shown the value of path coefficients in sequence:  $\beta_{41} = 0.372$ ,  $\beta_{42} = 0.349$ ,  $\beta_{43} = 0.417$ ,  $\beta_{51} = 0.244$ ,  $\beta_{52} = 0.362$ ,  $\beta_{53} = 0.252$ , and  $\beta_{54} = 0.344$  with a residual value  $\varepsilon_1 = 0.419$ , and  $\varepsilon_2 = 0.294$ . To sum, the variable  $X_1$ ,  $X_2$ , and  $X_3$  simultaneously contributed for 58.1% to variable  $Z$ . Also, the variables  $X_1$ ,  $X_2$ ,  $X_3$ , and  $Y$  simultaneously contibuted for 70.6% to variable  $Z$ .

**Keywords:** Entrepreneurial knowledge, self-efficacy, readiness instrumentation, the intention of entrepreneurship, readiness entrepreneurs

### I. INTRODUCTION

Unemployment increased in number as time goes by. As for the cause of the problem is the large number of educated unemployed graduates of educational institutions that aim just looking for work, rather than creating jobs. Though into self-employment is one of determining the progress of the economy because the field of self-employment have the freedom to work and independent. This entrepreneur is able to create new jobs so that it is able to absorb manpower. This led to the development of entrepreneurship into the warm issues the last few years in many quarters, both regional levels national, even international. This trend is due to the belief that entrepreneurship is the key to improved economic growth, reduce unemployment, and the modernization of technology (Baumol, et al. 2007).

Development entrepreneurship is one of the solutions reduce unemployment figures educated. That is because the entrepreneurship as events create a job and certainly requires manpower so it can reduce the high unemployment figures, then the capability should be built consciously entrepreneurship from an early age. Thus the younger generation also began to make self-employment as one career choice to support the well-being of the nation.

Vocational high school students need to be directed and supported not only as a job seeker-oriented but can also be ready and job creator. Vocational secondary schools so that students must be prepared to be mid-level skilled workforce in the industrialized world as well as working independently or entrepreneurship. But the reality on the ground shows a lot of students who are not yet ready for entrepreneurship, some others choose to work with other people and only a few who decided to entrepreneurship (Nurbaya and Murdi, 2012:4).



Based on the results of the interviews in schools vocational secondary Machining Techniques, it is known that nowadays many graduates of vocational high schools in Makassar that are idle because of the expertise of a graduate qualification not in accordance with the competency of the industry. Secondary vocational school graduates tend to choose to search for a work than create your own job, thereby causing the increase of educated unemployment. This happens because the readiness entrepreneurship graduates of vocational high school belongs to the low caused by lack of knowledge entrepreneurship, low readiness instrumentation, low confidence to entrepreneurship and low-impact entrepreneurship the intensi finally caused unpreparedness students in entrepreneurship.

The main things that cause someone did the entrepreneurial activity is due to the desire for entrepreneurship or known by the term intensi. Entrepreneurship can be learned and become a career choice for graduates of vocational high schools when there are students within intensi to become an entrepreneur. Intensi earnest intention a person to do any act or bring up a particular behaviours (Wijaya, 2007). According to Urdag (1985) has a Word equation with intensi plans, objectives, expectations, design, direction, or objects, where there was a desire to do something through self- expression and self-reliance.

According to Katz & Gartner intensi entrepreneurship is defined as the process of information search that can be used to achieve the objectives of the formation of a business (Indarti and Rostiani, 2008). Bandura reveals that intensi is a determination to do certain activities or generate a certain circumstances in the future (Wijaya, 2007). Further disclosed that a person's motivation is intensi to act a certain way and explain how hard the person to try out, providing a lot of time and effort to bring up a behavior. Intensi is hopes, desires, ambitions, goals, plans or something that someone has to be fought in the future.

Intensi the typical role in directing the action, i.e. connect between a deep consideration, it is believed and desired by someone with a specific action. Intensi has become the best predictor for entrepreneurship behavior someone (Indarti and Rostiani, 2008). Therefore it can serve as the intensi basic approach to understand anyone who would become an entrepreneur.

Intensi students acquiring entrepreneurial surely will be influenced by a variety of factors, including the entrepreneurial knowledge, self-efficacy, and the readiness of the instrumentation. According to Suryana (2010) of entrepreneurship is the ability to be creative and innovative base, tips, and resources to explore opportunities towards success. Knowledge entrepreneurship is the ability to produce something new through creative thinking and acting in innovative, so was created the ideas or opportunities and put to good use.

Entrepreneurial knowledge can be acquired through learning activities. Entrepreneurial knowledge obtained from learning activities are expected to give an overview and the provision concerning the entrepreneurship that can encourage someone to entrepreneurship interest. Subjects of entrepreneurship including the competencies taught at vocational secondary school curriculum, with subjects taught entrepreneurship will increasingly add to the knowledge of entrepreneurship and vocational high school



students. It is expected to foster entrepreneurship intensi so with subjects he teaches entrepreneurship and skills, students are expected to be creating jobs himself in accordance with his skills. According to Roxas (2008) that knowledge entrepreneurship has direct influence the perception of entrepreneurship desires, perceptions of social norms, and entrepreneurship abilities against intensi entrepreneurship.

Efficacy that is the confidence of the individual regarding the ability to establish a behavior of entrepreneurship. According to Sarwoko (2011) self-efficacy effect on intensi entrepreneurship, the higher the confidence and mental maturity so the higher the pula intensi entrepreneurship. Other research results conducted Indarti and Rosiani (2008) States that self-efficacy is proven to affect intensi learners. Efficacy of one's self can be an important factor in the determination of whether a person's entrepreneurial intensi already formed on the early stages of a person's career. The higher a person's self-efficacy on entrepreneurship the strong entrepreneurial intensi owns (Betz and Hacket, 1986).

Susanto (2000) suggests that some of the motivation that may encourage someone to be intensi entrepreneurial, one of which is the availability of capital for an important part in determining the success of starting entrepreneurs. In addition, the availability of business information is also an important factor that drives the desire of a person to open a new venture and the determinants of sustainability efforts. In the meantime, the relationship has also become a decisive success of someone in his efforts. The greater number of the business relation, the faster a person achieve success in this endeavor, as well as the opposite (Sudjatmoko, 2009).

The availability of capital, the availability of information, and the availability of the business relation are called readiness instrumentation an entrepreneur (and Indarti Rosiani, 2008). The readiness of the instrumentation affects entrepreneurship intensi someone because in the readiness of the instrumentation already fulfilled it will boost the confidence of a person to become an entrepreneur. Research results Agustina (2011) shows that the readiness of the positive and significant effect instrumentation against the wishes of entrepreneurship.

Based on the description of the problems above, the purpose of this study is to: (1) test structure of causal relationships against variable knowledge entrepreneurship, self-efficacy, the readiness of the instrumentation, entrepreneurship, as well as the readiness of the intensi be entrepreneur; and (2) find a direct and influence of each pair of variables.

## **II. RESEARCH METHODS**

This research uses a quantitative approach to type of ex post facto and technique done with path analysis structural equation model decomposition. This test aims to find out causal relationships directly and indirectly set of exogenous variables against endogenous variables. This research was carried out in vocational secondary schools public and private areas of expertise in mechanical engineering in the city of Makassar, namely SMK Negeri 2Makassar, SMK Negeri 5 Makassar, SMK Kartika Wirabuana, and SMK Negeri 1 South Sulawesi. The population of this research are all students of class XII which totaled 366 students with sample 180 students. Sampling using a proportional random sampling techniques.



Research data collected with the use of the test, the question form and documentation. Knowledge entrepreneurship students obtained based on the test results as well as the documentation value of entrepreneurial lessons. While the readiness self-efficacy variables, instrumentation, intensi entrepreneurship, entrepreneurship and readiness to use the question form with techniques scoring using a Likert scale. Further data obtained were analyzed using descriptive statistics analysis and statistical analysis inferential with the help of SPSS application version 20.0. To test the hypothesis used regression analysis techniques. This analysis is used to view the contribution of endogenous variables exogenous variables against. The test results criteria analysis of the coefficient of correlation is to look at the value of significance. If their significance less than 0.05 then  $H_0$  is rejected, meaning that there is a significant relationship.

### III. RESULTS AND DISCUSSION

A descriptive analysis of the results of a variable knowledge entrepreneurship, self-efficacy, the readiness of the instrumentation, intensi entrepreneurship, entrepreneurship and readiness are presented in summary form as shown in Table 1. Based on Table 1 Note that a variable knowledge entrepreneurial, self-efficacy, readiness instrumentation, entrepreneurship intension, and readiness entrepreneurship of the vocational secondary school students entrepreneurship package engineering Machining in Makassar city located on the category either.

**Table 1.** Summary of the Results Descriptive Analysis

Description Of Data	Knowledge Entrepreneurship	Self- efficacy	Readiness Instrumentation	Entrepreneurship Intention	Readiness Entrepreneurship
Mean	85,84	83,45	82,67	75,80	110,05
Median	87,00	82,00	81,40	73,00	112,03
Mode	24,00	27,40	26,30	34,00	56,00
Std. Deviation	85,00	74,00	69,00	72,00	116,00
Varians	5,50	8,60	7,50	7,40	10,30
Range	22,40	57,23	46,29	45,37	79,14
Minimum	75,00	73,00	71,00	63,00	94,00
Maximum	100,00	96,00	97,00	94,00	145,00

Prior to testing the hypothesis, first performed a classic assumption test or test the prerequisite analysis. A classic assumption test using the test of normality, linearity and multicollinearity. A classic assumption test results summary presented in table 2, 3, and 4.

**Table 2.** Summary of the Results Test Normality

Variables	Test Results	Criteria Sig.	Summary
Knowledge Entrepreneurship	0,193	> 0,05	Normal
Self-Efficacy	0,171	> 0,05	Normal

Readiness Instrumentation	0,200	> 0,05	Normal
Entrepreneurship Intention	0,200	> 0,05	Normal
Readiness Entrepreneurship	0,120	> 0,05	Normal

Based on the test result summary normality on table 2 note values of the Kolmogorov-Smirnov.  $G$  is greater than 0.05 for all variables so that it can be concluded that the data for knowledge entrepreneurship, self-efficacy the readiness of instrumentation, intensity entrepreneurship, entrepreneurship readiness is distributed normally.

**Table 3.** Summary of Test Result Linearity

Exogenous Variables	Endogenous Variables	Deviation from Linearity		Summary
		Test Results	Criteria Sig.	
Entrepreneurship Intention	Knowledge	0,724	> 0,05	Linear
	Entrepreneurship			
	Self-Efficacy	0,279	> 0,05	Linear
Readiness Entrepreneurship	Readiness Instrumentation	0,250	> 0,05	Linear
	Knowledge			
	Entrepreneurship	0,090	> 0,05	Linear
	Self-Efficacy	0,607	> 0,05	Linear
Readiness Instrumentation	Readiness Instrumentation	0,530	> 0,05	Linear
	Entrepreneurship Intention	0,704	> 0,05	Linear

Summary of test results based on linearity on table 3 Note that the value of the significance of the deviation from linearity to each spouse be eligible all regression linearity (Sig. > 0.05). Therefore can conclude that all regression couples meet the assumptions of linear relationship between endogenous exogenous variables with variables.

**Table 4.** Summary of the Test Results Multicollinearity

Variables	VIF	Tolerance	Summary
Knowledge			
Entrepreneurship	1,027	0,922	Not Multicollinearity
Self-Efficacy	1,234	0,903	Not Multicollinearity
Readiness Instrumentation	1,031	0,891	Not Multicollinearity

Based on the test results summary of multicollinearity in table 4 may be aware that the value of the VIF is smaller than 10 so that it can be concluded that the symptoms do not occur the presence of multicollinearity between free variables. In addition, the value of the Tolerance that approximates the number one also shows not the occurrence of symptoms of multicollinearity between free variables. Thus



all test prerequisites are met to perform a test of the hypothesis by using regression analysis. Furthermore the results of the test the hypothesis presented in table 5.

**Table 5.** Summary of the Results Analysis Inferential

Sub-Structur	Variables	Great Influence			Sig.
		Partial	Simultaneous	Other Variables	
Sub-structur 1	X <sub>1</sub> against Y	0,372			0,000
	X <sub>2</sub> against Y	0,349	0,581	0,419	
	X <sub>3</sub> against Y	0,417			
Sub-structur 2	X <sub>1</sub> against Z	0,224			0,000
	X <sub>2</sub> against Z	0,362	0,706	0,294	
	X <sub>3</sub> against Z	0,252			
	Y against Z	0,344			

Significance test results on the structure of 1 shows the value of Sig. of 0.000. Those values means that the Sig value  $\geq 0.05$ . so that  $H_0$  is rejected and the  $H_1$  is accepted, this means significant regression coefficients. Based on this it can be inferred that the variable knowledge entrepreneurship, self-efficacy and the readiness of instrumentation simultaneously and contribute significantly to intensi entrepreneurship i.e. of 51.8%. So it partially also contribute significantly. Meanwhile, the significance of test results on structure 2 shows values 0.000. Of Gis. Those values means that the Sig value  $\geq 0.05$ . 0.000 so that  $H_0$  is rejected and the  $H_1$  is accepted, this means significant regression coefficients. Based on this it can be inferred that the variable knowledge entrepreneurship, self-efficacy, and Instrumentation intensi readiness entrepreneurship contribute simultaneously and significantly to the readiness of the entrepreneurship that is of 70.6 per cent of. So it partially also contribute significantly.

Results of the analysis show that there is a significant contribution to knowledge entrepreneurship against intensi entrepreneurship i.e. registration  $(0,372)^2 \times 100\% = 13.84\%$ . This suggests that the high low entrepreneurial knowledge possessed by students affect intensi entrepreneurship. An entrepreneur will not succeed if it does not have the knowledge, ability, and willingness. There is a will but without the skills and knowledge will not make it successful entrepreneur, by contrast have the knowledge and ability without a strong volition based on will not usher in the entrepreneur's on success. Next the Alma (2013) States that an entrepreneurial talent will grow and thrive thanks to the knowledge. This is in line with research done Dania and pearls (2012) that showed a significant positive relationship between entrepreneurship and knowledge with the desire of entrepreneurship.

The results of the analysis show that there are significant contributions towards self-efficacy intensi entrepreneurship i.e. registration  $(0,349)^2 \times 100\% = 12.18\%$ . This suggests that the high low self-efficacy which is owned by the student affect intensi entrepreneurship. These results are supported by the results of other research conducted Indarti and Rosiani (2008) States that self-efficacy is proven to affect intensi

learners. Efficacy of one's self can be an important factor in the determination of whether a person's entrepreneurial intensity already formed on the early stages of a person's career. The higher a person's self-efficacy on entrepreneurship the stronger the entrepreneurial intensity is (Betz and Hackett, 1986).

These results are supported by research Sarwoko (2011) which suggests that entrepreneurship is influenced by intensity subjective norm and self-efficacy, where its influence is positive, the higher the support on the students, then the higher the intention of entrepreneurship, as well as the higher confidence and mental maturity, the higher the intention of entrepreneurship. Self-efficacy is a condition in which the individual's behaviour to believe that entrepreneurship is easy or can be done. Self-efficacy has a role against the intention of entrepreneurship student, the higher the confidence of students and her mental maturity so the higher the role to stir up the intention of entrepreneurship students.

The results of the analysis show that there is a significant contribution towards instrumentality intensity readiness entrepreneurship i.e. registration  $(0.417)^2 \times 100\% = 17,39\%$ . This suggests that the high low readiness student-owned the instrumentality affects intensity entrepreneurship. The readiness of the instrumentality affects entrepreneurship intensity someone because in the readiness of the instrumentality already fulfilled it will boost the confidence of a person to become an entrepreneur. Research results Agustina (2011) shows that the readiness of the positive and significant effect instrumentality against the wishes of entrepreneurship.

The results of the analysis show that there is a significant contribution to knowledge entrepreneurship i.e. readiness against registration  $(0,224)^2 \times 100\% = 5.02\%$ . This suggests that the high low entrepreneurial knowledge possessed by students affect the readiness of entrepreneurship. These results are supported by research conducted by the Ramadani, et al (2000) shows that there is a direct contribution to intercultural knowledge readiness entrepreneurship with entrepreneurship.

Lestari & Wijaya (2012) suggests that entrepreneurship education may establish a mindset, attitude and behavior in students becoming an entrepreneur so that it directs to choose entrepreneurship as a career choice. Besides research conducted Nurbaya & Murdi (2012) States that the higher the entrepreneurial knowledge then the higher the readiness for entrepreneurship. Students who already have some knowledge, tend to want to apply your knowledge.

The results of the analysis show that there are significant contributions towards self-efficacy readiness entrepreneurship i.e. registration  $(0.362)^2 \times 100\% = 13.1\%$ . This suggests that the high to the low efficacy of self-owned by students affect the readiness of entrepreneurship. These results are supported by research conducted by Sari (2012) where it is known that there is a positive influence between self-efficacy against the readiness of high vocational school student entrepreneurship.

It is also aligned with the research conducted by Caecilia, (2012) which found that self-efficacy provides a positive influence towards entrepreneurship intensity. Self-efficacy is able to provide the confidence and belief in the capability and become an important capital in starting a business. Therefore because of self-efficacy is very useful in supporting entrepreneurship in the future if the student has readiness for entrepreneurship.



The results of the analysis show that there are significant contributions towards readiness instrumentation readiness entrepreneurship i.e. registration  $(0,252) 2 \times 100\% = 6.35\%$ . This suggests that the high low readiness instrument owned by students affect the readiness of entrepreneurship. The readiness of the instrumentation consists of the availability of capital, a good relationship, and the availability of business information. Entrepreneurs must be able to determine the amount of capital needed to start a business, an entrepreneur must first determine the minimum amount of resources needed. Most of the resources needed in the quantity and quality level higher than compared to most other (Susanto, 2009:11).

The availability of business information is also an important factor that drives the desire of someone to open new businesses and critical factors for the growth and sustainability of the effort. The intervention of others can determine the success or failure of a person in the business world. Business relation has the principle of proportional, meaning that the greater number of the business relation, the faster a person achieve success in this endeavor, as well as the opposite (Sudjatmoko, 2009:25).

The results of the analysis show that there are significant contributions towards readiness entrepreneurship intensi i.e. registration  $(0,344) 2 \times 100\% = 11,83\%$ . This suggests that the high low entrepreneurial intensi owned by students affect the readiness of entrepreneurship. Relevant research that supports this result of the contribution of entrepreneurship against Italy intensi include research conducted by Maryani (2010) which declared the existence of a positive relationship between the interest in employment with job readiness. Subsequent research conducted by Nasser (2014) stated the existence of significant influence between the interest in entrepreneurship with the readiness of entrepreneurship.

#### **IV. CONCLUSION**

Based on the deliberations of the research results can be concluded that the description of knowledge entrepreneurship, self-efficacy, the readiness of the instrumentation, intensi entrepreneurship, and entrepreneurship including a readiness in both categories. In addition, knowledge entrepreneurship, self-efficacy, and the readiness of instrumentation simultaneously or individually contribute significantly towards entrepreneurship intensi vocational high school students. Further knowledge entrepreneurship, self-efficacy, the readiness of instrumentation, and simultaneously as well as entrepreneurship intensi individually contribute significantly towards readiness entrepreneurship and vocational high school students. Thus it can be said that the intensi entrepreneurship can be developed through the knowledge entrepreneurship, self-efficacy, and the readiness of the instrumentation that could eventually have an impact on the readiness of entrepreneurship and vocational high school students.



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## INNOVATION IN LEARNING BASIC COMPETENCE OF VOCATIONAL SKILLS IN ELECTRONIC INDUSTRIES BASED PROBLEM SOLVING IN SUPPORTING ASEAN ECONOMIC COMMUNITY (AEC)

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**ABSTRACT:** *This development research aims to produce an innovation in learning the basic competence of vocational skill in industrial electronics field by using problem solving in supporting Asean Economic Community (AEC). The subjects were students and teachers of industrial electronics at SMK Negeri 2 Makassar (A vocational school in Makassar). Data were analyzed through a combination of descriptive and qualitative. The products are books of innovation in learning basic competence of vocational skill in electronics industry through problem solving based and the learning instruments, including: lesson plan, teacher book, student book, student worksheets, and assessment of learning. The results show that (1) the initial testing (validation) for the book of innovation in learning basics competence of vocational skill in electronics industry through problem solving and the learning instruments are valid, (2) theoretically, the book of innovation in learning basics competence of vocational skill in electronics industry through problem solving and the learning instruments can be implemented in a class; empirically, the book of innovation in learning basics competence of vocational skill in electronics industry through problem solving based and the learning instruments meet the criteria of practical and effective. Therefore, it can be used in schools.*

**Keywords:** *Innovation in learning, problem solving, skill of electronics industry*

### I. INTRODUCTION

Education development of 21st century which is more complex needs creative students who are able to learn independently in different environment. Being able to learn and to innovate is one of the abilities that must be possessed by the students of this century. The higher the degree of complexity of life is, the better ability to learn and to innovate is required. Moreover, the students are required to have critical thinking and problem solving skills, and also good communication among students in order to create academic atmosphere, good communication, and effective collaboration and to have high creativity and innovation.

Attempts to generate innovation and creativity can be resulted in continuous correction of the education system, repair of learning, fulfillment of learning facilities and laboratories, repair of units production, school management, teacher and students competences and the principal's policies. Bray et. al. (2010) states that there are 4 Cs in learning and innovation skills: (1) Critical Thinking and Problem solving; (2) Communication; (3) Collaboration; and (4) Creativity and Innovation. This theory emphasizes on skills of learning and innovation regardless of critical thinking skills, communication, collaboration, creativity and innovation that can improve the students' ability.

Vocational high school as a vocational institution aims at generating professional graduates that are able to continue to study. Furthermore, as one of the vocational institutions, a vocational high school is hoped that learning objectives can be achieved maximally, basic learning of vocational skills in particular (Dasar Kompetensi Kejuruan 'DKK') and industrial electronic expertise. DKK description has expertise competences to develop basic skills for students. In addition, DKK contains essential skills to generate



competences' graduates. However, there are some obstacles that have recently occurred at the vocational schools, teaching DKK applied still use direct learning and is full of theoretical nuances. Students in vocational schools are awarded a number of learning problems, but the students do not know the steps to solve the problems. As a result, learning created in the classroom causes boredom, unexplored creativity, less ideas, and saturation. Therefore, innovation development is necessary to do in learning.

Innovation in learning can improve motivation and learning outcomes. Learning innovation of DKK based on *problem solving* aims at being autonomous students in learning. Students are trained to apply (cognitive) thinking skills in designing steps for solutions by seeing the problems given by the teachers in electronics industry.

Chen (2008:23) identifies three main conditions problem-based learning, ie learning by doing, learning in context, and focusing on the student. The teachers play a role as a facilitator of the problem solving process by helping students to describe problems, to develop some ways to solve problems, to search sources of information, and not to provide solutions to the problems (Newton & Newton: 2008:57).

According to Impedovo (2009:37), basically-problem solving skills consist of four major phases: namely, (1) understand the problem; (2) design a plan; (3) implement the plan, and (4) look back and check. When applying problem solving strategies in learning at least there should be some factors to consider; (1) specific knowledge domain, (2) algorithm, (3) heuristic, (4) the decision mechanism, and (5) reflection. These are all the stages of problem solving used in learning to embed students' thinking skills. Soden (2013) explains that thinking skill development that will improve learning and problem-solving performance in the workplace is an important goal for vocational education and training. Furthermore, Ahghar (2012) explains that problem-solving in educational skills is effective in students' self-regulation learning and it always has good stability.

Recent researches in respect to problem-solving method have changed professional standards, demands on the new workplaces, learning theories, educators/ trainers to revise curriculum integrated in learning environment. It has also encouraged learners to apply higher thinking skills, and problem solving skills. Therefore, honest educations are important to apply problem solving learning to expand students' thinking skills.

Mimi Mohaffyza Mohamad et.al. (2011) state that problem-solving in building construction (BC) is students' ability to solve a given problem, and then to produce new ideas. This is the highest cognitive skills needed in SMK's curriculum. An element analysis was conducted before working, so that students are able to resolve any situations. Carson (2007:11) revised 8 (eight) problem-solving elements, they are; (1) define problems, a student must have knowledge to solve problems; (2) define problem-solving, relationship between thought and knowledge; (3) & (4) algorithms and heuristics are problematic; (5) dichotomy between knowledge and thought; (6) problem solving teaches a creativity; (7) problem solving requires a basic knowledge; and (8) problem solving is a concept application or transfer. Based on these



elements, phases, and requirements, DKK problem solving based learning in electronics industry uses problem-solving approach.

Furthermore, Akhmad Sudrajat (2011) states that problem-solving based learning has several characteristics; (1) Orientate students to authentic problems and avoid isolated learning; (2) Students center in long term; (3) Create interdisciplinary learning; (4) investigate authentic problems integrated with real-world and practical experience; (5) produce and exhibit products/creations; (6) teach students to be able to apply what they have learned at school in their daily life; (7) Learning occurs in small groups (cooperative); (8) The teacher acts as a facilitator, motivator and mentor; (8) Problems are formulated to focus on and to stimulate learning; (9) Problem is a vehicle for the problem-solving skill development; and (10) New information is obtained from self-learning.

Based on the problem solving characteristics, problem-solving based learning is necessary given to the students of SMK, especially in expertise of industrial electronics, basic electronics skills base. DKK learning is a basic learning which needs problem-solving approach to the Atom Model with Semi Conductor Materials, Various semiconductor materials, and half circuit and wave rectifiers. Therefore, problem solving is a cognitive learning strategy in that students accept systematic instruction, and then they analyzes it and give solutions for the DKK problems.

A research result found by Bambang Widarta & Priyono (2014) shows that; (1) the mean score of the students' learning outcomes obtained from problem-solving based learning is significantly higher than the students' mean score studying through conventional methods. (2) the mean score of the students having high motivation is higher significantly than those students with low motivation, and (3) there is no interaction or relationship between the learning method and the students' motivation toward learning outcomes. Therefore, innovative learning based learning model is required in order to help the students understand DKK. Besides that, students are guided to find solutions using their own ways with a variety of approaches and to produce the right and better solution.

## **II. RESEARCH METHOD**

Type of this research is a research and development (*Research & Developmental*) Plomp model (2007) to produce learning product which is innovation in learning, i.e. Guidelines model lesson plan (RPP), worksheet student (LKPD), teacher book, student book, Results test Learning and Activity Questionnaire students (Aadp).

Research subject is teacher electronic industry expertise at SMK Negeri 2 Makassar, which totaled 8 peoples. That teacher has teaching experiences more than 5 (five) years and they has been certified educator. Innovation procedure development learning model DKK electronic industry expertise based *problem solving* at SMK using 4 (four) steps that is modified, there are; (1) beginning investigation phase; (2) model/planning learning phase; (3) realization construction phase; (4) test, evaluation, and revision phase. Instrument is used as tool data collections to measure the feasibility model are: (1) student activity observation sheet in learning; (2) teacher skill observation sheet in manage learning; (3) student response



questionnaire to component and learning activity; and (4) achievement test. Data analysis which is do in this research is analysis data in descriptive-qualitative.

### III. RESULT AND DISCUSSION

#### A. Initial investigation result

Initial investigation is conducted through assessment need design analysis with a discussion with a partner team teachers to conduct Focus Group Discussion (FGD) and learning observation in the classroom. FGD result with partner team teachers obtains the following information.

1. Identify learning DKK electronics industry expertise aims on the subjects' basic electronics. Based on results identification learning aims, i.e, for 1 and 2 meeting, there are 14 learning aims. Learning aims is reviewed and integrated to problem solving steps, at suitable material of these approaches. For 3, 4, 5 and 6 meetings, describing 22 learning aims that involve *problem solving*. At that meeting, lesson plan is reviewed on its learning aims.
2. Problems at applications direct learning model. Lesson plan which has been arrange by teacher, and still refer to direct learning, namely speech, discussions, and debriefing. Based on classroom observation is found several weaknesses on the study, namely: (a) students do not pay attention in learning, (b) teacher still haven't build critical thinking skills, (c) completion assingment still monotonous (giving homework and still haven't give homework result response), (d) convey the material through talk, it makes boredom, (e) students unresponsive and difficult to understand the student book, (f) students saturated follow the lesson, (g) teacher still haven't raise student motivation, (h) teacher still haven't use problem solving approach, and (i) learning impressed simple.

#### 3. Initial knowledge and student character

Initial knowledge is show based learning observation in classroom, this subject is teaches at first semester in X class, generally students have prior knowledge that is knowledge about atoms and magnetization at science subjects physics subject. Prior knowledge is still not enough to understand DKK, thus requiring early explanations about main material which is guided by teacher with clipping assignment. That student's prior knowledge, as a base in providing new material and advanced on the DKK material.

Students' character is important aspect to know the demands, interests, attitudes, learn motivation, learning styles thinking skills and early ability that students have. Based on observation is obtained information, there are: (a) students have an enthusiastic attitude to new subjects, (b) students have learn motivation that can be developed, (c) high students discipline, (d) students has been able to explain simple problem, (e) students are still sensitive at emotionally and mentally, and (f) students can accept explanation or suggestion from teacher and classmate.

#### B. Stage Model or design Learning

Activities is held at this stage by designing Model Code, lesson plan based on syllabus, teacher book, student's book, LKPD, achievement test, Activity Questionnaire learners (Aadp), research instrument. The results design is discussions with teachers team DKK. Lesson plan is designed to





integrate with problem solving characteristic approach. It is done so that students' learning ability and self-reliance can systematically achieve.

### C. Realization Phase Construction

Realization Model Guidelines, lesson plan, teacher book, student book, LKPD, achievement test, students activity (AApd), and instrument with conducting revise comments/suggestions revision from validator professional and practitioners of industrial electronics expertise.

Validation model guidelines before tested is done by professional and practitioners of industrial electronics expertise. Validator provides assessment and correction both on the sheet provided validation although at the script that is validated and assert model-based problem solving can be used at the stage testing after revised suitable with suggestions for improvements on the model guidelines. After repairing results validator then it discussed again with the subject teachers, results discussion became final draft of the guidelines and learning devices. Some aspects is assessed in guidelines learning model, are: (1) introduction. (2) Model contain,(3) guide implementation learning, and (4) language.

**Table 1.** Result Validation Guidance Model

No.	Assessed aspects	$\bar{X}$	Information
1.	Introduction	0,75	<i>Valid</i>
2.	Content model	0,91	<i>very Valid</i>
3.	guide implementation learning	0,87	<i>Very Valid</i>
4.	Languange	0.84	<i>Very Valid</i>

Based on Table 1, guidelines model result validation is fulfill very valid criteria; however there are some important inputs of validator that encourage revision, toward guidelines model. Some corrections and suggestions for improvements as follows: (a) utilization easier language in understand its meaning by practitioners (teachers) and readers; (b) Learning assessment, i.e. rubric theory assessment and practice is more clarified; (c) Model application should characterize thinking development; (d) writing format model uses problem solving, and (e) learning practice steps integrate problem solving, and (f) Learning phases in the table form.

Furthermore,level consistent and stability of validator is acquired Percentage of Agreement (PA) 0,81. The reliability coefficient value, is bigger than minimum criteria that is used, i.e. 0.70. Thus, general guidelines models otherwise reliable.

#### 1. Validation result learning Instrument

Learning instrument that made is integrated with problem solving component that is the most important part in learning DKK. Therefore, before testing learning instrument should be validated by professional and practitioners. validation activities Learning instrumentis done by providing a script (lesson plan, guidance model, teacher book, student book, LKPD, and achievement test) and validation sheet to validator. validator result is revised and become learning model. Summary result assessment validator to learning instrument is presented in Table 2.

**Table 2** Validation result learning instrument

N o.	Instrument learning	$\bar{X}$	PA	Information
1.	Lesson Plan (RPP)	0,87	0,76	Valid

2.	Guidance model	0,87	0,82	Valid
3.	Teacher book	0,89	0,83	Valid
4.	Student book	0,88	0,80	Valid
5	LKPD	0,87	0,74	Valid
6.	Achievement test	0,86	0,70	Valid

Based on the data at table 2, it can be stated that all learning instrument fulfill valid criteria. Here is presented results validator assessment to learning instrument. (Lesson plan, practical guidelines, teacher book, students book, LKPD, achievement test) and students activity.

a. Validation results of lesson plan

Lesson plan is guideline or grip teachers in teaching, because lesson plan contains systematic steps or phases. Lesson Plan is validated by 3 (three) professional and practitioners whose its assesment is review of 6 (six) aspect, i.e. basic competence (KD), achievement indicators KD, content and learning activities, language, and closing. Validation result at table 2, then is compared with has been established criteria, is obtained that lesson plan is valid, and can be used in tasting phase after has been revision appropriate corrections and suggestions validator.

Furthermore, to determine consistency and stability level validator to lesson plan learning is obtained Percentage of Agreement (PA) 0,76. This result shows consistency and stability level of validator to lesson plan.

Although, professional and practitioners state that lesson plan fulfill valid criteria, but still provide improvements corrections and suggestions. Some revision from validator either on validation sheet, nor lesson plan script which is related with: formulation indicators basic competence achievement, learning activities, language, and time. Based on some revision note from validator, and then is repair as improvement lesson plan, i.e.(1) Lesson plan made from I to IX meetings; (2) lesson Plan format adapted with format lesson Plan at school; (3) learning materials only write the title of sub-subject of each meeting.

b. Result validation guidance model

Guidance model is a practical guide for teachers and students to doing DKK learning. Therefore, before is used in study, is necessary need validated. Guidance model validasi, is done by professional and practitioners whose assessmentsis review of four (4) aspects, i.e. format, language, illustration, and content.

Based on Table 2. Is found that guidelines models are valid be accompanied some revision notes as follows.

- (1) Learning aims are adapted to basic competencies and basic competence indicators.
- (2) Target activities utilizations laboratory is all teachers and students of expertise electronics industry field that followed practice learning. Laboratory can also be used for teachers who will conduct research action and researchers at universities.
- (3) Implementation activities only contain a description activities and practice materials.
- (4) Practitioner task and practicum instructor teacher is adapted with task is used in schools



(5) Instrument assessment at guidelines learning based on problem solving with regard lesson plan and instrument assessment in testing school.

Besides a note above, there is used term has been changed, like; (1) study program become program expertise or competency skills; (2) field study become field expertise; and assistant become garage manager/laboratory/toolman. Input from the validator, further is done revisions to models guidelines is obtained coefficient Percentage of Agreement (PA) 0.82. These results show consistency and stability level from validator to results validation guidelines models.

c. Validation result teacher book

One of learning model that is very important at the school is teacher book. Teacher book contains a set of materials/substances subject that is arranged systematically, display full figure of competence mastered by students in learning activities. Teacher books enable students can learn a competence or basic competence in a coherent and systematic, thus accumulatively able to master all the competencies intact and integrated. Therefore, before teacher book is test needed validated by professional and practitioners

Assessment is reviewed of 4 (four) aspects, i.e. format, language, illustrations, a content and is provided general assessment toward teaching materials. Based on that aspect, it is concluded that the teaching materials are valid. Nevertheless, there are still some things require revision based on the corrections and suggestions validator, i.e. ;(1) Teachers book is equipped with instructions or problem solving steps;(2) utilization operational sentence on basis competence indicator; (3) utilization repeated term should be avoided; and (4) utilization words or sentences that communicative with teachers and students without decrease its scientific meaning.

Furthermore consistency and stability level of validator to teaching material is obtained coefficient Percentage of Agreement (PA) 0,83. This result shows the consistency and stability level of validator to teacher books result validate.

d. Achievement test result validation

Test competence learning result and rubric assessment is done validated contents by professional and practitioners in expertise electronics industry field, stages which is done to discuss and thrifty carefully together professional and practitioners about test content that will be given to students according to teachers books and students books already made. The next stage, make points test according to the level of knowledge (analysis, application, synthesis and evaluation).

Result validation analysis that show at table 2, afterwards compared with criteria, concluded that results learning test fulfill content validity. Furthermore consistency and stability level of validity toward test competency results learning is obtained coefficient Percentage of Agreement (PA) 0.74. These results show the consistency and stability level of validity toward learning test result.

2. Validation result instrument

All instruments are used in development learning model DKK previously been assessed for feasibility by professional and practitioners. Feasibility assessment of each instrument is reviewed by 3 (three) aspects, i.e. instructions utilization, materials (content), and language (mean score 3,78). Refers to



data regarding, can be state that 5 (five) instruments feasibility is used without revision and 2 (two) instruments feasibility is used with revision. Revision is done include improvement sentence, a statement which has double meaning, understanding the same concepts, and writing consistency. Thus instrument has been revised feasibility is used to collect data validity, practicality, and effectiveness. DKK learning model based problem solving.

Like other validation sheet, some improvements and suggestions which is done to validation sheet, i.e. (1) Language and Grammar is corrected so students is easy understood; (2) produces learning model that contains components syntax, social system, accompanist and support impact, learning theories base problem solving which is part of innovation learning at SMK; and (3) produce final product based on validation result with considered that the product fertilization is used to next test process.

#### D. Phase Test, Evaluation and Revision

Activities at this stage is done at the next research stage, by conducting test initial product that has been designed and review then implemented in limited classes and expanded class.

Result research was supported by research Atiko Nur Oktaviani & Sunyoto Eko Nugroho (2015) which resulted that learning Creative Problem Solving familiarize students to develop creative mind processes in resolving a problem with structure steps so students is better to understand the concepts and be able to communicate his mind Maryuli Darmawan (2013) stated that based on the I and II cycle observation, it can be seen an increase towards independently 19% from first value is 72% to 91% by using learning strategies problem solving. Furthermore results resource Tri Kuncoro & Amat Mukhadis (2012) state that learning strategies open ended problem solving is more superior than closed-ended problem solving strategy to group learning styles diverging, assimilating, converging and accommodating. Learning styles converging is more superior to diverging learning styles at learning open ended problem solving and closed-ended problem solving.

#### IV. CONCLUSION

*First*, initial investigations results already produce need analysis learning design based problem solving, namely; (1) Identify aims learning DKK with related subject electronics industry expertise, (2) various problem implementing direct learning model; and (3) prior knowledge and student character; and various learning problems based problem solving. *Second*, produce learning models that contains syntax component, social system, accompanist and supporter impact, learning theories based problem solving. This model is produce based on suggestions / improvements result of the validator. *Third*, produce final result validation with consideration that it model is feasible used to next experiment process.

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## CONTRIBUTION OF LEARNING MANAGEMENT CLOTHING BUSINESS OF READINESS PLANTING BUSINESS TEXTILE CRAFT

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**ABSTRACT** : This study examines the contribution of learning outcomes with the readiness Clothing Business Management pioneering textile craft business. The aim of research to obtain the data, how the contribution of learning outcomes with the readiness Clothing Business Management pioneering textile craft business. The study population is students of Education Studies Program dressmaking class of 2013, using a random sample numbered 30 people. The research method using descriptive methods, with techniques of data collection in the form of tests and questionnaires. The findings show that the learning outcomes of Business Management Clothing and readiness pioneering textile craft businesses that are in sufficient criteria. Conclusion The study shows that the learning outcomes of business management outfit with indicators of the concept of business management, elements of business management, business management, and business concepts textile craft contribute to a positive and significant but included in the criteria of small on the readiness of the pioneering business textile craft in terms of the index coefficient of determination. Suggestions This research aimed to learners should further enhance the knowledge of Business Management Clothing that can be the foundation for a pioneering business venture textile craft and to future researchers in order to examine internal and external factors that cause little influence learning outcomes Management of Clothing on the readiness of the pioneering business kriya textiles.

*Keywords: fashion business management, pioneering, textile craft business.*

### I. PRELIMINARY

Kriya is an activity or craft creative in creating a variety of craft that has aesthetic value (decorative objects), the value of the function / use (disposable items), or have them both that have aesthetic value and has a value function. Opening a business is a business activity that is carried out either individually (individual) or an organization with the aim to make profit, as disclosed Hugres and Kapoor (Buchari Alma 2009: 21): Business is the organized effort of individuals to produce and sell for a profit , the goods and services that satisfy society's needs. The general terms of business Refers to all such effort within a society or within an industry. (Business or business is a business activity of individuals organized to produce and sell goods and services to gain an advantage in meeting the needs of the community. In general, these activities exist in society, and there is in the industry).

Clothing Business Management lectures held on the 3rd semester with a weight of 2 (two) credits. Interest lecture MUB as stated in the syllabus that after taking courses MUB students can understand the scope of business management, business type field, planning and organizing, directing and coordination, purchasing, capital and operating expenses, bookkeeping and determining the selling price, environmental impact, health and labor (Syllabus Class MUB, 2014).

Outline of the Business Management Clothing material covers the basic fundamentals of business management of clothing, a clothing business, type of business in clothing; business couturier, atelier, tailoring, boutiques, galleries clothing, intermediate clothing, distribution, factory outlets, clothing, venture garment, the garment, planning and organizing, directing and coordination, purchasing, capital



and operating expenses, bookkeeping and determining the selling price, environmental impact, health, and labor (MUB Class Syllabus 2014).

Clothing Business Management study results can be seen from the student competencies acquired, they understand the function, the nature and principles, objectives and management role in the business of fashion, one of them in textile craft business. The study results should contribute to the readiness pioneering textile craft. Associated with pioneering textile craft, learning outcomes Clothing Business Management is expected to provide knowledge and managerial skills of the business, so that the learning outcomes appear on the change in behavior of learners called learning outcomes. The learning result is the ability of the students after receiving their learning experience that includes knowledge, attitudes, and skills (Nana Sudjana, 2011. p, 22). The success of a learning process can be seen from the changes in students' knowledge is seen from the results of learning obtained. Management learning business

Clothing can be used as a benchmark whether learning outcomes are achieved by learners is optimal and can be the foundation of readiness pioneering textile craft business. Management learning outcomes fashion business is expected to be a provision to the readiness of business pioneer textile craft products mainly decorative objects as well as disposable items.

Understanding business readiness pioneering textile craft business refers to the above opinion is student readiness for business pioneer textile craft business. Readiness is one indicator of the success of the learning process to prepare learners who are skilled in entering the world of work and opening a job (Slameto 2010, p. 113). The preparation is expected to obtain a student of Business Management courses Clothing. Description of the background research issues such as a benchmark the author to conduct research on the contribution of learning outcomes with the readiness Clothing Business Management pioneering textile craft business. Formulation of the problem is an essential part of doing research. The problems are used as a guideline in determining the next steps. The formulation of the issues examined in this study is "How Contributions of Learning Outcomes Business Management Pioneering Clothing For Business Readiness textile craft".

### **Research Objectives**

The goal of this research is to gain an overview of the contribution of learning outcomes Clothing Business Management as a business pioneer textile craft readiness by the students of Education dressmaking 2013 UPI forces who have followed this course to obtain data on:

1. Results of studying fashion business management in terms of indicators: textile craft business management concepts, management elements of textile craft, textile craft management areas.
2. Readiness pioneering textile craft
3. Contribution of business management learning readiness pioneering fashion as textile craft business
4. The contribution of business management learning readiness pioneering fashion as textile craft business



## **Benefits Research**

The results obtained are expected to provide benefits to all parties, especially researchers and Education Studies Program dressmaking either directly or indirectly are as follows:

### 1. Theoretically

The result is expected to enrich and increase the knowledge, experience, and insight into the pioneering textile craft business for learners.

### 2. Practically

- a. The results of this study are expected to be used as input for the given advice in an effort to respond to the study of students to improve the quality of learning, the development of learning materials and the learning process as readiness Clothing Business Management opened a textile craft business
- b. The results of this study are expected to motivate learners in the learning process to develop themselves and improve their competence as readiness opening textile craft business

## **Location, Population and Sample Research**

The location was chosen in the study is the campus of the University of Education Indonesia PKK FPTK Department at Jalan Dr Setiabudhi no. 207 Bandung. The population in this study were students of the Department of Education study program dressmaking PKK FPTK UPI Bandung force in 2013, with a sample of 30 people who had followed the fashion business management courses.

## **Methods**

The method used in the study is research dekskriptif that focus on the actual problem as their problem when the study was conducted. Method is expected to provide information on the Contributions of Learning Outcomes Business Management Textile Clothing Against Planting Kriya. This research is done by taking steps of data collection, classification and analysis of data processing as well as the conclusion, with the test (test) and Questionnaire or questionnaire, by means of processing and analyzing data. The steps are performed: a) Verification of the data is the examination and selection of answer sheets that really can be further processed, b) Scoring on the whole question of assessment instruments using the guidelines scoring Likert scale the highest score five and lowest scores 1atau modification of scale Likert each option was given a score of 1 and respondents could choose more than one answer. , Test the validity of this research using product moment correlation formula (product moment) with SPSS 20. The test criteria: the instrument is said to be valid when  $t > t$  table,  $t$  table obtained from tabelnilai product moment  $r$ ,  $n$  30 people with a significant level 0, 05 obtained  $t$  table 0.361. Item  $t$  greater than table included in the category Valid.

## **Discussion of Results**

Discussion of the results of the research contributions of learning outcomes with the readiness Clothing Business Management pioneering textile craft business, compiled by the research objectives, hypotheses, the theoretical basis, and the data processing will be described as follows:





1. Learning Outcomes Management of Clothing The learning result is a capability of the students after receiving their learning experience that includes knowledge, attitudes, and skills (Nana Sudjana, 2011., 22). Indicators of learning outcomes Clothing Business Management consists of the basic concepts of business management textile craft, textile craft elements of business management, business management fields of textile craft. Results of research on learning outcomes of Business Management Clothing on students Prodi Education dressmaking department PKK FPTK UPI Bandung force in 2013 with indicators of management concepts textile craft more than half of respondents are in sufficient criteria, indicators management elements textile craft less than half of respondents are in sufficient criteria, indicator textile craft management field for more than half of respondents are in sufficient criteria, indicators textile craft party concept more than half of the respondents are in sufficient criteria. This finding indicates that the student has not fully mastered the subject Business Management Clothing Levels of mastery learning outcomes of students who generally are in sufficient criteria was allegedly influenced by internal and external factors that are not investigated by the author.

2. Pioneering Business Readiness Kriya textiles Readiness by Slameto (2010, p. 113), namely: the overall condition of a person who makes it ready to respond or answer in a particular way to a situation which covers the physical, mental, and emotional. Pioneering effort is the first step the establishment of an undertaking that requires careful preparation in order to obtain good results. Textile craft is the type of business or establishment that sells or offers products with high quality materials and quality stitching, sewing techniques, as well as the application of good decoration. Results of research on the readiness pioneering textile craft are at sufficient criteria. The findings of this study indicate that less than half of the respondents already have opened a textile craft starting readiness of understanding the concept of textile craft management, element management of textile craft, textile craft management areas. Readiness is essentially the individual's willingness to do a job and act with all conditions / state owned (Slameto 2010, hlm.113). The study's findings about the readiness pioneering textile craft that are at sufficient criteria shows that learners have sufficient ability and motivation to learn skills in a fashion that supports pioneering textile craft. Motivation that is a driving force that transforms the energy in a person in the form of real activity to achieve certain goals (Syaiful, 2011, p. 148).

3. Contribution of Learning Outcomes Business Management Business Pioneering Clothing Against Readiness Kriya textiles Normality test results showed that the variables X and Y have normal distribution. These findings indicate that the hypothesis testing can be done by using the parametric product moment correlation coefficient. Simple regression analysis results obtained by the functional relationship between the variables X (learning outcomes Clothing Business Management) and Y (readiness pioneering textile craft), namely:  $Y = a + bX$  is  $Y = 26.99 + 0,66X$ , means regression Coefficient of 0.66 states that any additions (+ sign) a point of learning outcomes will improve readiness by 0.66. Conversely, if the learning outcomes down by 1 point, preparedness is also predicted to decrease by 0.66. So, the sign (+) states prediction direction unidirectional (linear). Description increase or decrease in the independent variable (X) will result in an increase / decrease in the independent variable



(Y). The hypothesis testing results obtained outcome variables studied Business Management Clothing and textile craft pilot readiness Sig value of 0.004, then compared with a probability of 0.05, it turns probabilitas value of 0.05 is greater than the probability value Sig [0.05 > 0.004] So  $H_0$  rejected and  $H_a$  accepted, meaning that significant, in other words, "There is a significant positive contribution of learning outcomes Clothing Business Management (variable X) on Readiness Planting textile Kriya (Y)

4. The amount of Contributions of Learning Outcomes Business Management Business Pioneering Clothing Against Readiness Kriya textiles The result of the calculation coefficient of determination (KD) obtained a significant and positive contribution of 25.9% of the clothing business management study on the readiness of the pioneering textile craft. The rest 74.10% allegedly influenced by other factors. Results studying fashion business management views of business management achievement test readiness questionnaire peintisan clothing and textile craft donations or a significant and positive contribution of 25.9% on the readiness of the pioneering usaaha boutique business, findings show that the learning outcomes fashion business management contributed little impact on the readiness of pioneering textile craft. This situation is expected because the material on Business Management Clothing is not discussed in depth so that students do not really understand the pioneering textile craft. This contribution shows that learning outcomes fashion business management has not contributed the maximum to the readiness of the pioneering textile craft, due to the pioneering textile craft requires diligence, rigor, tenacity which is not only supported by knowledge of subjects Fashion Business Management. Their considerable contribution to the readiness of the pioneering textile craft can be concluded that the readiness pioneering textile craft is not only influenced by the results of learning, but rather influenced by other factors not discussed or examined in this study, the factors are likely to consist of family and neighborhood participants learners.

## II. CONCLUSIONS AND RECOMMENDATIONS

The conclusion of this study is based on research purposes, the data processing and discussion of the results of a study entitled "Contribution of Learning Outcomes Business Management Preparedness Against Clothing Business Pioneering textile Kriya". conclusions of this research are:

1. Learning Outcomes Management of Clothing Results of research on learning outcomes acquired Clothing Business Management Education students Prodi dressmaking based indicator management concepts textile craft, textile craft elements of management, field management of textile craft, textile craft concept in general respondents more than half are on sufficient criteria. The results showed that not all respondents understand the subject matter of fashion business management. Clothing Business Management learning outcomes which are at sufficient criteria allegedly influenced by internal and external factors that are not investigated in this study.
2. Readiness Pioneering textile Kriya  
Results of research on the readiness of business pioneering textile craft less than half are in sufficient criteria. The results of this study indicate that students have sufficient readiness in pioneering textile craft business. perintisana readiness textile craft business located on the criteria



sufficiently influenced by motivation and purpose in self-learners, learning experiences and environmental factors, whether family, school, or social learners in the community.

3. Contribution of Learning Outcomes Management of Clothing The results of hypothesis testing positive correlation coefficient values obtained are significant. The results of this study indicate that the working hypothesis is accepted, in other words there is a significant positive contribution from Business Management Learning Outcomes Clothing (variable X) on the readiness of the pioneering textile craft business (variable Y).
4. The amount of Contributions of Learning Outcomes Management of Clothing Judging from the coefficient of determination, learning outcomes Clothing Business Management contributed little to the readiness of business pioneering textile craft is in terms of learning outcomes Clothing Business Management courses.

These suggestions are aimed at students Prodi author dressmaking Education Ministry PKK FPTK UPI Bandung force in 2013. The results showed that the learning outcomes of Business Management Clothing indicator management concepts textile craft, textile craft elements of management, field management of textile craft, textile craft concept in general are the sufficient criteria. This shows that learning outcomes Clothing Business Management in sufficient criteria, among others, due to the lack of student understanding of the teaching materials Clothing Business Management and allegedly influenced by internal factors and eksternal not examined in this study. The results of the study should be a motivation so that learners are able to improve their knowledge and can be the foundation for pioneering textile craft, and to future researchers in order to examine internal and external factors that cause little influence learning outcomes Clothing Business Management Readiness pioneering textile craft.

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## E-COMMERCE SYSTEM MODEL FOR ENTREPRENEUR FROM DIGITAL NATIVES GENERATION WITH NON INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) BACKGROUND (CASE STUDY ON INDONESIA UNIVERSITY OF EDUCATION STUDENTS)

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**ABSTRACT:** *The aim of this research is to determine the most suitable and user friendly e-commerce systems for entrepreneur from digital natives generation with non information and communication technology (ICT) background. The research involved 20 students in bachelor degree of Indonesia University of Education as its sample which is consist of 20% participants with ICT background and 80% participants without ICT background. In this case the models of e-commerce system are classified into three models namely cloud-based e-commerce/ e-marketplace (Bukalapak.com), non cloud based e-commerce/ web e-commerce (Prestashop), and social media based e-commerce (Facebook Fanpage). Participants are given practical training programs to create and manage the three models of those e-commerce systems, which is organized in 16 sessions for 8 months. Based on observations during training process, routine evaluations, and questionnaires, all participants (100%) declare to choose cloud based e-commerce system/ e-marketplace as the most suitable and user friendly e-commerce system, in terms of cost, creation, management, features, security, and market segment which there is 1 participants (5%) gives a note that the marketplace is selected within the limits for Small and Medium Enterprises (SMEs) scale.*

**Keyword:** *E-Commerce, Online Shop, E-Marketplace.*

### I. INTRODUCTION

In a broad definition, e-commerce transactions can be defined as an electronic transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organizations, conducted over computer mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line [1]. While the electronic marketplace can be defined as a virtual marketplace where buyers and suppliers meet to exchange information about product and service offers, and to negotiate and carry out business transactions [2].

Digital natives is the generation born after 1980, when the digital social networking technologies such as Usenet and Bulletin board system comes online/ birth. They all (digital natives) have access to networked digital technologies and have the skills/ ability to use those technologies [3]. Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [4].

Based on data that released by the Central Bureau of Statistics Republic of Indonesia (BPS), in August 2015 the open unemployment rate in Indonesia amounted to 6.18%, equivalent to 7.6 million



people, an increase of 0.37% compared to February 2015 which is 5.81% [5]. To suppress the unemployment rate, the government (through various ministries) have been promoting various programs including the new entrepreneurs incubator program, the establishment and development of Small and Medium Enterprises (SMEs), fostering cooperatives, capital support, and implementation of entrepreneurship programs for student in various universities such as Student Entrepreneur Program (PMW), and a Program of Student Creativity in Entrepreneur (PKM-K).

Based on data released by the Association of Indonesian Internet Service Provider (APJII) mentioned that the penetration of Internet users in Indonesia continues to increase from year to year, in 2005 by 7.8% (16 million) and in 2014 amounted to 34.9% (88.1 million), where a sector which dominates internet usage in Indonesia in 2014 is the trade sector by 31.5% and the service sector by 26.1% [6]. Increasing the number of Internet users is not separated from the development of supporting technology internet access that is getting reachable such as smart phones, tablets, USB internet modem, and other portable devices. In 2014, the Internet access technology most widely used in Indonesia is the mobile phone of 85%, where 11% of Indonesian Internet users do buying or selling Online when access the internet [6].

In Indonesian E-Commerce Association (IDEA) there were 35 e-commerce marketplaces that is included into the category, which includes bukalapak.com, and 106 e-commerce are included in the category of online retail [7]. As a new e-marketplace, which was founded in 2011. In 2015, bukalapak successfully grown rapidly and is able to occupy the fifth position as an e-marketplace that is most widely used in Indonesia, with a percentage of 9.58% [8], and till November 2015 has 500 thousand members (MSMEs) are joined by an average transaction value of 8 billion per day [9].

ICT developments and an increasing number of Internet users in Indonesia has become the driving factors for the growth of various e-commerce and e-marketplaces enterprise in Indonesia as a cloud based online marketing, which is meet buyers and sellers in cyberspace. Existence of social networks also have encouraged their online transaction, who carried out by individuals by utilizing channels of communication in different social networks and messenger applications such as Facebook, Instagram, Blackberry Messenger, WhatsApp and others. In addition, the increasing number of e-commerce content management system (CMS) that can be used free of charge, as Prestashop, OpenCart, Woocommerce and others, increasingly allow the entrepreneur of e-commerce to build e-commerce website (non-cloud based) independently.

This research aims to find a model of e-commerce system that is the most relevant and user friendly for the entrepreneur from digital natives generation with non information and communication technology (ICT) background. In this research, the model of e-commerce system is restricted and classified into three: cloud based e-commerce, in this case using e-marketplace bukalapak.com; non cloud based e-commerce, in this case using Prestashop CMS; and social media based e-commerce, in this case using Facebook Fanpage. From these three models, testing and research to seek which model is most relevant to use and user friendly in terms of cost, creation, management, features, security, and



market segments was conducted. This research takes a case study on students of Indonesia University of Education.

## **II. METHODS**

The research was conducted upon students of Indonesia University of education with 20 people of sample. The sampling was based on predetermined criteria, that is: students who are has already built a business, a graduate student, students which will take entrepreneurship subject, students PMW (Program Mahasiswa Wirausaha, Student Intrepreneurship Program) program, HIMA Himpunan Mahasiswa, Student Organization of Department level) representatives, and student representatives of SME entrepreneurship. Furthermore, the selected students will be selected again based on his or her experience in ICT to make a comparison between the generation of digital natives with ICT background and non ICT background. During the study participants were given training applications applied in making cloud based e-commerce (e-marketplace), non cloud based e-commerce, and social media based e-commerce.

E-marketplace used is bukalapak.com sites. It's because bukalapak.com being a marketplace with fastest growth in Southeast Asia, with sales growth per month is more than 20% [10] and the nominal value of transactions per November 2015 amounted to IDR 8 billion per day [9]. In addition, the site bukalapak.com also ranked fifth as an e-marketplace that is most widely used in Indonesia, with a percentage of 9.58% [8].

Non-cloud based E-commerce that used is the CMS Prestashop, this is because Prestashop is the winner in the "Open Source E-Commerce Application Award" held by Packt Publishing in 2010 [11]. Prestashop also ranked fifth as e-commerce technology used in the world, with a percentage of 5.34% [12].

Social media based e-commerce that used is Facebook Fanpage. From 88.1 Million internet users in Indonesia, as many as 87.4% of them use the internet to access social networks [6]. Facebook is a social network with the largest number of users in Indonesia as many as 79 million users per November 2015 [13]. Features of Facebook is quite diverse, including the manufacture of business Fanpage for free. These three factors are used as a basis for consideration choosing Facebook Fanpage as social media based e-commerce being used.

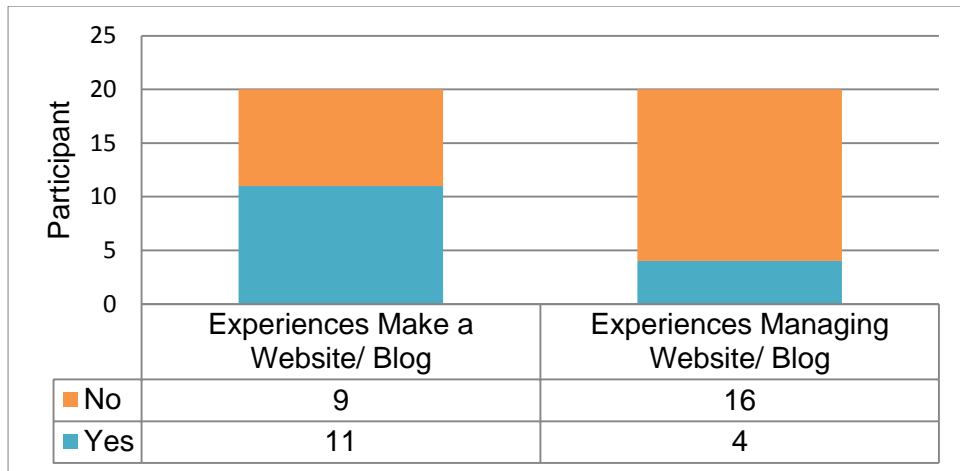
After being given practical training program to create and manage the three models of e-commerce system, then a team of researchers conducted a survey of a sample/ participant in choosing and determining the model of e-commerce system that is relevant for use and user friendly. The data collection instrument used was a questionnaire consisting 6 pieces of choice questions and 6 pieces of essay questions.

## **III. RESULTS AND DISCUSSION**

### **A. Participants Profile**

Participants were involved in this study is 20 bachelor students with 55% of them is the students who will be pioneering business, and 45% of them are students who have their own business. Based

on Information and Communication Technology (ICT) background, as much as 20% of participants had experience in ICT, while 80% of participants do not have experience in ICT.



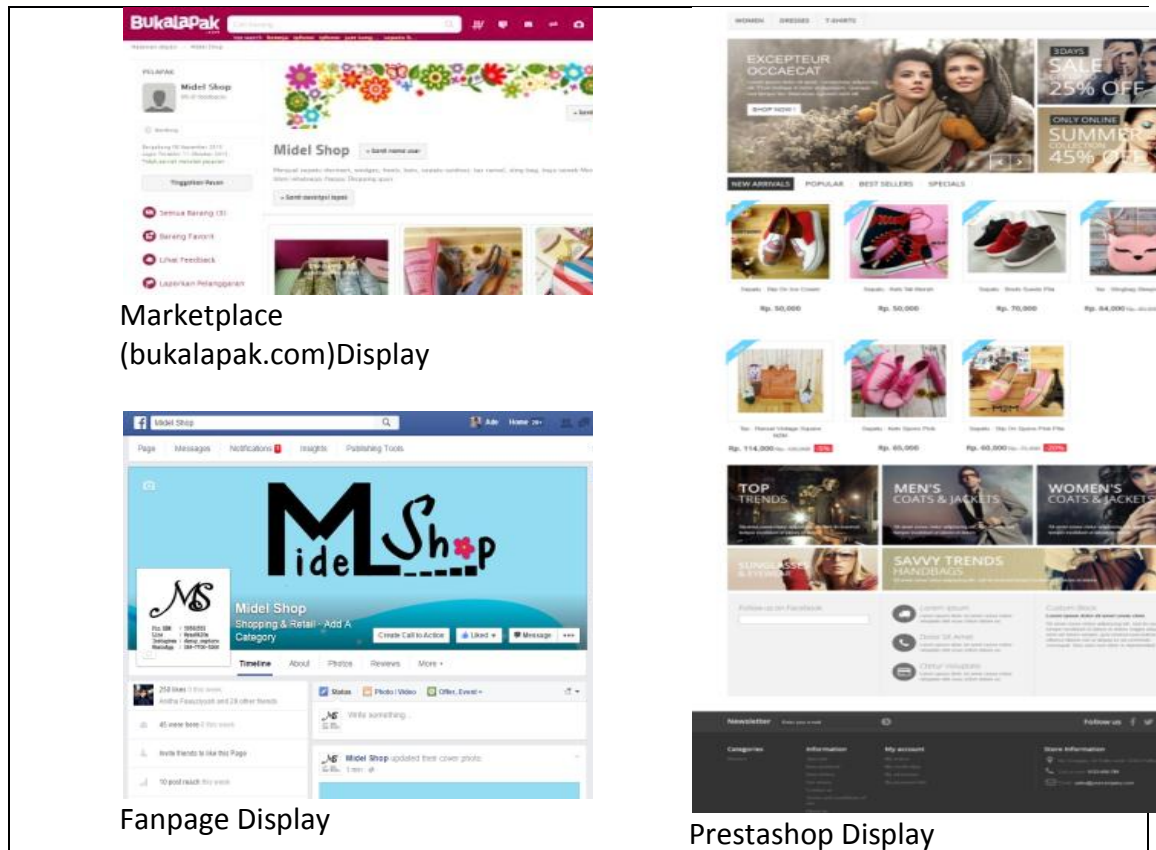
**Figure 1.** Diagram of Participant Profile Based On ICT Background

From the diagram (Figure 1), 9 participants had never made a website or blog, while 11 other participants ever made a blog account college assignment purpose. Meanwhile, 16 participants (80%) never manage a website or blog, while the four other participants (20%) have experience in managing a blog.

Marketing of products by the participants mostly via internet messengers like WhatsApp, BBM, and Line, which is 95%. Besides via the Internet messenger, marketing is done well through the printed media (40%) such as pamphlets, brochures, and banners; mobile (35%) such as SMS broadcast and telephone; Facebook (20%); and Instagram (15%).

#### B. Resulting Output

In this research, the participants were given practical training program to create and manage the three models of e-commerce system: cloud based e-commerce (Marketplace: bukalapak.com), non cloud- based e-commerce (Prestashop CMS), and social media based e-commerce (Facebook Fanpage). Here is one example of an e-commerce generated by the participants:



**Figure 2.** Displays of e-Commerce Examples Who Created By Participants

C. Questionnaire Results of Model E-commerce System

Based on observations during the training program, routine evaluation, and questionnaires given, all participants (100%) declare to choose cloud based e-commerce system/ e-marketplace as the most suitable and user friendly e-commerce system, in terms of cost, creation, management, features, security, and market segment.

	Cost	Creation	Management	Feature	Security	Market Segment
Participant Fanspage	0	4	4	3	4	4
Participant Prestashop	0	0	0	1	6	4
Marketplace	20	16	16	10	10	12

**Figure 3.** Participants Questionnaire Results of the Choosing Model E-Commerce System

The reason that being a consideration of the Choosing model e-commerce system by the participants described in the following table1:



**Table 1.** Reason of Consideration In Election Model E-Commerce System

Measured Aspect	<i>Bukalapak.com</i>	<i>Prestashop</i>	<i>Fanspage</i>
Cost	Free	Should pay to make the hosting and domain	Free
Creation	Free, just an email.	Must have hosting and domain first.	Free just email and facebook account.
Management	Easy, users just upload photos of products, price list, and product descriptions.	Difficult, have to mastering of programming to be able to manage the website.	Medium, product photos can be classified with a neat and attractive. Price and description of any product can be input directly on the photo caption.
Features	Medium, the user can see the number of orders, the ordering address, chat with buyers, and some other features. However, the image display products less attractive	5. Simply complete, the user can view the orders, chat with the buyer directly, know the traffic of visitors, add to cart feature that allows the buyers see the products that have been ordered, and the products sold can be displayed with a draw. 6. There are a variety of themes for e-commerce web that can be used. 7. Branding a product can be done quickly and more personal.	Medium, users can chat directly with a buyer, and product displays can be classified by category.
Security	Security systems: secure from hacking.  Transaction security: guaranteed because the seller has been verified first, and payment is made through a joint account so that there is guarantee refund to the buyer when the goods are not shipped.	Security systems: potentially exposed to hacking.  Security transaction: the seller must build trust to buyers as a honest and trustworthy sellers. Image of trust more easily obtained by webstore/ Online Shop than Fanpage.	Security systems: potentially exposed to hacking.  Security transaction: the seller must build trust to buyers as a honest and trustworthy sellers.
Market Segment	Marketplace traffic that is high enough, so that the products sold are more likely to be searched and visited by prospective buyers.	It takes Search Engine Optimization (SEO) technique to increase webstore visitor traffic.	To increase visitor traffic, carried by promoting the page to get a lot "like".



#### IV. CONCLUSION

This research involved 20 students of Indonesia University of Education with 20% background in ICT and 80% do not have a background in ICT. Participants are selected by reference to predetermined criteria. During the research participants were given practical training program to create and manage cloud based e-commerce, non-cloud based e-commerce, and social media based e-commerce. E-commerce or e-marketplace that is used is bukalapak.com sites, while non-cloud based e-commerce is used Prestashop CMS, and social media based e-commerce used is Facebook Fanpage.

After being given practical training program to create and manage the three models of e-commerce system, then a team of researchers surveyed participants in selecting and determining the model of e-commerce system that is relevant for use and user friendly. From the aspect of costs, 100% of participants chose the marketplace; whereas from the creation and management aspect 80% chose the marketplace and 20% chose Fanpage. While in terms of features, 50% of participants chose Marketplace, 35% choose to use CMS Prestashop, and 15% use Fanpage. Judging from the aspect of security, 50% chose Marketplace, 30% chose CMS Prestashop, and 20% chose Fanpage. The last, in terms of market segmentation, 60% said they chose the marketplace, 20% of participants chose to use CMS Prestashop, and 20% use Fanpage.

Based on these survey results, we can conclude that all participants (100%) stated choose a model marketplace based e-commerce system, in terms of cost, creation, management, features, security, and market segment, in which one person participants (5%) give notes that the marketplace be selected within the limits of small and medium enterprises (SMEs) scale.

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## ANALYSIS OF PROGRAM DEVELOPMENT OF ENTREPRENEURSHIP IN SOUTH KOREA

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**ABSTRACT :** *Entrepreneurships activity in South Korea State caused the growth of South Korea's economy. South Korea became one of the countries with the greatest economic power in the world. The South Korean governments include the concept entrepreneurship early age through education to the younger generation so that South Korea has a number of entrepreneurs 4 percent of the total population. The South Korean government gave full support to the business community by providing infrastructure, capital, low taxes, and quality of human resources. Entrepreneurship incubator optimal was given the guidance by the government. Besides that, the Government also gave attention and strong support to education, research, and human resource development to entrepreneurship. Orientation export of market for grand strategy over the world market has been prepared since the beginning. South Korea's success can't be separated from the development of powerful national character, highly trained labor force, a relatively clean government, solid macroeconomic and socio-political conditions that are free from conflict, and the love of the society on domestic products. Incentives for innovation ease of creating and dissolving the SME, the perception of risk and reward makes South Korea is able to bring successful entrepreneurs, which resulted in the country's economic progress.*

**Keywords:** *Analysis of Development, Entrepreneurship.*

### **I. BACKGROUND**

Capitalism and liberalism system domination which is spread in all economy system over the world, entrepreneurship movement is the equalizer between capital-oriented market interests and social necessity that has social equality perspective. With the spirit of collectivism, entrepreneurship is an economic umbrella organization that empowers internal resources independently with the spirit of togetherness. The responsive rule of the government is needed to manage and organize economic matter for society to get prosperity service with good standard. The country has duty to build optimal prosperity level for its people by improving public service quality and public policy reformation. The country also has to be adaptive toward fluctuating social and economy changes in country reformation to aim the prosperity. Entrepreneurship is viewed by many as an engine of economic growth; encouragement of entrepreneurial behavior by means of entrepreneurial education is discussed in academic as well as in popular literature (De Grez & Van Lindt, 2013; Van Praag & Versloot, 2007). Research has demonstrated that entrepreneurship can be taught (Drucker, 1985; Kuratko, 2005; Peterman & Kennedy, 2003). Developed countries in general have more entrepreneurs compare to developing and poor countries. South Korea, for example, has 4 percent of entrepreneur from the total of its people (Sulistiyo, 2015). According to the entrepreneur David McClelland, a country will achieve the prosperity level if the total of the entrepreneur is at least 2 percent from the total of its people (Astamoen, 2005: 11). South Korea is a country that has developed rapidly in the last four decades. This is exceedingly influenced by the government policy that changes the orientation of its economy from agriculture to trading and technology industry which is involved the entrepreneurship. After World War II, South Korea is included to one of the impoverished country in the world which is



still rely on agriculture aspect. After that time, South Korea arose and started to build developing country standard for industry, such as textile, shoes, etc. The person in charge in ginseng country wanted a full aspect, all of the necessity had been prepared start from infrastructure, human resources, and knowledge for heavy industrial level, automotive, and shipping that was not built to dominate the world. The export marketing orientation had been prepared from the beginning as its 'great strategy' to dominate global market. This is because they realized with the very limited natural resources and internal small market, the only way out is *export oriented*. To accelerate this strategy, the government gives full support toward the business. By providing the infrastructure, capital, low-tax payment for superior industry and preparing high quality human resources. The efficiency and quality management on bureaucracy level, where the bureaucrats are educated with the quality world-class discipline and learning process. The reduction on inefficiency is able to produce a quality policy without leaving the bureaucracy rules behind.

South Korea government also gives attention and support consistently toward education, research, and human resources building to be an entrepreneur. The government of South Korea makes a success to encourage the entrepreneurs in that country to develop the nation. In addition, major role of government to introduce entrepreneurship since earlier through the education to young men and make it easy for society to keep the entrepreneurship spirit while they are still in educational level and later. South Korea also gets involved in character building and strong South Korean, well-trained labor force, well-managed foreign debt, the government which relatively clean, solid macro-economy, and social-politic condition which relatively free from conflict, those conditions make the entrepreneurship spirit of South Korea people grow firmly and becoming one of the factors contributes in the success of South Korea economy development, mainly through trading industry sector that nowadays, dominate the global market.

## **II. MATERIAL AND METHOD**

This study is undertaken by reviewing some scientific studies such as books, and international and national journals.

## **III. DISCUSSION**

### **1. Entrepreneurship Practice in South Korea**

At the beginning of independence, South Korea used to be an impoverished traditional agricultural country and had to rely on foreign debt. But in some decades later, South Korea arose and becoming respected industrial country in the world. South Korea achieve incredible achievement that flip over all the low-sight for this country. During the year 1960-1990, South Korea started to arise marked by becoming one of the rapid development countries. In 1988, South Korea succeeded in becoming the host for World Olympic 1988. During 1990s, South Korea made it to become developing country with high economy growth and human development index. Until today, South has beaten many countries including Europe. South Korea becomes the 15<sup>th</sup> country with economy power globally and the fourth in Asia behind Japan, China, and India. This country becomes one of the exporter countries for main high-tech manufacturer product, started from electronic equipment,



cars/buses, ships, machineries, petro-chemistry, and also robotic. One of the powers of this country is moved by network system. The nation of South Korea apply the same network root, that is trust, or well-known as *Chaebol*. Chaebol network in South Korea means the giant corporation conglomeration who have power South Korea economy. Among of them is the giant Samsung, LG, Hyundai-Kia, etc.

The people of South Korea have a very high work-ethos. In 2012, this country is known to have the longest work hours among the OECD (Organization for Economic Cooperation and Development) countries. This industry power is supported the authorizing domestic market by its nation. When the local products are salable, as the results, local companies will also develop and become bigger even become giant. The character of South Korean who love and proud to use local products make the large companies in that country appear to be domestic *leader market* and gradually becoming *leader* in other countries. Giant corporation product becomes the first choice of South Korea people. The other factor is the existence of strong partnership between governments, non-public sector, and society, along with society ability to adapt fast with technology changes and new challenges.

South Korea is known for its high entrepreneurship spirit. It is possible for some business group to exist in global competition for pretty long period. Entrepreneur incubators are given optimal guide from the government. Indonesia learns the incubator development from South Korea to increase the amount of entrepreneur, as well as increasing workers recruitment. Special place is provided for business incubator for entrepreneur development, such as Suwon Business Incubator Center (SBIC) and Korea Industrial Complex, which is shortly becomes the best business incubator center in Korea.

The significant economy growth in South Korea is supported by some factors, they are the discipline workers, many businessmen with well entrepreneurship skill, and also the history and culture that strengthen both of them. Open market also contributes on economy growth success. Make strategic policy for future investment to make it productive and less waste. Foreign investment is used in strategic sector to stimulate export increase. Economy and industrial development is cannot be separated from its nation empowering in manufacture industry which develop into development research. This industry empowering is supported by local market empowering by its nation. This condition means, if the local products are salable, local companies will developed and become a large company as well. This case directly affects the jobs application. The result of industrial and economy growth is used for the sake of its people.

This rapid entrepreneurship is supported by South Korean government. Smart education is prepared by inviting science and technology experts from other countries. This global knowledge absorbing is made as a tradition to make the next generation of South Korea get used to it, and become a competent expert in science and technology. The accurate mental building gives the inspiration that smart education is the quick factor for entrepreneurship in South Korea.

South Korean Government divide more than 20 percent of the budget to accelerate learning process. The next generation of this country also encourage to study abroad in popular campus all over the world. The research is established, people and research organizations are funded with big amount



by the government. The future market potential industries are analyzed and tried to get by government and non-public sector.

Generally, the characteristics of entrepreneurship culture in South Korea are as follows:

- a. Economy deregulations and foreign companies floe change business attitude
- b. Confucius doctrine which teach to not commercialize changes into quick industrialization and commercialization
- c. Money is the standard for private success, while the businessmen figure used to be seen unimportant
- d. Economy crisis in 1997 resulted restructurization in government corporation system, one of the values is individual freedom, resulted Small Medium Enterprises
- e. The women in South Korea participate in business

## **2. Innovation in South Korea**

Creating talents in South Korea is the inherent part of empowering National Innovation System in that country, the cause of the rapid economy growth in relationship with innovation and implicate rapid economy growth. The factors concerning the South Korean National Innovation System which are encourages innovation output such as scientific work, patent, process, and new products are (<http://dpr.go.id/doksileg/proses1/RJ1-20151210-040422-7678.pdf>) :

- a. Research and Development activity in many business sectors.
- b. Research sector inside governmental and public sector.
- c. High Education and University System.
- d. Interaction between all of those three sectors that can be categorized as capital flow, human resources, and knowledge.

The South Korean National Innovation System reinforcing also means facilitating good science and technology infrastructures such as information and telecommunication technology, where South Korea is at the top in the world in 2004. People call this country as “*Miracle form Han River*” for its economy growth miracle where one of them is based on innovation ecosystem improvement.

## **3. The Incentive for Innovation in South Korea**

One of the supporting factors for innovation development is the incentive given by the government for innovation. The function of this incentive is to help commercializing research and development. By giving this incentive, the government expects to encourage research and development for Small Medium Enterprises and creating new companies in research and development commercialization activity. The followings are the incentive for innovation:

- a. Financial support from government is more than 90% of the total budget for Small Medium Enterprises to commercialize new technology.
- b. Tax reduction is more than 15% of the total budget to build technical training center.
- c. The support for more than 50% of research and development budget when a research and development company or institution gets involved in national project.
- d. The existence of Government Committee for Patent Technology Commercialization providing financial support, technology support, marketing strategy, and management help for Small Medium Enterprises which commercialize new technology.



- e. Government partnership toward the company leading technology transfer (for example: Korean Technology Transfer Center).

#### **4. The Convenience to Build and to Disperse Small Medium Enterprises in South Korea**

The convenience to build Small Medium Enterprises also contributes on the growth of business entrepreneur beginners. Complicated licensing and paying process can obstruct the growth of new entrepreneurs and new investment. With easier licensing and paying process, new entrepreneurs are able to start running the business with easy access to investor to get financial support, and new companies will be able to enter stock exchange with the existence of stock market efficiency. The followings are the conveniences to build and disperse Small Medium Enterprises in South Korea:

- a. Small Medium Enterprises is sponsored by government and non-public company partnership.
- b. The government encourages domestic financial institution and foreign venture capital to invest on non-public venture financing.
- c. The law allows venture investment by using pension finance.
- d. The stock market for companies which are sold more expensive than prime stock market.

#### **5. The Risk and Appreciation Perception in South Korea**

The attitudes of society and government to appreciate and give punishment for entrepreneurs for the risk also impact the growth of entrepreneurs' amount. For example the tax reduction on accumulated income affects the creating of Small Medium Enterprises start up. The risk and appreciation perception of country and society toward entrepreneurship in South Korea are as follows:

- a. Self employed is allowed to divide their income with family members to reduce household tax.
- b. Lower tax for Small Medium Enterprises compare to a company.
- c. The rules for bankruptcy which support business.

#### **IV. CONCLUSION**

Entrepreneurships activity cause economy growth and is a help to decrease the poverty. Take the lesson from South Korea to put entrepreneurships concept in at early age through education to young generation so that society of South Korea easily continue their entrepreneurship spirit when they are at the next education level. The next is, the export-marketing orientation has been prepared since the beginning as its 'big strategy' to overpower global market. To conduct this strategy, government give a full support on business world by providing infrastructures, capital, low-tax payment for superior industry, and preparing human resources with high quality. Efficiency and quality management on bureaucracy level where the bureaucrats are educated with world class and high quality learning process and discipline. This inefficiency reduction allows the making of good quality policy without leaving bureaucracy rules behind.

South Korean government consistently gives attention and strong support on education, research, and the development of human resources to become entrepreneurs. As the impact, entrepreneurships spirit of South Korean grows strongly and becoming one of factors that contribute on the success of economy development. Along with it, South Korean has strong culture and strong characteristics, insistent and hard worker and has high nationalism where the people feel proud to use



their language and local product in comparing to others product or language. The existence of incentive for innovation, the convenience to build and disperse Small Medium Enterprises, the risk and appreciation perception make this country able to create successful entrepreneurs, and strengthen and improve the country and improve people's economy.

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## INCULCATE TECHNOPRENEURSHIP IN THE STUDENT VOCATIONAL FACING ASEAN ECONOMIC COMMUNITY

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**ABSTRACT:** Vocational education is the level of education that is always dynamic changes in educational curricula in accordance with the growth of the job market and adapt to the development of science and technology. This means vocational education will always have a paradigm shift. Vocational education also has the purpose of preparing students to be ready to compete in the world of work, including one in the face of the Asean economic community. One of the efforts that can be made of vocational education in preparing students who can compete in the MEA is to infuse soul technopreneurship. To support this then it takes the right curriculum design, instructional methods that are effective and of course the support of party schools (facilities and quantity) as well as the most important spaces to practice concepts in technopreneurship like searching for business opportunities, markets and tastes as well as the needs of consumers, creating products and marketing strategies. If mindsets are already embedded so students can are invited to plunge in the business world, such as placed on a company in order to realize the ideas, technological innovation. If students already terimotivasi then it can be geared to creating a more sophisticated technological innovation based academic/research so as to benefit the community and the nation.

Key words: Tecnopreneurship, vocational education, the ASEAN Economic Community

### I. INTRODUCTION

#### 1.1 Background

Enter the global era, the world of education in Indonesia at the moment and that will come is still facing the challenges of an increasingly heavy and complex. Indonesia must be able to compete with other countries, both in the products, services, as well as in the preparation of human resources. Indonesia inevitably involved in the process of globalization and the increasingly widespread competition in various forms in the form of goods and services current labor and capital flows. The ASEAN Economic Community (MEA) is one of the opportunities while challenges for Indonesia in dealing with the Asian economy this century.

Through the MEA, the integration of economic sectors. The main concept of the MEA is creating ASEAN as a single market and production base where unity occurs free flow of goods, services, capital, investment and production as well as the Elimination of tariffs for trade between ASEAN countries which are then expected to reduce poverty and economic disparities between its member countries through a number of mutually beneficial cooperation. In pilihnya Indonesia as a center of free trade MEA Indonesia, then the Government needs to do preparations, starting from the preparation of the infrastructure to the preparation in creating human resources (HR) community Indonesia skilled and professional.

To cope with the challenges of globalization, there is no way the most potent, except to increase the competitiveness of the nation. The reality facing at the moment is that the competitiveness of Nations, Indonesia was still weak. Things that affect the low competitiveness, such as the low



management capabilities and both low ability in the field of science and technology, as well as the poor quality of human resources. One way to overcome this is by improving education so as to improve the quality of human resources of the nation.

Vocational education as one of the sub system in the national education system are expected to prepare and develop HUMAN RESOURCES who can work professionally in their field, as well as competitive power in the world of work. Vocational education is the level of education that is always dynamic changes in educational curricula in accordance with the growth of the job market and adapt to the development of science and technology. This means vocational education will always have a paradigm shift. Vocational education also has the purpose of preparing students to be ready to compete in the world of work, including one in the face of the Asean economic community.

One of the efforts that can be made of vocational education in preparing students who can compete in the MEA is to infuse soul technopreneurship. Technopreneurship development of entrepreneurship, i.e. the process and the establishment of new businesses in the field of technology, which is expected by the existence of this technological innovation can put technology as a factor for the development of the national economy.

Technopreneurship probably is nothing new in the world of entrepreneurship, but in the field of education are still many institutions that have not instilled this attitude technopreneurship and apply to students so that upon graduation the students focus more in search of work from in creating their own jobs. That's necessary to study how to infuse soul technopreneurship on vocational students so the students can compete in the era of globalization, especially in the face of the ASEAN Economic Community (MEA).

### 1.2 Formulation Of The Problem

Based on the background that has been discussed above, then the problem can be formulated in this research are:

1. What are the problems facing vocational education in cultivating a technopreneurship soul and apply to students?
2. What measures and strategies that could be undertaken by educational institutions and educators to infuse soul technopreneurship to students so that students are prepared to compete in the MEA?

### 1.3 Research Objectives

As for the purpose of doing this research are as follows:

1. To know and analyze the problems faced by vocational education in cultivating a technopreneurship soul and apply to students.
2. Formulate a strategy that can be done by educators and educational institutions to instill a soul technopreneurship to students so that students are prepared to compete in the MEA.



## 1.4 Reference

### A. vocational education

Rupert Evans (1978): vocational education is part of the system that prepares a person to be more capable of working at one job or one group of field work than other job fields. UUNo. 20 in 2003 about the system of national education Chapter 9: vocational education is the level of secondary education that prepares students especially for working in a particular field. The United States Congress (1976): vocational education is education programs that are directly linked to the preparation of a person for a particular job or additional preparation for a career person.

#### Principles Of Vocational Education:

1. PTK will be effective if the environment of the learners are trained like a replica in the work environment.
2. PTK will be effective if given the task by the way, the tool and the workplace as it is in the industrialized world.
3. SUPPORT effective if exercise can shape the work habits and habit of thinking correctly.
4. the PTK will be effective if the teacher has the experience in applying the skills and knowledge on the real work of oration.

As for vocational education characteristics are:

1. Prepare graduates to enter the workforce
2. Based on the needs of the world of work
3. Relationship with the world of work is the key of vocational education

### B. ASEAN Economic Community

MEA is an abbreviation of the ASEAN Economic Community which has a pattern of integrating ASEAN economies by way of forming the system of free trade or free trade among ASEAN member countries. The members of ASEAN including Indonesia have agreed on an agreement of the ASEAN economic community. MEA is the term present in indonesia but basically MEA is the same with the ASEAN ECONOMIC COMMUNITY or AEC.

MEA will start forming the ASEAN market and became the base of a single production can make ASEAN a dynamic look and can compete with the existence of mechanisms and measures in strengthening the implementation of the new economic initiative; accelerate the combination of the existing regional sector-a sector priority; provide facilities towards business, labor movement has talent and skilled; can strengthen the institutional mechanisms in ASEAN. Be the first step in realizing the ASEAN Economic Community or MEA.

At the same time, MEA will be able to overcome the gap in development and integration of acceleration to do Laos, Myanmar, Vietnam and Cambodia via the Initiative for ASEAN integration and other initiatives of the regional. As for the forms of their cooperation is

1. development of human resources and an increase in capacity
2. Recognition of professional qualifications related



3. Consultation closer towards macro economic and financial policy.
4. Select steps in trade financing.
5. Improve infrastructure.
6. Do the development in electronic transactions through e-ASEAN.
7. Memperpadukan all industries throughout the country to be able to promote the resources of the region.
8. Enhance the role of the private sector to be able to establish the ASEAN Economic Community or MEA.

As for the main features of the MEA

1. highly competitive economic Region.
2. Have the region economic development evenly.
3. These areas will be fully integrated in economic globa
4. a single production Base and market.

### C. Technopreneurship

According to Antonius Tanan (2008) are technopreneurship, the term is a combination of two words namely teknologi and entrepreneur. The word technology comes from the Greek meaning of action sistematis from a know-how, including art. While the solicitor is an action against the commercialization of a product. So that concludes the technopreneurship Tanan is a process of commercialization of the products of the less valuable technology into a variety of high-value products so as to attract consumers to buy or possess it.

According to Tata sutarbi (2013) stated, "that is a process of formation and technopreneurship new venture involving technology as the base, with the hope that the creation of a proper strategy and innovation later could put technology as one of the factors for the development of the national economy".

Technopreneur is a portmanteau of two words, namely technology and entrepreneur. Techonology means something that can ease the work of man, while the entrepreneur means the ability to work alone. Broadly, the technopreneur own means creating something that can help people's lives to earning. In the book Cash Flow Quadrant by Robert Kiyosaki mentions that there are 4 characters in the world in terms of income, namely employee, self-employee, business owner, and investors.

Technopreneurship as an effort in developing innovation and creativity especially in information technology, has become a new means for people to grow real sector. Technopreneurship has opened up a lot of jobs for the community. It is certainly capable of improving a country's economy. With support from various parties, expected technopreneurship is able to continue to grow for the sake of the welfare of society's progress.

## II. RESEARCH METHODS

### 2.1 Research Place and Time



This research was conducted at SMK Kartika Padang city to see the problems faced in embed soul technopreneurship and srategi that can be reached. This research was conducted for 1 month during the month of may 2016.

## 2.2 Data Collection

To collect all the required data in this study then conducted interviews with teachers to find out problems encountered in creating the soul technopreneurship and also some students to find out the extent of their knowledge and interest about technopreneurship.

## 2.3 Analysis Method

After all data is collected then the qualitative data analysis done to describe the problems facing educational institutions in creating and instilling the soul technopreneurship, so that it can formulate strategies. to address the problem.

# III. RESULTS and DISCUSSION

## 3.1 Problems Facing Vocational Education In Cultivating A Technopreneurship Soul And Apply To Students.

Prepare human resources is indeed not an easy job and can be done instantly. More effort is needed to be able to produce HUMAN RESOURCE who have competitiveness in the era of globalization. One trick is to infuse soul technopreneurship to students, so students have the attitudes and mindsets as a provider of employment, not to mention as a job seeker.

But in a technology-based entrepreneurial soul imparts is not an easy thing, there are several constraints that become problems in technopreneurship introduced to students. From the results of research that researchers do, get the results of interviews with some of the students, where most of the students do not know what that technopreneurship, and students do not recognize what the talents and skills that they have to be developed so that it can produce something that has competitiveness. Every day they come kesekolah and learn about the variety of theories in the field Department respectively. Practice activities are also only performed 3-4 times in each semester. This has resulted in inequality and the understanding of the students, where students only know the theory but less balanced with practice, but in practice will be a lot of things – things that will happen in field that is not explained in the theory and is a science that is very useful for students.

The availability of adequate facilities belonging to the school to develop student's skills is also a problem in creating soul technopreneurship. Where this becomes a barrier to transmit ideas and create new innovations. The least facilities such as a tool – the tool of network practices, computer/internet, inadequate labor that comes with technological advances became a barrier for students to transmit ideas they have and get creative with science that they've got.

The budget and the cost of an expensive main factor being the lack of availability of adequate facilities. Where to create a space for creative students then must be equipped with a variety of sophisticated equipment, while the school facilities to provide constrained with budgets.



### 3.2 Strategies That Could Be Undertaken By Educational Institutions And Educators To Infuse Soul Technopreneurship To Students So That Students Are Prepared To Compete In The MEA.

Technopreneurship is a technology-based business incubator, which has the insight to develop menumbuh the soul of entrepreneurship among young people, particularly college students as learners and is one of the new breakthrough strategy for problems like the increasing intellectual unemployment.

Infuse soul technopreneurship is one of the steps that must be taken by education world in particular vocational education to produce human resource who have competitiveness in the face of the era of globalization, especially in the face of the ASEAN economic community. There are some steps that can be done by educators and educational institutions (schools) to menumbuhkembangkan soul technopreneurship in students which are:

- a. Providing guidance and counseling in order to change the mindset of students as job seekers become a provider of employment.

Guidance and counselling is very useful for students to open against the students insight into the world of work. Guidance and counselling is directed to open a student's knowledge of terhapat utilization technology in generating employment and income for them. The activities of the guidance and counselling can be utilized to explore and know the students skill and talent at their disposal so they can improve it. With a known skill and talent on each individual then the next step is to motivate the students to continue to develop his talent. Motivation can be done by providing information in the form of people-people who work on the same field with the talent and skill they have, give information on the development of technology and knowledge in the field and so forth. Expected with the guidance and counseling the students ' horizons will open wider and they are motivated to innovate.

- b. Developing the curriculum by giving more time for practice and the practice of field work to the industry.

With more time given to the activities of the practice then expected the students will understand not only theory but also familiar with the events that occurred, the situation with respect to the theory they've got. Practice activities are extremely important means for vocational education, because education is the vocational education that prepares students for the world of work can plunge directly, he did so with practice in educational activities so students already have a lunchbox when facing the world of work. In addition apprentices/street vendors is also very important, where with his students to factory/industry so students can acquire knowledge directly. Students also can learn a lot from the world of work that directly looks in front of the eyes. So it is expected students have the independence to be able to create and innovate, and gained knowledge about the market and consumers.

- c. The Government provides the budget to facilitate spaces for students can be creative channeling ideas they have.



To resolve the problem of the availability of adequate facilities then the Government is expected to provide the budget, so that each school have the space and facilities for students to be able to berkreaasi and innovate. With the space and facilities so students will be more motivated to perform and create – a novelty.

#### **IV. CONCLUSIONS And SUGGESTIONS**

##### **4.1 Conclusions**

Based on the discussion that has been presented then the conclusion can be drawn:

1. One effort that can be made of vocational education in preparing students confront the MEA is to infuse soul technopreneurship.
2. In instilling the soul technopreneurship to students there are several constraints faced by educational institutions such as lack of facilities available for students to be able to develop their talents and capabilities.
3. To fix the issue, there are several steps the strategy that can be made of vocational education as providing mentoring through counselling and guidance activities to introduce students to the technopreneurship, menyediakan spaces that can be used to practice the students of science and kemampuan, as well as budget support from the Government in order to facilitate the practice of space.

##### **4.2 Suggestions**

With respect to the discussion there are several suggestions that may the author ask:

1. The school can do work closely with some of the industry that has flourished as an alternative to a lack of budget practices to make room so that students can acquire knowledge and new experiences.
2. Good students or educators should more often follow the training activities and seminars to encourage the soul technopreneurship and unlock insights into the development of the technology.

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## BUSINESS PROCESS MODELLING OF INTERNAL QUALITY ASSURANCE SYSTEM FOR DIPLOMA PROGRAMS: CASE STUDY

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**ABSTRACT:** *Quality assurance becomes imperative for higher education institutions (HEIs), including TVET institutions to produce human resources that can meet the demands of global and regional competitions. However, the general quality of HEIs in Indonesia are still low and do not perform continuous quality improvement. It demonstrate the ineffectiveness of internal quality assurance systems. To improve the effectiveness of it, HEIs must know internal quality assurance activities that are being executed. This requires a deep understanding of all parties in HEIs, so a universal modelling method that can be easily understood is needed. In this article, the business processes of internal quality assurance in Padang State Polytechnic are modelled and analyzed. Interview, survey, observation, and document collecting are used to collect informations. The system is modelled using Business Process Modelling Notation (BPMN). It shows that the internal quality assurance system business processes consist of quality standard planning, implementation, monitoring, evaluation and improvement, supported by various data from various sources. It is concluded that the business processes can be improved by automation and interoperability among HEIs units. The business processes model resulted will be the basis for designing an information system as the tool in performing internal quality assurance activities comprehensively.*

**Keywords:** Internal quality assurance system, higher education, TVET, Diploma Programs, Business Process Modelling, BPMN.

### I. INTRODUCTION

Quality assurance becomes imperative for higher education institutions (HEIs), including TVET institutions that run diploma programs, to develop human resources that can meet the demands of global and regional competitions, especially skilled labour. Indonesian government also has realized the importance of higher education quality assurance by establishing policy and necessary guidance for HEIs to perform quality assurance. According to Act no 12 /2012, quality assurance in higher education is a systemic activity to improve the quality of higher education in a planned and sustainable way, done through the establishment, implementation, evaluation, control, and improvement of high educational standards. Internal quality assurance system. Quality Assurance System of Higher Education in Indonesia consists of 1) Internal Quality Assurance System, called SPMI, a quality assurance performed internally through self-evaluation thoroughly by the HEIs, 2) System External Quality Assurance, called SPME, a quality assurance performed through accreditation to external parties, and 3) HEIs Database, called PDPT, a HEIS data reporting mechanism to the Directorate General of higher Education, called RISTEKDIKTI.

However, the general quality of HEIs in Indonesia are still low and do not perform continuous quality improvement. It can be concluded from World Rangkaing and national accreditation results. No continuous quality improvement demonstrates the ineffectiveness of internal quality assurance system. It is known that internal quality assurance system involving various parties and requires various data and documents from various sources either inside or outside HEIs. It is also performed in a continues cycle of activities. To improve the effectiveness of internal quality assurance system HEIs must know





how internal quality assurance system works. This requires a deep understanding of all parties in HEIs, so a universal modelling method that can be easily understood by all parties with different backgrounds is needed.

The purpose of this study is to identify, model and analyze the business processes of internal quality assurance in Padang State Polytechnic, as one of TVET institution that maintains diploma programs. The understanding of the business processes need to be share with all parties involved with the internal quality assurance activities on a daily basis. Knowledge of how are the existing internal quality assurance system business processes, provide a good basis for improving internal quality assurance system effectiveness.

According to Workflow Management Coalition (WfMC) (1999) “Business processes are sets of linked activities or tasks that collectively realize a business objective or policy goal within the context of an organizational structure”. Business processes are essential to understand how organization operates, business processes also play an important role in the design and realization of flexible information systems (Weske,M, 2012). Business processes can be classified by the type (organizational versus operational), degree of automation, degree of repetition, and degree of structuring.

Business Process Management (BPM) is the art and science of overseeing how work performed in an organization to ensure consistent outcomes and to take advantage of improvement opportunities (Dumas, M, et. al., 2012). According to Wolf, C., Harmon, P. (2010) and McCormack, K., et al.(2009) in Susanne Patig, Vanessa Casanova-Brito, and Barbara Vögeli (2010), typical BPM maturity levels are: 1) Level 1: No processes are defined, and the organization is functional. 2) Level 2: The core and most commonly used processes are defined, and the representatives from functional areas meet regularly to coordinate with each other. 3) Level 3: All processes are defined; BPM is employed with strategic intent; process-oriented organization exist outside the functional organization to gather process data and optimize processes. 4) Level 4: The coordination within the company and with its vendors and suppliers is process-oriented. The functional organization structure is subordinate to the process structure. Process performance measures and BPM software are extensively used.

To facilitate communication between stakeholders involved in a BPM initiative, process models are needed. Commonly, diagrams are used to model business processes to be easy to understand and avoid the misinterpretation inherent in textual descriptions. Business process modeling can be used as a basis for reengineering and automation (Dumas, 2012).

One of modelling language which define the basic elements for constructing business process models is Business Process Model Notation (BPMN), a graphical representation for specifying business processes in a business process model. BPMN defines a Business Process Diagram (BPD), which is based on a flowcharting technique tailored for creating graphical models of business process operations. A Business Process Model, then, is a network of graphical objects, which

are activities (i.e., work) and the flow controls that define their order of performance. A BPD is made up of a set of graphical elements. The four basic categories of elements are (Figure: 1) Flow Objects: event, activity, gateway; 2) Connecting Objects: sequence flow, message flow, association 3) Swimlanes: Lane, pool, 4) Artifacts: Data objects, group.

## BPMN Core Components

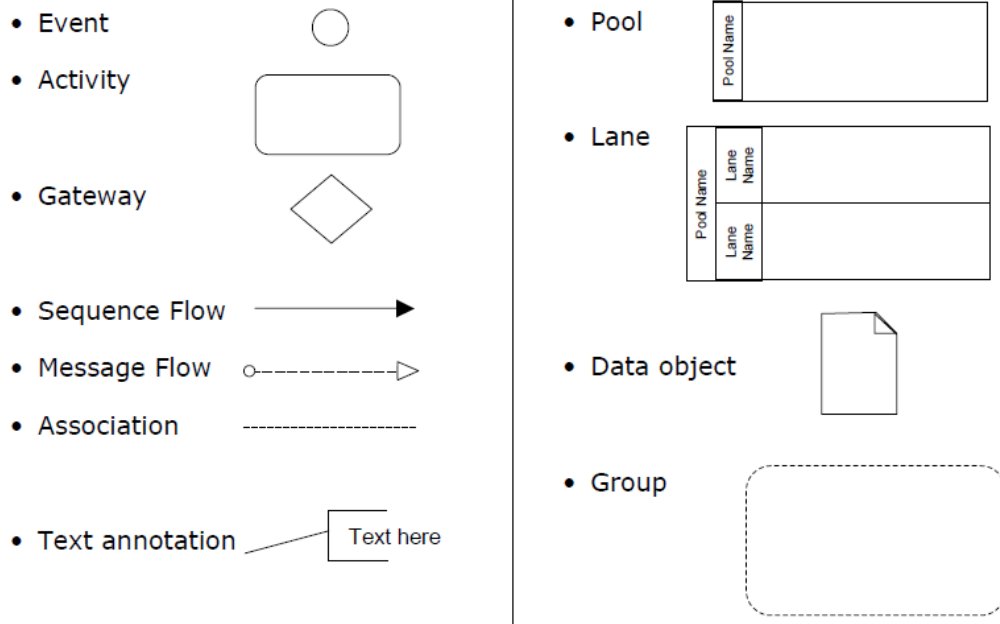


Figure 1. Business Process Diagram Elements

## II. METHOD

The study took place in Padang State Polytechnic from January until -May 2016. The study consist of three phase, namely literature study, field study and business process modelling as described in Figure 2. In literature study, definitions of various terms used in the internal quality assurance system are collected. Field study aimed to know how the internal quality assurance implemented and what are the problems. Then the business process are modelled by using BPMN.

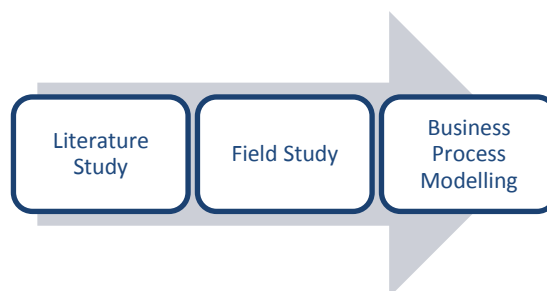


Figure 2. Research methodology.

Interview, survey, observation, and document collecting are used to collect informations. Both interview and surveys are held to identify the business processes and the problems in implementing

them. The documents help analyzing the policies and procedures. Chief of quality assurance unit are interviewed. Surveys were held with respondents consist of chief of departments, and chief of study programsto identify business processes and related problems. Observation are usefull to know how the system implemented. Data are analyzed by means of qualitative and quantitative methods.

### III. RESULT AND DISCUSSION

#### Quality Assurance System in *Politeknik Negeri Padang (PNP)*

Politeknik Negeri Padang (PNP) / Padang State Polytechnic implement all the requirements of the Quality Management System (QMS) ISO 9001: 2008 and Internal Quality Assurance System called SPMI. Quality assurance applied in education and teaching and educational administration.

#### Purpose of Quality Assurance

Quality assurance aims to meet or exceed the education national standard on an ongoing basis and achieve and implement the objectives, vision and mission of PNP, as an effort to meet especially the needs of internal stakeholders (students, lecturers, and staff).

#### Organization Structure of Internal Quality Assurance System

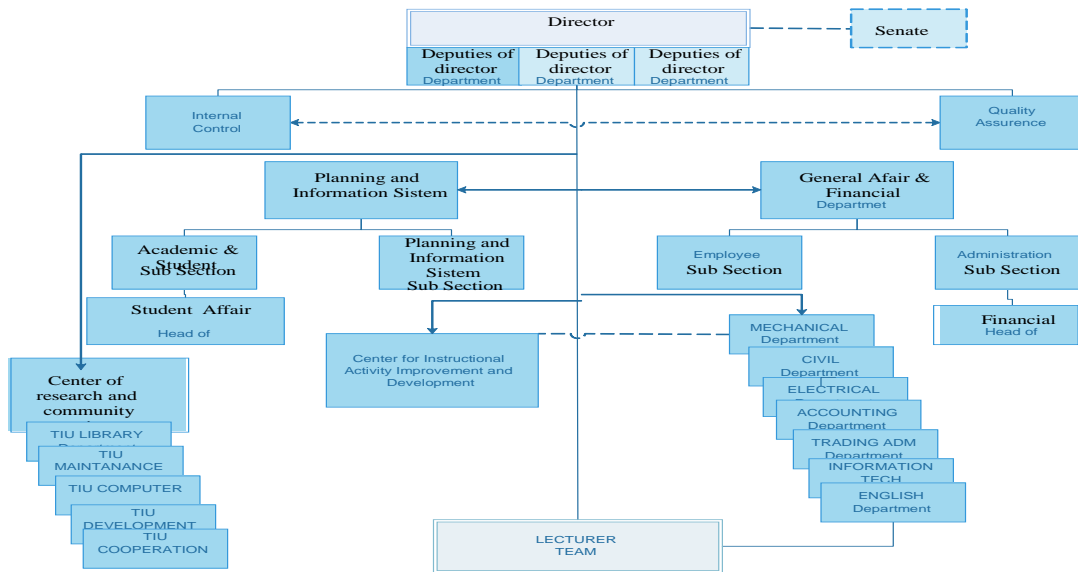


Figure 3. Organization Structure

Based on Kepmenpan No.164 / 2002 organizational structure chart of PNP governance can be seen in Figure 3.

#### Internal Quality Assurance System Mechanism

Internal Quality Assurance System Mechanism including planning activities with measurable targets and implementation of activities through efficient and effective procedures, as well as performance measurements based on data and facts for continuous system improvement.

Implementation involving the Director, all Deputy Director, head of departments, academicians department, and other employees with full sincerity, liveliness and always contribute to improve the quality through a thorough quality management. The results of implementing quality assurance

delivered by the head of the Quality Assurance Unit to the Director, with copies to all the working units involved.

#### Stakeholders of Internal Quality Assurance System

1. Quality Assurance Unit
2. Internal Control Unit
3. Director and Deputies of Director
4. Sections.
5. Departments.
6. Centre of Research and Community Services;
7. Technical implementation Units.
8. Lecturers
9. Staffs
10. Students

#### Data and documents in Internal Quality Assurance System

Documents of Internal Quality Assurance System suggested in written documents comprising: internal quality assurance guideline, procedures, work instruction, supporting documents, forms, records. Data used in Internal Quality Assurance System includes graduate competence, learning content; learning process; learning assessment, lecturers and education staff; learning facilities and infrastructure; research and community services.

#### Business Process

##### a. Process Business of Internal Quality Assurance System

Internal Quality Assurance System consists of a series of processes in a continuous cycle.

Broadly speaking, it has several categories of business processes as described in Figure 4.

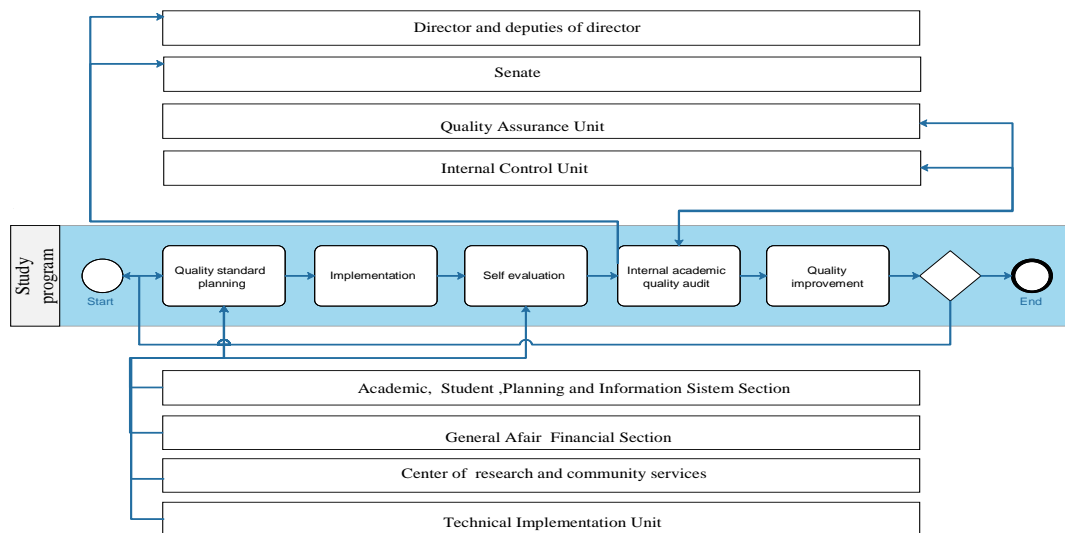
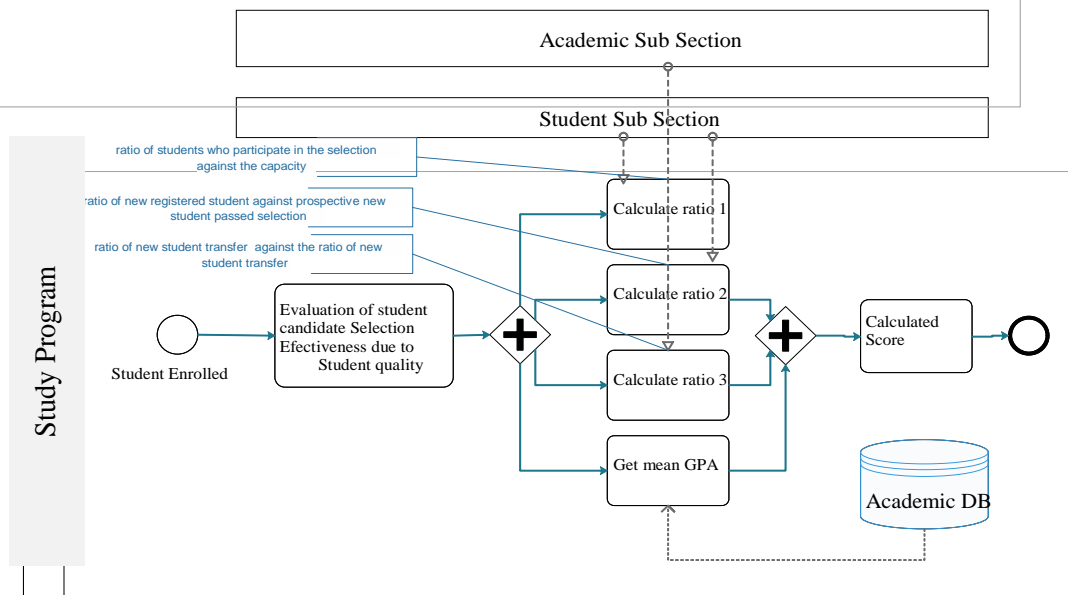


Figure 4. Process Business of Internal Quality Assurance System

From Figure 4 can be seen the need of various data from various sources for internal quality assurance system.

##### b. Business Process of Self Evaluation

Case Study : Self Evaluation based on *BAN-PT* Accreditation Standard : Third Standard,  
Point 3.1.1



**Figure 4.** Example of Business Process of Self Evaluation

#### Analysis

In this study we found that the organization already define the core and most commonly used processes in internal quality assurance system, so it can be classified to level 2 in BPM maturity. But the socialization is still lack and limited to group of people. The business processes can be classified to operational. The degree of automation related to the amount of manual task and the use of information system. There are several information system has built to support HEIs business processes, but not yet for internal quality assurance system. Many task still performed by means manual operation, including collecting and processing data, for example the process in Figure 4. The degree of repetition is high related to many task has to be conducted regularly and the decision to accomplish the task are structured.

Based on interviews, surveys and observations, there are several issues found in the internal quality assurance system implementation. The processes tend to be performed partially and not as a countinuous cycle. It caused by several reason, such as:

- a. Data / Information
  - Need to exchange information with other HEIs unit
  - Different data formats
  - Existing data need processing before used
- b. Stakeholders
  - Need to collaborate with other section/unit/department
- c. Method / Policy in organization
  - Lack of procedure socialization



- High activity load
  - Some manual data processing
  - Jobs repetition
  - Lack of good documentation
- d. Facilities and Technology
- Inadequate facilities for some departments
  - Difficulty of exchanging information among different technologies
- e. Human Resource
- Human resources are insufficient
  - Human resources do not have the necessary expertise

#### **IV. CONCLUSION**

With business process modelling approach the overall business processes in *Politeknik Negeri Padang* (Padang State Polytechnic) and the corresponding interrelationships are identified. It shows that the internal quality assurance system business processes consist of quality standard planning, implementation (and monitoring), evaluation and improvement. These activities are supported by various data from various sources. There are still many weaknesses and deficiencies in business processes that lead to the ineffectiveness of internal quality assurance. It is concluded that business processes can be improved by automation and interoperability among HEIs sections, units and departments. The results of business processes analysis can be used as a reference for internal quality assurance business processes automation. Automation can be done through the development of information systems that support the comprehensive implementation of internal quality assurance process cycle.

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## MINANG TRADITIONAL FOOD DEVELOPMENT AS A FORMULA IN THE IMPROVEMENT OF CHILD NUTRITIONAL STATUS OF CHILDREN IN WEST SUMATRA

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**ABSTRACT.** Utilization of traditional Minang food has a huge potential to improve the nutritional status of children under five and society in general. This is due to the sustainability of society can continue to be implemented and does not require changes in food consumption patterns are in fact difficult to change. However, what needs to be done by the community, especially parents of children under five are the adjustments standardized recipes and traditional food development minang fortified nutritional content. This research aims to develop traditional Minang food to ensure nutritional needs of children under five. This study uses a design development. The research data obtained through organoleptic and hedonic validator expert in the field of food, nutrition and food processing and the test results to a limited group of toddlers and followed by laboratory tests. Food traditional Minang standardized and developed for the food of children under five are sala bulek with the addition of the fish and spinach, and pergedel kentang with the addition of carrot and quail eggs. Results of the assessment of the quality of sala bulek validator and pergedel developed are as follows: sala and pergedel soft dough, fried sala currently erupting and is suitable for toddlers with color, texture, flavor, aroma and interesting shapes. Rate infants and children against products developed by four indicators ie the portion that is eaten, the edible part of the product, the expression of/ interest in food was given and the length of time spent serving of food given to show good results.

**Keywords:** Nutritional status, food traditional Minang, sala bulek, pergedel kentang

### I. INTRODUCTION

#### Background

Nutritional problems among children remains one unresolved issue on Indonesia's health sector, including in West Sumatra. Based on data from the Health Research (Riskesmas) of West Sumatra Province in 2013, the child was very underweight dan underweight the total is 21.3% with respectively 6.9% and 14.3%. The total of stunting and very stunting children is 39.2%. From this data, implicitly it can be said that the challenge ahead is how to reduce the prevalence of nutritional problems that have occurred chronically, so that children who experience malnutrition and short sufficiently large can pursue the growth of the kids his age who are well-nourished.

Many people have aware that the the nutritional problems that occur is a multi-dimensional problem. Conceptually, Unicef (1998) describes that the main cause nutritional problems is low intake of nutrients and infectious diseases. Both of these factors is the end of a chain of other interacting factors such as food availability at the household level, parenting, health services and other ancillary factors such as low socio-economic circumstances and environmental quality are not adequate. Therefore, nutritional improvement program should be in synergy with improvement program or family economic empowerment, environmental improvement program, behavioral changes and others conducted a comprehensive, integrated approach to a specific region.



To accelerate the alleviation of nutritional problems in infants, the government through some of the relevant departments have issued a number of policies, one of which is about increasing food security at the household level. The research results of Yuliana, Katin and Holinesti (2009) proved that there is a significant relationship between family food security and nutrition status of children under five in West Sumatra. Efforts to improve food security can be developed with a family-based food systems and production capabilities, food diversity, institutional and local culture including, in this case the feeding of traditional Minang.

Associated with the Minang traditional food, various problems faced is the lack of standardization of the original recipe and the lack of information contained nutritional value of foods that are processed, so it is not known with certainty the nutritional quality of the food is traditional Minang. When viewed from the main constituent material of traditional Minang types of snack foods, can be predicted that these foods are high in carbohydrates and low in vitamins and minerals, making it less suitable to the needs of a toddler who is undergoing a period of rapid growth. Similarly, traditional food types of side dishes that are rich in protein and fat. Whereas the resources available foodstuffs in the province of West Sumatra were adequate to meet the nutritional needs of the community, especially children under five. But because the public keterbatan in processing and utilizing more local food causes for traditional Minang food contains nutrients that are not balanced.

The prospects for the development of traditional food is actually very bright at the moment, mainly because of communications and information technology is so rapid development can enhance the resonance sale (Yulastri 2006). Therefore, efforts to improve the nutritional quality of food is very important for traditional Minang to do.

### **Problem Formulation**

How is the development of traditional Minang food as a formula in improving the nutritional status of children in West Sumatra?

### **Objective**

The purpose of research is to develop traditional Minang food by standardizing recipes and improve the quality and nutritional quality of traditional Minang food according to food consumption of children.

## **II. RESEARCH METHODS**

### **Time and Place**

Research conducted at the Cullinary Laboratory Department of Family Welfare Faculty of Engineering Padang State University in 2014.

### **Procedure Research**

In the early stages of a survey conducted to determine the “Sala Bulek” recipes and recipe potato cakes in the community. Recipes found analyzed to establish a standard recipe as a recipe that will be developed. Before prescribing standards are developed, tested the recipes in advance and then assessed or analyzed by expert panelists with organoleptic test. “Sala Bulek” recipe development is done by



adding spinach and Gambolo fish, while the development of the “potato pergedel” done with the addition of carrot and quail eggs. Recipes have been developed and then tested the validity by expert panelists to products declared invalid by a score approaching 5 for all the assessment indicators. Then test the acceptability to children below kindergarten housed in Darmawanita UNP and test laboratory in Baristan (Agency for Industrial Research and Standards). Research procedure shown in Figure 1.

### Techniques of Data Analysis

The data were analyzed with the validity development, hedonic and labor test. Analysis of the laboratory test performed is the analysis of the nutrients include carbohydrates, fats, protein, calcium and Fe (Yenrina, Yuliana and Rasymida, 2011).

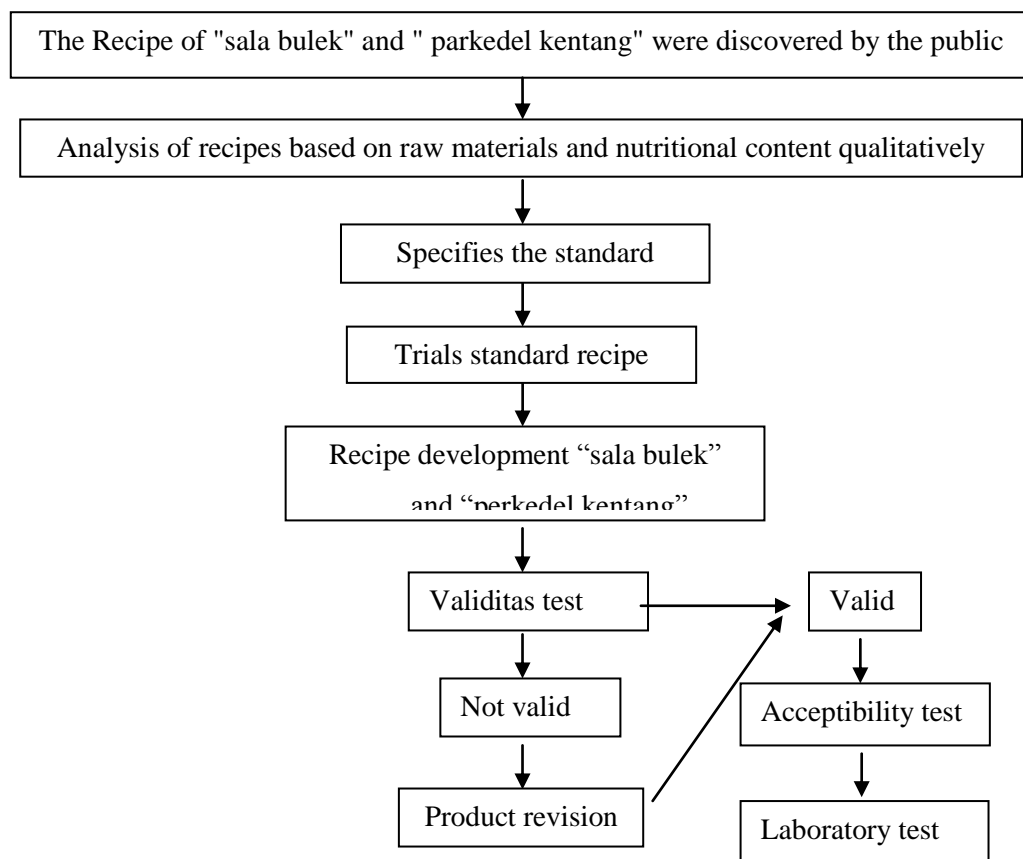


Figure 1. Research Procedure

## III. RESULTS AND DISCUSSION

### Result

#### 1. Sala Bulek

Based on the results of the field survey found 10 recipes “sala bulek”. All the recipes are not standardized, it can be seen from the the composition of the materials used by the public is still using a different household sizes, whereas the type of raw material used is relatively the same. The standard material used for the recipe “sala bulek” also different. The process of standardization of recipes made on recipes that do not use synthetic dyes and do not use flavorings. Standardization is the process of turning the unit recipe from the recipe that made reference in the form of standard units. This process

is done by trying out original recipes are still in the form of household unit, then weighed each material before processing. The process of testing the original recipe of this “sala bulek” done 3 times ie until results were considered together by the original recipe source.

The next process is carried out on “sala bulek” is a qualitative analysis of the nutrient content using List of Food Composition. From the calculation “sala bulek” known that contain high levels of carbohydrates, less protein and almost no vitamins and minerals. Furthermore, the development of products by making some changes to the original recipe. The aim is to improve the nutritional content of processed foods. Changes made not only on the materials used but also include processing method. Each finished result of processing, product sala Bulek validated by experts that food experts, food experts and nutritionists toddlers. The validation process sala Bulek declared finished after the experts give good to excellent ratings or in other words is valid for toddlers food. For this Bulek sala product validation process was performed three times. Recipes sala Bulek that improvements have been made to test as much as three times as shown in Table 1.

**Tabel 1.** Resep Sala Bulek yang Dikembangkan

Ingredient	Unit	Total
Rice flour	gr	500
Gambolo fish	gr	100
Spinach	gr	20
Red onion	gr	12
Garlic	gr	24
Chili	gr	40
Gingger	gr	12
Termeric	gr	8
Leek	gr	20
Termeric leaf	gr	8
Salt	gr	8
Water	gr	1.250
Coconut oil	gr	1.000

Processing of “sala bulek”

1. Roasted rice flour to dry
2. The fish is cleaned, separate the flesh and bones, take the meat course, and blend until smooth
3. Clean the spinach, took part the leaves and finely chopped
4. Mix all ingredients smooth, except turmeric leaves and thinly sliced scallion
5. Boil water, put all the spices, fish and spinach stir, let it permeate and flavor boiling water
6. Enter the boiling water into the rice flour, stir quickly until smooth
7. After that, mix well dough until smooth.
8. Allow the dough to a temperature of the heat down, for about 1 to 2 hours.

9. Rounded the dough and fry in hot oil until brownish yellow.
10. Remove and drain
11. Serve.

The results of “sala bulek” quality assessment by the validator in the first experiment were as follows: (1) “sala bulek” dough too hard, because less water. This is shown by the value of the average score of texture is 3.3; (2) less time in kneading the dough, until dough is smooth yet; (3) at the time of fried dough that erupted so many irregular shape; (4) the average score for an indicator of the sixth form validator is low at 1.7; (5) The color and aroma is quite good, but in terms of texture and flavor there needs to be improvement with the addition of fish and vegetables that were previously only 15 grams of fish and 3 grams of spinach.

Based on the results of the first validation, then the improvement in processing “sala bulek” by taking into account the advice of the validator. Rate validator of the second “sala bulek trial are as follows: (1) the dough “sala bulek” rather soft because of excess water; (2) less time in kneading the dough, until dough is smooth yet; (3) at the time of fried dough erupted but did not explode; (4) inside the “sala bulek” underdone because too fast frying process; (5) Overall pretty good.

Based on the validation results of the second, then made improvements in processing “sala bulek” by taking into account the advice of the validator. Rate validator against third trial “sala bulek” products are as follows: (1) The “sala bulek” dough is soft; (2) “Sala bullek” does not erupt when fried and (3) “Sala Bulek” valid for tested to childrent. The average score on the quality assessment “sala bulek” validator shown in Table 2.

**Table 2.** “Sala Bulek” Product Validation Results

Indicator	Validation 1	Validation 2	Validation 3
	Average of Score	Average of Score	Average of Score
Color	4,0	4,5	5,0
Shape	1,7	4,3	5,0
Texture	3,3	3,8	5,0
Aroma	4,0	4,0	5,0
Flavor	2,3	4,7	5,0
Hedonic	3,0	4,3	5,0

In order for the development of the food product can be used as of children, then the limited testing done with the 30 children in TK Dharma Wanita UNP. Assessment conducted on four indicators ie the portion that is eaten, the edible part of the product, expression or interest in food is given and the length of time spent serving of food given. Recently conducted laboratory test to determine their nutritional content.

Based on the number of servings eaten, it can be seen that 90.0% of children can spend an entire portion “sala bulek” (40 g) given. A total of 3.3% consume more than half and 6.7% consume less than half. Based on the indicator expression / interest to note that 70.0% of children to have expressed

interest in the “sala bulek”. A total of 26.7% consumed with regular expressions only 3.3% consumed “sala bulek” with excited expression. Acceptance of infants and children against “sala bulek” product with the length of time spent indicator portion of food as much as 53.4% of children consume “sala bulek” for less than 10 minutes. A total of 43.3% consumed “sala bulek” for 10-15 minutes and 3.3% consume more than 15 minutes. The processing of “sala bulek” standardized and developed is shown in Figure 2.



**Figure 2.** The processing of “sala bulek” standardized and developed

Analysis of the product through a laboratory test of proximate in explaining the nutrients contained in the sala Bulek is the carbohydrate content of as much as 85.320%, 18.05% total fat, calcium as much as 72.50 mg / kg and iron (Fe) as much as 23.18 mg / kg.

## 2. Pergedel Kentang

“Pergedel kentang” is a typical Indonesian food, including in West Sumatra. Pergedel can be served as a side dish and can also be used as a supplementary food soup, soup and others. Based on the search results about “pergedel kentang” recipe used by society, it can be seen that there has been no standardized recipes especially for toddlers consumption.

In West Sumatra in particular research areas, people do not use the meat in the manufacture “pergedel kentang”. Thus it can be seen that the nutritional content of potatoes pergedel dominated by carbohydrates and less protein from eggs materials used. There are no forms pergedel processing potatoes by using carrots as food that contains vitamins and minerals. In addition, the protein content of potato pergedel too little. Therefore, researchers developed pergedel use of carrots and potatoes with quail eggs. Pergedel potato recipe developed as in Table 2.

**Tabel 2.** “Pergedel Kentang” recipe that has been developed

Ingredient	Unit	Total
Potatoes	gr	500
Carrots	gr	100
Chicken egg	gr	60
Quail eggs	gr	160



Garlic	gr	18
Shallots	gr	50
Leek	gr	18
Celery	gr	4
Salt	gr	5
Coconut oil	gr	250

Making way pergedel potatoes were developed:

1. Wash the potatoes and then fried peeled and mashed
2. Eggs boiled quail
3. Wash the carrots then peel the skin, then grate
4. Onions, leeks and celery thinly sliced
5. Garlic finely ground
6. Onion fried dry
7. Sauté shredded carrots along with leeks, celery and garlic that has been milled.
8. Egg yolks and whites separated.
9. Combine all ingredients and mix well.
10. After the dough is well blended into a round shape and the holes in the middle and enter quail eggs into the hole until sunset.
11. When will fry, enter first into the beaten egg whites and then fry over medium heat until the color is yellowish.

So that the results “pergedel kentang” products developed can be received by a toddler, we conducted the experiment of making “pergedel kentang”es and the results are validated by experts. The results of the first validation “pergedel kentang” products as shown in Table 3. Results of votes on the first try validator “pergedel kentang” products show that there is no one indakatorpun are very good quality. The color quality “pergedel kentang”es are browned. This is due to the oil is too hot when frying. Consequently pergedel not form neat and hard texture of the exterior, while the inside soft. In terms of taste salty so that the use of salt should be reduced. To improve the quality of potatoes pergedel developed, then made a second trial with regard to the outcome validator votes on the first try. Results of votes against pergedel validator potato developed in the second experiment is still less valid, especially in the indicator is still less varied forms, placement quail eggs more will be found again. On the other indicators such as color, texture, aroma, flavor and hedonic already showing good results. Experiment three products “pergedel kentang” processing done by considering the advice of the validator. From the results of the assessment of the validator can be seen that all the quality indicators “pergedel kentang”es are very good, so the potatoes developed pergedel declared valid and could be tested to the group of children under five.

Tabel 3. “Pergedel Kentang” Product Validation Results

Indicator	Validation 1	Validation 2	Validation 3
	Average of Score	Average of Score	Average of Score
Color	3,3	4,3	5,0
Shape	4	3,5	5,0
Texture	3,8	4,1	5,0
Aroma	3,8	4,3	4,8
Flavor	3	4,5	5,0
Hedonic	3,8	4	5,0

To get the product development “pergedel kentang”es were good so it can be used as food among children, then testing is limited to 20 children in TK Dharma Wanita UNP. Assessment conducted on four indicators ie the portion that is eaten, the edible part of the product, the expression of / interest in food was given and the length of time spent serving of food given. Acceptance of infants and children against “pergedel kentang” products with edible portions indicators show that 65.0% of children can spend an entire portion “pergedel kentang”es (40 g) given. A total of 30.0% consume more than half and 5.0% consume less than half. Acceptance of infants and children against “pergedel kentang” products with edible parts known indicator that 65.0% of children can spend the entire section “pergedel kentang”es supplied. A total of 20.0% and 15.0% consume only superficially. Based on the indicator expression / interest in food is known that 70.0% of children under five show the expression of interest / eager to consume “pergedel kentang”es. A total of 20.0% consumed with regular expressions only 10.0% consumed “pergedel kentang”es with excited expression. Based on the indicators of the length of time spent serving food in mind that 85.0% of children under five spend a portion of potato pergedel given for less than 10 minutes. A total of 15.0% consumed pergedel the potatoes for 10-15 minutes and consumes no more than 15 minutes. The processing of potatoes developed pergedel shown in Figure 3.

Analysis of the product through a laboratory test of proximate in explaining the nutrients contained in pergedel potatoes are carbohydrate content as much as 11.20%, 13.08% total fat, calcium as much as 93.50 mg / kg and iron (Fe) as much as 13.37 mg / kg as shown in Table 4.



**Figure 3.** The processing of “Pergedel Kentang” standardized and developed

**Table 4.** Content of nutrients of “Pergedel Kentang”

No	Test Parameter	Unit	Results Analysis
1	Carbohydrates	%	11,20
2	Fat Total	%	13,08
3	Calcium (Ca)	mg/kg	93,50
4	Fe	mg/kg	13,37

### Discussion

Development of traditional Minang food in the form of “sala bulek” and “pergedel kentang” as food formula in improving the nutritional status of children under five can be solutif for families in West Sumatra, especially with children. This is due to the raw material used is based on the potential of local and also according to the processing method performed by the community. What is different is the variety of materials used that with the addition of other foodstuffs such as vegetables and sources of protein are of good quality so that the result is also better.

Laboratory test have shown that the nutrient content of “sala bulek” dan “pergedel kentang” that developed containing nutrients pretty well. Nutritious food is needed by children in helping the process of growth and development. As argued by Sediaoetama (1996: 11) "Toddlers need nutrients (carbohydrates, proteins, fats, vitamins, minerals and fiber) are relatively more with higher quality for children under five is in the process of growth is very active , Likewise proposed by Irianto (2007: 166) "Nutrition is very decisive character growth and nutritional problems that arise".

## IV. CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

Minang traditional foods such as “sala bulek” and “pergedel kentang” developed and created by the potential of local raw materials and processed in a simple way. Minang food standardization process is done by the food processing that have been selected and tested the validity of such foods by the validator.

Increasing the quality and nutritional qualities “sala bulek” by replacing gambolo fish anchovies with fresh fish and added spinach as a source of minerals. While the “pergedel kentang” enhanced nutritional quality with the addition of carrot and quail eggs. The results of product development is favored by toddlers.

### Suggestions

The food is traditional Minang developed in this study can be input in the planning of human resource development programs related to improving the nutritional status of children and program diversification of food consumption through the improvement of the nutritional quality of traditional Minang food. However it is suggested to the Department of Health and other related sectors can follow up on these results in the management of health and nutrition program based society. For people, especially with children are advised to try the processing of food products that have been developed with reference to a standard recipe tdihasilkan of this study.



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## OBSERVING THE TOURISM POTENCY IN KENAGARIAN SIMABUR, DISTRICT OF PARIANGAN TANAH DATAR REGENCY, WEST SUMATRA

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**ABSTRACT.** *Kanagarian Simabur Pariangan Tanah Datar has a population of 4050 people, made up of 1,600 men and 1450 Women located in Three Jorong namely Jorong Simabur, Koto Tuo and Tanjung Limau with a population density of 105 / km<sup>2</sup>. Kanagarian Simabur has the potency of tourism to attract potential tourists to visit, among others; the beautiful natural scenery, pacu jawi attractions, typical food of cakes dumayang and padeh rice that can only be enjoyed in this area just as well as ease of access for Kanagarian is located in the traffic lane of Batusangkar. However, the full potential of objects and tourist attraction is not yet well inventorized and holistically. This research tried to assess the whole potential of objects and tourist attraction was available in the three area (jorong) in Kanagarian Simabur, so it is expected to be a reference base zoning of tourism potential in making the grand design of the development strategy for Kanagarian Simabur as one of the Tourism Village-based culture in West Sumatra Province. This research is a descriptive study with qualitative data. Data was collected using interviews, observation and documentation involving informants, namely: 1 person from the Head of Destination Development, Department of Culture, Tourism, Youth and Sports Tanah Datar, 1 person of Wali Nagari Simabur, 3 persons of the Head of Jorong in Kanagarian Simabur, 6 people of local community surrounding the attraction, using Snowball Sampling technique. Data analysis techniques in the study include: data reduction, data presentation and conclusions. The results of this study indicate that: Tourist attractions which available in Kanagarian Simabur form hills and natural landscape of paddies field, where the location of the natural attractions are easy to reach from the main street of Padang-Batusangkar with a very affordable cost of travel by tourists if departs from Padang. While cultural attractions in Kanagarian Simabur is either: Batagak pangulu, randai, khatam quran, and pasambahan are available in each Jorong. But for potential entertainment attractions, there is only the Paju Jawi event held in Jorong Simabur and Jorong Koto Tuo once a month in rotation (except for the month of fasting). Amenities in Kanagarian Simabur in the form of Public Toilet facilities are already available in every area (Jorong), but the amenities likes restaurants, café, and travel is only available in Jorong Simabur. Infrastructure as supporting facilities such as telecommunication networks, roads, electricity is readily available in every area (Jorong). But infrastructure such as banks, Internet cafes, and conference hall and a football field are only available in Jorong Simabur. In addition, the accessibility in Kanagarian Simabur is very easy to reach from the main road Padang-Batusangkar (maximum 15 minutes) and intensity density occurs only in Jorong Simabur was an area of trading. Ancillary Services consists of souvenirs and recreational facilities. Only in Jorong Simabur, there are souvenirs of cake dumayang, dakak-dakak and padeh rice, while other jorong do not have the typical souvenirs from each jorong. The football field used as a night market as recreational facilities for the local community.*

**Keyword:** *Inventory, Tourist Objects, Tourist Attractions*

### I. INTRODUCTION

Indonesia is one of the world's leading tourist destinations. This is evidenced by the number of visits of Foreign during the period from January to June 2015 reached 815.148 people. However, in contradiction, the level of tourists to Indonesia is not in line with the level of tourists to the province of West Sumatra in the period January-June 2015 fell 18.88 percent, totaling 3,730 people. It contributes only 0.46 percent of the total foreign tourists visiting Indonesia.

Tanah Datar Regency is one of regencies in West Sumatra is attractive to tourists as a cultural tourism destination. This is evidenced by the increasing tourist arrivals and domestic tourists in the past two years. In 2014, the rate of tourist arrivals amounted to 101 245 foreign tourist and 825 055



people of domestic tourists. And in 2015, there were 869 485 domestic tourists and 115 444 foreign tourists who visit to this district (Department of Culture, Tourism, Youth and Sports Tanah Datar, 2015).

Nagari Simabur is one of six villages located in the Pariangan district, Tanah Datar Regency of West Sumatra. Nagari Simabur is located at government capital district of government is in the center with an area of 297 ha Pariangan with penduduk number 4050 people, made up of 1,600 men and women 1450. Having three Jorong namely Jorong Simabur, Koto Tuo and Tanjung Limau with a population density of 105 / km<sup>2</sup>.

Although it is located at the center of District Capital, mostly the community life but are largely engaged in the agricultural sector (60%), traders (15%), clerks (10%), and others (15%). From all the potential, in the agricultural sector is mostly agricultural lands of the people that is 273 hectares filled with production of farmers as Agricultural fields and plantations of the people and also have other potential possessed Nagari simabur besides food crops such as rice paddy, smallholder in the form of cinnamon (Casiavera), clove. Besides farm like, buffalo, cows, goats, chickens, ducks and fish ponds. Also had Crafts Home Appliances such as embroidery, 20 units of of dakak-dakak and cake home industried, 2 units of bread home industry, 1 unit of tofu home industry, manufacturing Alsintan (agricultural equipment) 1 unit and the education sector has recorded a kindergarten as much as 2 units, 2 units of elementary schools, Education religion has one kindergarten junior / senior high school (Thawalib), 4 TPSA / TPA, 3 unit of mosque and 5 units of surau.

Based on population data above, illustrated that Nagari Simabur population dominated by men, and worked as a farmer. Thus, it can be assumed that the potential of tourism in Nagari Simabur not become a priority as a leading sector in order to improve the economy of local communities. In fact, in this village there are many that can be used as a potential tourist attraction likes cow race event, the typical food of the area that there is no other area (the interviews with the former head of the village Simabur, 2016). By opting to manage, the public will be subject not an object, and even quicker to enjoy collectively the multiplier effect of the tourism industry. Likewise in terms of facilities now Kanagarian simabur has had a web site that can be accessed in order to see the latest information that can be known. Just unfortunately can not be fully utilized because of the lack of human resources professionals (interview with Mr. Ershad, Wali Nagari Simabur, 2016)

This research aims to assess the potential of tourism in Kanagarian Simabur, Pariangan District Tanah Datar Regency of West Sumatra, so it can be known by the public and local government anything and anywhere -the place that could potentially become the object and tourist attraction. This Kanagarian has the object and tourist attraction potential tourist attraction include cultural tours, culinary tours, and more. It required an inventory of objects and tourist attractions that already exist so that it can be a basic reference zoning of tourism potential in making the grand design Kanagarian Simabur in the purpose on development strategy as one of the culture based Tourism Village in the province of West Sumatra for the future.



## **II. RESEARCH METODOLOGY**

This research is a descriptive study with qualitative data. Data was collected using interviews, observation and documentation involving informants, namely: Head of Destination Development Tourism Office Tanah Datar, Wali Nagari Simabur, Head Jorong in Kanagarian Simabur, the communities surrounding attraction, using the technique of Snowball Sampling. Interviews as the primary data used to explore the potential that exists in Nagari Simabur which can be used as objects and attractions. While secondary data in the form of documents owned Nagari Simabur and the Department of Culture, Tourism, Youth and Sports Tanah Datar, such as; Data of tourist arrivals and a general description Kanagarian Simabur.

The instrument used for data collection in this study is the researchers themselves (human instrument) using the interview guidance as the tools, observation and documentation. Data analysis techniques in the study include: data reduction, data presentation and conclusions. This study was conducted in January-May 2016 in Kanagarian Simabur, District of Pariangan, West Sumatra.

## **III. RESULTS AND DISCUSSIONS**

The findings in this study can be divided into two types, namely: 1) the general findings holistic, 2) special findings about the potential of objects and tourist attraction located in Kanagarian Simabur, District of Pariangan, West Sumatra. The findings of this study, researchers get in the field from several informant interviews.

### **1. General Findings**

Nagari Simabur is one of six villages located in the Pariangan district, Tanah Datar Regency of West Sumatra. Nagari Simabur is located at government capital district of government is in the center with an area of 297 ha Pariangan with penduduk number 4050 people, made up of 1,600 men and women 1450. Having three Jorong namely Jorong Simabur, Koto Tuo and Tanjung Limau with a population density of 105 / km<sup>2</sup>.

Although it is located at the center of District Capital, mostly the community life but are largely engaged in the agricultural sector (60%), traders (15%), clerks (10%), and others (15%). From all the potential, in the agricultural sector is mostly agricultural lands of the people that is 273 hectares filled with production of farmers as Agricultural fields and plantations of the people and also have other potential possessed Nagari simabur besides food crops such as rice paddy, smallholder in the form of cinnamon (Casiavera), clove. Besides farm like, buffalo, cows, goats, chickens, ducks and fish ponds. Also had Crafts Home Appliances such as embroidery, 20 units of of dakak-dakak and cake home industried, 2 units of bread home industry, 1 unit of tofu home industry, manufacturing Alsintan (agricultural equipment) 1 unit and the education sector has recorded a kindergarten as much as 2 units, 2 units of elementary schools, Education religion has one kindergarten junior / senior high school (Thawalib), 4 TPSA / TPA, 3 unit of mosque and 5 units of surau.

### **2. Special Findings**

a. Data of Potential Attractions in Kanagarian Simabur



Based on observations of researchers and interviews, the obtained data on potential attractions that exist in Kanagarian Simabur divided into:

Attractions	Long Tanjung Limau	Long Koto Tuo	Long Simabur
Culture	Fields, Paddy Fields	Paddy Fields	Heritage of Paddy Fields (Bosek)
Location	Distance: 1,5 KMs from main streets	Distance: 2,5 KMs from main streets	Along the main road towards Nagari Simabur
Culture	Atagak Pangulu andai Recitation of Quran Musambahan	Atagak Pangulu andai Recitation of Quran Musambahan	Atagak Pangulu andai Recitation of Quran Musambahan
Entertainment			Cow Race (Caw Race Event)

b. Data of Potential Amenities in Kanagarian Simabur

Based on observations of researchers and interviews, the obtained data on potential amenities in Kanagarian Simabur divided into:

Amenities	Long Tanjung Limau	Long Koto Tuo	Long Simabur
Facilities	Public Toilets	Public Toilets	Public Toilets Restaurants Café Travel Agent
Infrastructure	Telecommunication Network, Road, Electricity	Clean Water Resources (Pansimas), Telecommunication Network, Road, Electricity	Bank BPR, Bank BRI, Bank BMT Internet Cafe Meeting Room Football field

c. Data of Potential Accessibility in Kanagarian Simabur

Based on observations of researchers and interviews, the obtained data on potential accessibility in Kanagarian Simabur divided into:

Accessibility	Long Tanjung Limau	Long Koto Tuo	Long Simabur
Distance	Approximately 1,5 km from the main road of Padang	Approximately 2,5 km from the main road of Padang	Along the main road of Padang Batusangkar



	Batusangkar	Batusangkar	
travelling Time	0 minutes	15 minutes	minutes
Travel Cost	R 25.000 (using public transport from Padang)	R 25.000 (using public transport from Padang)	R 25.000 (using public transport from Padang)
Intensity (density) of locations	somewhat Crowded	isolate	crowded

d. Data of Potential Ancillary Services in Kanagarian Simabur

Based on observations of researchers and interviews, the obtained data on potential Ancillary Services in Kanagarian Simabur divided into:

Prakasi Wisata	Jorong Limau	Jorong Tanjung	Jorong Koto Tuo	Jorong Simabur
Amenities				Desa Dumayang Batagak-Dagak Pasar Padeh
Recreational Facility				Field for Night Market

#### IV. SUMMARY AND CONCLUSIONS

Based on the research results obtained from observation, interviews and documentation, it can be concluded objects and potential tourist attraction Kanagarian Simabur as follows:

1. Tourist attractions which available in Kanagarian Simabur form hills and natural landscape of paddies field, where the location of the natural attractions are easy to reach from the main street of Padang-Batusangkar with a very affordable cost of travel by tourists if departs from Padang. While cultural attractions in Kanagarian Simabur is either: *Batagak pangulu*, *randai*, *khatam quran*, and *pasambahan* are available in each Jorong. But for potential entertainment attractions, there is only the *Paju Jawi* event held in Jorong Simabur and Jorong Koto Tuo once a month in rotation (except for the month of fasting).
2. Amenities in Kanagarian Simabur in the form of Public Toilet facilities are already available in every area (*Jorong*), but the amenities likes restaurants, café, and travel is only available in Jorong Simabur. Infrastructure as supporting facilities such as telecommunication networks, roads, electricity is readily available in every area (*Jorong*). But infrastructure such as banks, Internet cafes, and conference hall and a football field are only available in Jorong Simabur.
3. In addition, the accessibility in Kanagarian Simabur is very easy to reach from the main road Padang-Batusangkar (maximum 15 minutes) and intensity density occurs only in Jorong Simabur was an area of trading.



4. Ancillary Services consists of souvenirs and recreational facilities. Only in Jorong Simabur, there are souvenirs of cake dumayang, dakak- dakak and padeh rice, while other jorong do not have the typical souvenirs from each jorong. The football field used as a night market as recreational facilities for the local community.

## V. SUGGESTIONS

1. For the future research, it is suggested to use the results of this study as a reference of tourism area zoning in. Researchers further also examine the development strategy for Kanagarian Simabur as tourism village through SWOT analysis.
2. For the Department of Culture, Tourism, Youth and Sports of Tanah Datar in order to empower the potential of objects and tourist attraction that has been owned by Kanagarian Simabur thereby providing a multiplier effect for the local community through cooperation and synergy with all the relevant stakeholders. With the potential of natural and cultural tourism are the main assets in Kanagarian Simabur, should also be supported with a uniform tourist facilities in each corner, so there is no inequality of development of tourism facilities which is currently dominated in Jorong Simabur. Formation of kelompok sadar wisata, it is necessary that the community benefits from tourism activities.
3. For the Government of Kanagarian Simabur, should explore further other tourism potential such as hot springs, cultural and other events. With the increasing number of tourist potential will make tourist visits increased and thus provide economic benefits for the community doubled. Physical development is not a major capital development of tourism, but the packaging of travel products from existing tourism potentials felt it would be optimal to provide benefits for both tourists and the public.

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**GROWING UP THE ENTREPRENEURIAL POTENTIAL LIFE OF THE STUDENTS  
THROUGH INTERNSHIP IN BUSINESS CENTER IN SMALL INDUSTRIES OF PUDAK,  
GRESIK - EAST JAVA**

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**ABSTRACT** : Number of scholars in Indonesia from year to year showed a sharp increase. However, very few of them are able to create jobs, both for themselves, even more so for others. Entrepreneurial spirit may not be cultivated only through teaching alone, but must be accompanied by self-training and coaching in real working setting intensively through internship. The purpose of internship program are: 1) To equip the experience and practical skills to students participating in the internship which includes the skills to apply science and technology, as well as adopting existing skills in IKM so that after graduation can grow and develop into a reliable and independent entrepreneurs, 2) Assisting the acceleration of the realization of prospective undergraduate student who has entrepreneurial life and aware of issues around the neighborhood. Implementation of the internship program received very good response from the industry partners and students who participating in this program. Industry partners feel the enormous benefits that the problems can be resolved by the internship program. The problems are: there is no variation of the taste of Puduk, the durability of Puduk that cannot be lasting longer (only 2 days), the label and packaging of Puduk that does not exist/less attractive.

*Key word* : entrepreneurship, internship program, small industry, pudak.

## **I. INTRODUCTION**

Number of Indonesian scholars from year to year showed a sharp increase. However, only very few of them who able to create jobs, both for themselves and even more for others. The willingness and the ability in becoming entrepreneur are very limited. In fact, they prefer waiting for a rollicking then jump into the arena of race, and competing in a small number of job vacations. Basically, they have good potential to develop themselves, because they understood the art of science and technology studied at college. On the one side, it's caused by the lack of their financial capital and opportunity and the other side, the entrepreneurial spirit has not appeared yet.

Entrepreneurial spirit may not be cultivated only through teaching alone, but it must be accompanied by self-training and coaching in the real working intensively through internship programs. The financial capital and the entrepreneurship opportunities will be easier to obtain if it has practical experience applying science, technology and art learned before. Therefore, the college students as an undergraduate candidate should be equipped with some practical skills such as; skills to apply science and technology, and the arts and membership marketing management as well as the adoption of innovation-technology. So, after their graduation they would not only become as a scholar



who just able to act as a human investment, but also they can grow and develop themselves into candidates of independent entrepreneurs.

The implementation of this program will be carried out in an active role in order to help small industrial group located in Sentra Small Industries “Pudak” in Kebomas village, Gresik regency, East Java to develop its existence. Pudak Gresik is one of food made of a mixture of rice flour / corn starch, sugar, eggs, and milk with a specific composition made it homogeneous. Then, the mixture is filled into packaging made of stems of the tree nut (upih). And it is one of tasty food there but, there are problems should be solved. It will expire in 2-3 days. The large size of Pudak made it looks unattractive. These obstacles need solution. In fact, Pudak is one of maintainable traditional food of Gresik, and the developing of it is possible to be done. One thing should be remembered is that the traditional food culture of the nation is one of our assets should be preserved from the extinct / lost.

That the implementation of the internship program runs successfully and achieve maximum results, the students participating in this program will be selected and prioritized for those who have high motivation to join the program and be an entrepreneur. While the lecturers who become committee of the program is carefully selected based on the problems faced by small industrial partners. So, the management program team selected as committee, are coming from the professors who have high relevance and expertise to the fields needed to address the problems faced by the group. Besides that, the priority of this mandate is given for the supervisors who have been proven to have high motivation and commitment concern to the development of the entrepreneurial world.

## **II. METHOD**

Internship programs were performed with the following steps:

### **1. Enrolment**

As the first step of Internship program, the researcher announced the enrolment of Internship program at the Family Prosperity Education major or Food Science major, Chemistry major, and Art and Craft major in two weeks. These three majors are relevant to the subject matter needed to overcome the problems faced by Small Industry Partner—*pudak* cannot stay longer, its taste is too sweet, there is no innovation in term of taste, and the size, shape of the package is not interesting. The selection of the applicants was done the following week.

### **2. Selection**

The selection was conducted by an executor team which consisted of two tests; interview and written. In doing the selection, the executor team looked for applicants who had a high motivation and interest to carry out Internship program, had enough basic knowledge about entrepreneurship, were fifth semester students, and were ready to join Internship program actively for a predetermined time. From 35 applicants there were 15 applicants finally chosen to participate in Internship program. Those were 5 students of Food Science major, 5 students of Chemistry major, and 5 students of KKR major.

### **3. A survey to Small Industry Partner**





The survey was done by Internship program participants who were selected to be more intelligent than the other participants. Those participants were accompanied by a lecturer who acted as a supervisor (DPL). The survey was aimed to obtain accurate data about; the economic conditions of the society in the industrial environment, industry characteristics, and all problems faced by each industry. The data were delivered to all Internship participants then, as the basis information in arranging Internship program.

#### **4. Training**

Training for Internship participants were done in a week. The aims of this training were: 1) to evoke entrepreneurial potency, 2) to integrate Internship participants' perception related to attitudes and characteristics of (IKM), and the strategy needed to improve (IKM), and 3) to spur the growth of (IKM) by transferring abilities and entrepreneurial skills. The training materials included knowledge about entrepreneurship, information related to (IKM), problems faced by (IKM), and strategies to improve (IKM). The training materials were delivered by the executor team.

#### **5. Program Arranging**

After having training, the participants of Internship must arrange programs implemented at (IKM) and determine a strategy to improve the (IKM). They must determine what kind of program would be implemented, who would perform the programs, which (IKM) they would cooperate with, what materials needed in these programs, and how and when the programs would be carried out. They arranged the programs by using the data taken from the third step. The data had been processed by using SWOT (*Strength, Weakness, Opportunity, and Threats*) analysis before.

#### **6. Implementation of internship at (IKM)**

The participants then carried out Internship for 3 weeks alternately. Each group consisted of 5 participants and stayed at (IKM) for a week. With the hope that Internship programs would be successful, before performing the programs the participants must; 1) adapt to the environment, 2) make introduction with village government officials and local residents, 3) legitimize Internship program to the head of the village or village officials. Any change of the program was tolerated as long as it was appropriate to the purpose of Internship. Moreover, if there was a problem hadn't been identified by the participants during the survey, the participants could make a new program in order to solve the problem. Of course, it must be adjusted to the participants' abilities, fund, equipment, and time.

The supervisor monitored Internship programs every week and gave briefing to the participants. The supervisor helped and gave suggestions for the problems faced by the participants.

#### **7. Withdrawal**

Having reached the predetermined time limit, and gained what became the targets of Internship program, the participants were withdrawn from (IKM). They then conducted an evaluation, prepared a business plan, and created a final report of the programs.

### **III. RESULT AND DISCUSSION**

#### **1. Evaluation and Discussion of the Benefits and the Achievement of the Objectives**



The evaluation of Internship program was conducted by several people: industry supervisor, the executor supervisor (the lecturer) and the supervisor of the college (LPM UNESA). The assessment of lecturer was carried out from the training program, internships, Internship report and completion of the other tasks. Based on the observation, the Internship participants were enthusiastic during the training program. Evaluation of the internship was done by giving the participants some questions related to their programs, and asked them to practice some program such as the way to diversify the taste of *pudak*, how to use of food additives, and how to design the package of *pudak*. The explanations delivered by the participants show that they have been able to solve the problems faced by (IKM) before Internship program is done.

The evaluation of Internship program conducted by supervisor of college (LPM UNESA) was done by supervising at the location of Internship program. The supervisor observed the program of internship participants in handling the problems in (IKM). Based on the observation, it can be concluded that the implementation of Internship program is good. The participants of Internship learned many things while the industry officials were willing to give guidance to the participants

#### **1. Benefits of Internship Program from Industry point of view**

##### **a. Economical Potency of the Product/Commodity**

By conducting these internship programs, the researcher holds a hope that the problems faced by (IKM)– such as *pudak* cannot last long; *pudak* taste is too sweet; the size, shape and packaging of *pudak* are less attractive –can be overcome. The other benefits are that (IKM) can come into existence, production capacity and quality of product can be improved, and scope of product marketing can be broader. It means that the products of (IKM) can be used as commercial commodities in the market which have high competitiveness. Furthermore, by selling the products into the market, (IKM) preserves and develops traditional foods while gain a big profit.

##### **b. Additional Value of the Products from Science and Technology Point of View**

The additional values of the products that can be gained after conducting internship programs are:

- 1) The products have better quality, diverse tastes, and durable. In addition, the package becomes more attractive and leads the products into high competitiveness. These special qualities make the products easily to be published.
- 2) Losses as a result of material damage caused by lack of preservation of the product can be minimized by using food additives (BTM) in safe levels.
- 3) Internship programs give much knowledge to (IKM) officials in order to improve the quality of human resources in (IKM).

#### **8. Social Impacts**

With the improvements done by the internship participants such as creating durable products, increasing the quality of the products (taste, texture, aroma), up grading the size, shape and design of the products, and doing diversification on the taste of *pudak*, it is believed that (IKM) is able to gain many benefits. Some of the benefits are knowledge about how to make the products more durable, to



increase the quality of the products (taste, texture, aroma), to improve the size, shape and design of the products and to diversify the tastes of the products. Thus, the (IKM) can develop well. Moreover, the officials of (IKM) can deliver the knowledge to the other industry officials in their society, so that the benefits can be boarder.

## **2. Benefits of internship programs from the internship Participants' Point of View**

After joining internship programs, the participants can hold these advantages:

- a) Internship participants can gain experience and practical capabilities including the skills to apply knowledge they have learned, skills of production and marketing, and skills to adopt innovation and technology.
- b) Internship participants can get additional knowledge about entrepreneurship.
- c) Internship HIP programs are able to encourage the participants' entrepreneurial interest, attitude, and motivation (entrepreneurial spirits)

## **3. Additional Value for**

internship programs, the lecturers can broaden their experience in implementing the science and technology. They also have opportunities to improve their course material.

## **4. Additional Value for the College**

Implementing internship programs can strengthen the cooperation between the college and the (IKM). It also can improve the relevance and proportionality between them.

# **IV. CONCLUSION AND RECOMMENDATION**

## **A. CONCLUSION**

1. In general, internship programs have been done well and appropriate to the pre-determined plans, objectives, and targets. There is no significant obstacle occurs in the implementation of internship programs.
2. internship programs can build participants' (students) skills. It also encourages entrepreneurial spirit of the students showed by their program in creating business plan especially related to food business.
3. internship programs get a good response from the officials of (IKM). Thus they welcome the college for the next programs.

## **B. RECOMMENDATION**

The openness of (IKM) toward the college should be utilized wisely in order to undertake internship for the next students or the other forms of useful cooperation.



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## DEVELOPMENT OF ENTREPRENEURSHIP FOR HOME ECONOMIC STUDENT AS FUTURE TEACHER IN VOCATIONAL EDUCATION

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**ABSTRACT** : *The development of entrepreneurship education in colleges , in addition to academic education focused on science , there is a vocational education that expects readiness of graduates to apply their expertise or competence to plunge into society , especially as educators in vocational schools and or working in the Industry. Development of entrepreneurship education has a very important role for professionals in their fields such as education of home economic that have food & nutrition , fashion design and hair dressing. These three study programs have great opportunities for entrepreneurship program developed to perform both services and products . As expected the prospective teachers of vocational college graduates have the academic competency , thinking skills , management and communication skills , adaptability and socializing with work environment . The diversity of the readiness of each colleges manages student entrepreneurship programs such as entrepreneurs , creativity students program , an internship program , and business incubators is the beginning of the experience acquired as a student entrepreneur. There are two policies in entrepreneurship program in college while in two , namely : 1) entrepreneurship as a subject in higher education, and as a subject to be taken 2 ) entrepreneurship as a skill that refers to the standard of competence . Factors to establish entrepreneurial competence food and nutrition, fashion design and hairdressing to implemented asconcrete action in preparing for the education of students of home economics as condidate for vocational teachers.*

*Keywords* : entrepreneurship, food nutrition, fashion , hairdressing, vocational teacher.

### I. INTRODUCTION.

Institutions of Higher Education as a teacher printer need to think about how to develop entrepreneurship education developments follow Or changes in technology that can be improve quality graduate able Teaching in Vocational Schools, especially entrepreneurial. Entrepreneurship is the findings of study Need implanted on students however, af fact enterepreneur soul may already owned by someone early on, Talent can occurs or soul heritage enterepreneur obtained from parent.

College instituted since 2007 in Unesa entrepreneurship It is a subject that already included hearts curriculum and must be taken by all students Studies Program S1. Family Welfare Education (Home economics Yang oversees Education Program S1 food nutrition, S1 fashion education, S1 education Makeup(Third Programme). Study singer fifth semester program entrepreneurship on or Seven semesters. Students Entrepreneurship education has equipped with different knowledge and skills aT half where they reprogrammed entrepreneurship courses. The development of entrepreneurship courses Giving experience how the Like A good business performer accordance field in Food nutrition, Fashion and Makeup.

### II. STUDY LITERATURE.

Development of entrepreneurship education.

Entrepreneurship is a process through knowledge, skills and attitudes that are trained to become entrepreneurs. To achieve the goal of an entrepreneur need to take strategic steps in



College since its inception has been to include entrepreneurship education in its curriculum. Hopefully, by the entrepreneurial education, students can develop the mental effort that is supported with foreign language skills as well as proficiency in computer science. So that when they graduate, students can directly apply their knowledge in the community.

Entrepreneurship Development Program was implemented to foster the entrepreneurial spirit in students and faculty as well as vehicle integration is expected to be a synergy between the mastery of science and technology with entrepreneurial spirit. Also expected are also the results of research and development is not only worth the academic course, yet has added value to the independence of the nation's economy. Entrepreneurship can be defined as the ability to see and assess the opportunities (opportunities) business and the ability to optimize resources and take action as well as highly motivated to take risks in order to succeed in business.

The role of universities in motivating young students to become an entrepreneur is very important in growing the number of entrepreneurs. With rising entrepreneurs from among the scholars will reduce the growing number of unemployed and even increase the number of jobs. The question is how the universities can print young entrepreneurs. Entrepreneurship education in Indonesia still lack adequate attention, either by education or society. Many educators are paying less attention to the cultivation of entrepreneurial attitudes and behaviors of target students, both in secondary schools, as well as in higher education. Their orientation, generally only in preparing the workforce.

The university is responsible for educating and providing the ability to see business opportunities and manage the business and provide motivation for having the courage to face business risks. The role of universities in motivating students to become young entrepreneurs is part of one of the factors driving the growth of entrepreneurship. According to Thomas Zimmerer in Kirschheimer, DW, there are several factors driving the growth of entrepreneurship among lin as follows:

#### 1. Entrepreneurship Education.

Entrepreneurship education very Popular Many different colleges and universities, especially students Yang will become the Vocational Field Educator ON tentunya Must prepare Yourself for review later develop entrepreneurship education Become A teacher in SMK Good field food nutrition, fashion , and hairdressing.

#### 2. Technological Progress.

Article Search Google Advancement in Technology Development Entrepreneurship education Need An increase in using it will accordance Developments era like Someone work by making Business programs that make it easy to review.

#### 3. E-Commerce And The World-Wide-

Web.

Need yourself as a candidate for vocational teachers how an attempt with already on-line internet sites mushroomed Based or Individual sites already have. Also singer factors encourage



growth entrepreneurs. All Sector Study in Home Economics Time to do the way singer to review it easier get Markets Better.

#### 4. Business Opportunities.

In the Search for customers, Small business now is NOT Again restricted scope N Alone hearts. The dramatic shift has hearts Economy Opens Door Into Outstanding Business Opportunity For entrepreneurs is willing to reach the entire Opportunities That allows for a review is conducted.

Role of Universities hearts motivate students to become young entrepreneurs is very important. It Singer Seen From some discussion Affairs has argued Above entrepreneurship. The problem is how parties College Being able to perform its role with A True And Capable of producing scholar Yang Ready to plunge as Teachers in the Field of Vocational OR Vocational Education The curriculum SDM are entrepreneurial. The role of parties College hearts provide A Case That provides an opportunity to start a business since the college is very important, According with Opinion Thomas Zimmerer that starting a business, can ON When the school term Runs, but more important is how the role of Universities hearts motivate students to the container belonging review hearts. because operates Without giving clear picture What are benefits of entrepreneurship, so big possibility of the students on motivated to deepen the skills of operating a business review. As Prospective teachers Not Just a theorized but have hearts entrepreneurship An experience that can be made experience the real thing for a review submitted on study.

Therefore, parties College Also Need to know The pale dominant factor motivating students to entrepreneurship hearts. Research says that hearts dominant factor motivating fence undergraduate being an entrepreneur namely opportunity factor, factor Freedom, Life Satisfaction factors. The third factor that makes them entrepreneurs.

College hearts give information shown to the students, that Being an entrepreneur will get a couple of occasions, Freedom and Life Satisfaction. Singer Must delivery process is often done so that students are more motivated to start entrepreneurship review.

The more big motivation, There at Students causes Containers Yang prepared by parties College not wasted, but will give birth to young entrepreneurs A reliable. Searching Google Pages The number of students starting a business since college, so big possibility taxable income other than as Educator Also Pass will continue the business that already started.

Entrepreneurship education needs more relevant with change the global environment The demands excellence, equity, and competition. The Role of Higher Education Learning hearts implement entrepreneurial. Learning patterns entrepreneurial Operates formal institutionalized. Bekal Motivation and attitude mental entrepreneurs who woke operate Natural, born from the limitations of life and the spirit of hard work Accompanied exemplary from lecturer or model example. The well-trained student will become a resource terlihah positive side and is transformed Being Benefits. According Ciputra, entrepreneurial competence is not witchcraft. Higher Education, should be taught the Three Competencies shown to students, which creates opportunities (opportunities creator), creates



new ideas The original (innovator) Dan Dare to take risks and is able to count (calculated risk takers). What role do universities are: (i) Internalization of Values entrepreneurship, (ii) increasing the skills (knowledge transfer) aspect hearts Marketing, financial, and Technology; And (iii) Support for entrepreneurship (business setup) (Vallini takes and Simoni, 2007).

Characters are designed to review scientific entrepreneurial know (know), do (did), and (be) entrepreneurs. Educational Objectives know Dan to doterintegrasi in hearts Curriculum Studies Program, distributed in the hearts scientific lectures. Integration is meant to review Internalization of Values entrepreneurship. In Stages Singers, College provide The entrepreneurial subjects intended to review Bekal Motivation And the establishment of employers mental attitude. Mean while aim of becoming entrepreneurs are given hearts Practical Business Skills training. Students are trained to realize Innovation Technology Business Into Practice hearts.

Strengthening Program for review activities encourage entrepreneurship and accelerate the growth of new entrepreneurs has launched the Government. Directorate General of Higher Education has developed a variety of entrepreneurial programs. In 2009, has introduced the Student Entrepreneurship Program or PMW (Student Entrepreneur Program) to review the student enters bridging the World business rill. Almost every year PMW activities throughout the College do with the objective of training students to review the entrepreneurial hearts do different disciplines. Department of Home Again Foreign Economic not with each entrepreneurial The Field Study subjects therein Already a entrepereneur element, even the Third Programme Start Three semesters The study Already Starting to learn entrepreneurship. High index of entrepreneurial activities The High- level entrepreneurship A gatra ( Boulton and Turner , hearts Hendarman , 2011)

Different hearts student development activities Interests and Talents, knowledge, Welfare OR other organizational skills Ability to provide for a review of entrepreneurship, entrepreneurial understanding hearts Business, Entrepreneurship Development at the University provide extra-curricular program of entrepreneurial competence shown to students. Program Objective Competence includes know, to do, and to be an entrepreneur. Where students obtain training materials, internships Until the

supply of capital for a review of Business Practices.

Be able to give birth to the formation of Creativity and Innovation as Top Energy entrepreneurship. Being able to utilize operating Potential national, for a review of support policies to improve the equalization on acses And Higher Education, Program increased Increasingly Being offered. \* According to Robinson, Huefner Dan Hunt (1991), they have the character of The High Singer hearts innovation, business practices, Confidence and Control. Is their Business Performer, Yang Also Want to improve entrepreneurship.

### **III. CONCLUSION.**

Entrepreneurship education at the College requires a real experience as An entrepreneur at a Time An educator in the field of Vocational Education is a responsibility as a teacher candidate That





would plunge the field. Education is an integral part Which can not be separated from human resource setup process Yang berkualitas, resilient and terampil.dengan lying words, through entrepreneurship education so qualified moreProductive and able to compete.

Readiness of Teachers in Vocational Education are required to have competence 1) .Communication skills. 2) .Critical and-creative thinking.

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Entrepreneurship education at the College requires a real experience as An entrepreneur at a Time An educator in the field of Vocational Education is a responsibility as a teacher Candidate That would plunge the field. Education is an integral part Which can be separated from human resource setup process Yang berkualitas, resilient and terampil.dengan lying words, through entrepreneurship education so Qualified more Productive And Able to compete.

Readiness of Teachers in Vocational Education are required to have competence 1) .Communication skills. 2) .Critical and-creative thinking.

Being able to give birth to the formation of Creativity and Innovation as Top Energy entrepreneurship. Being able to utilize Operating Potential national, for a review of support policies to improve the equalization on akses and Higher Education, Program increased Increasingly being offered. \* According to Robinson, Huefner Dan Hunt (1991), they have the character of The High Singer hearts innovation, business practices, Confidence and Control. Is their Business Performer, Yang Also Want to improve entrepreneurship.

Entrepreneurship education at the College requires a real experience as An entrepreneur at a Time An educator in the field of Vocational Education is a responsibility as a teacher Candidate That would plunge the field. Education is an integral part which can not be separated from human resource setup process , resilient and terampil.dengan lying words, through entrepreneurship education so Qualified more productive and able to compete.

Readiness of teachers in vocational education are required to have competence 1) .Communication skills. 2) .Critical and-creative thinking.3) information. 4)inquiry/reasoning skills. 5)interpersonal skills. 6) problem solving. 7) technological skills.

If observed from 6 competencies are soft skills , while competence is hard skills 7 graduates who will become vocational teachers must have real quality can be seen from the performance when they time to be educators independently apply the knowledge they have acquired within their existing field home economic (food nutrition, fashion and hairdrasing) Learning with entrepreneurship education komponen in the cognitive , affective and motor then embody an entrepreneurial attitude ,



because the students are given the experience in entrepreneurship and be prepared to be educators in the field of vocational reliable and students undertake an appropriate field of entrepreneurship in the home economics department is emphasis on equipping the professional capabilities of entrepreneurs.

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## DEVELOPMENT ON PRODUCTION BASED TRAINING ON AGRO INDUSTRY EXPERTISE COURSE TO IMPROVE STUDENTS' COMPETENCIES IN FOOD DIVERSIFICATION BASED ON LOCAL RESOURCES

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**ABSTRACT :** *The research approach was developmental research for improving, implementing and evaluating a production based learning (PBL on subject of Technology Processing of Animal Product at Study Program of Education on Agroindustry Technology, Universitas Pendidikan Indonesia. Syntax of Production based learning are (1) Explanation of the objectives and competencies to be achieved; (2) Explanation of course material; (3) the making of group where each member of the group is divided according to the division in the company; (4) Preparation of company profile by each group; (5) SOP for each part by each group; (6) Practical manufacture of processed products by each group - syntax 1 to 6 can be repeated according to the number of products produced by each group, each group member should play different role in every different , so that every group member possessed the skill in every work part of producing a product; (7) Naming the product and work report by each student. The result showed that there was improvement in students' knowledge seen from student's test score. The result also showed that there was improvement in student's skill seen by performance assessment.*

**Keywords:** *Technology of Animal product, Production based learning, design based research*

### I. INTRODUCTION

Vocational education has an important role to provide qualified workforce. Since the Study Program of Education on Agroindustry Technology, aims to fulfill the need of qualified vocational teachers on agro industry, its curricula has been develop by ratio of 60% agriculture processing science and 40% pedagogic science (Cakrawati et al, 2014). Alumna from this program are expected to have several competencies including psychomotor as they had to train students' skill in processing food. According to (Baker et al, 1981), students phsycomtor skill derived from their teacher.

Secondary vocational teacher acquired the competencies through college courses, apprenticeship and individual study (Findlay, 1989). It can be said that learning activities in university is important to produce excellent teachers. According to (Mclean and Camp. 2000) curricula in university program of agriculture or preservice teacher often conducted in the form of experiential learning. Roberts, (2006) stated that learning in the form of experiential can occur in the classroom or laboratory such as experiments or project. university has independency in designing curricula, course planning and teaching activities therefore teachers can properly develop curriculum that fulfill students need. Chung, (2015) proposed problem based learning technique because this learning technique was proven able to increase students motivation to learn proactive, improve student's critial thinking and problem solving knowledge also develop skills and attitude accroding to industries' expectation.

Learning at different places, such as laboratory, classroom and workplace provide possibilities to develop students' knowlegde and skill, also build their attitude towards many situations. Therefore



Vocational Education Program should improve learning quality by developing learning experience (Onstenk, 2009).

The research in this article is action based reseach of students' experience in production based learning consist of occupation spesific subject, which is Processing technology of animal product. In this course, students are expected o produce food product from animal such as yoghurt and ice cream. The aim of the study was to examine students' experience with formative asesment in workplace learning.

## **II. METHODS**

The research conducted using action research on the basis of class action research proposed by Kemmis dan Mc Taggart (2000). The action research focus on improvement on syntaks of Production Based Learning to improved learning process. Kemmis and Mctaggart action research model consist of four components, there are planning, action, observe and reflection. Research flow chart stated in picture below.

### **Data Collection**

Data collection techniques in this study are:

- (1) written post test conducted at the end of cycle 3 and cycle 6 to determine the final results of student learning after learning development model Production Based Training;
- (2) Reports about products made. Practical reports are made individually in the form of a paper on processing technology processed products that have been implemented. The paper not only contain practical implementation process, but starting with a review of the raw materials used up to the observations of the product. In this study, the student must make practical reports four refined products, namely: purple yam ice cream, yogurt with fruit leather dyes dragons.

Data Analysis Data obtained from the test result furthermore processed and converted according to Universitas Pendidikan Indonesia's academic guidelines then distributed in table of frequency distribution. Students who have score below 70 need to be remedial before continue to the next cycle. Project reports were scored based on teacher's guideline with ratings range 4 = very good, 3 = good, 2 = adequate, and 1 = less. For students who get less value, then the student must rectify its report.

## **III. RESULT AND DISCUSSION**

Production based learning is slightly different with project based learning, but almost simmlar with work based learning. In production based learning, students are given project to produce fish product that stated by the teacher. This learning also applied student-centered learning that according to ((Harmer, 2014), teacher act as tutor that helps student in their learning process by supporting them, if necessary. It is expected that with less teacher control, students have more responsibility for their learning. There were three steps conducted in the research; preparation, implementation and evaluation. In the preparations steps, researcher did some production trial on making fish ball and



craker from fishbone. Production trial was needed to know time needed to make the products and to make sure the laboratory have all the equipment to do production.

Before the implementation step, researchers do some reflection and make improvement on production based learning syntaks, as stated in Picture 2. Improvement was made to make student feel motivated since they are given real problem, as in real manufacturer, each member has spesific task and responsible with their task shown by organisational diagram and also jobdesk that each group make. Students were making standard operational procedure (SOP) on each production step, so that production process was controlled. according to (Harmer, 2014), giving the student, the opportunity to explore learning process is important matters in production based learning. Production based learning not only improve student's hardskill but also soft skill especially the ability to work in group. Since according to (Hanney & Savin-Baden, 2013), in production based learning, students are exposed to a complex series of interaction between group member and they develop their communication, planning and team working skill.

Implementation of production based learning was conducted with Class action research, consist of 3 learning cycles. First cycle was explanation on production based learning where students was given task to create SOP, company profile and jobdesk on each member. Second cycle was explanation of subject which is the principal of making fishballs and fishbone craker, it was conducted in laboratory. Third cycle was producing fishballs and fishbone crackers in laboratory. Students were working suited with their jobdesk. Learning process was begin when students buy raw material for their product since they were expected to have knowledge on selecting good raw material with limited budget. They also learn to calculate the amount of raw material to buy in accordance with the product to produce. After third cycles are finished, researched continue with reflection and evaluation. The refection resulted that students and teacher need to adapt with the new learning process. So teacher need to provide more time for students consult after class, for example in making SOP and process flow of making fish product. Picture 2. Syntaks of Production Based Learning

Students assesment was conducted using written post test and reports. The result show that there were increasing in students score. the main advantage of production based learning are improving academic result, the development of softskills and hardskills, increased student motivation and enjoyment, enhanced outreach and engagement beyond academia and advantages for lecturers (Harmer, 2014).

#### **IV. CONCLUSIONS**

1. Development on learning syntaks are the addition of students tasks of making jobdesk, SOP and organizational charts. Syntaks development was purposed to give student experience of working in "real worksite"
2. Implementation of Production based learning help improve student academic achievement, softskills and hardskill, shown by inceasing in student's test score, students ability to work in group, ability to solve problems.



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## THE INTEGRATION OF ENTREPRENEURSHIP LEARNING INTO OTHER COURSES TO STABILIZE ENTREPRENEURSHIP SKILL

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**ABSTRACT :** *Entrepreneur's role in the development of a country has been proven in some countries. For example in Japan after Hiroshima and Nagasaki's bombing which shattered the country. However, the Japanese did not give up and showed their spirit in building the country so that it became one of the developed countries in the world. There are at least 2% entrepreneur in the developed country, whereas, in Indonesia there are only 0.18% entrepreneur. The impact is that the national economy of Indonesia stays in low level. The education system in Indonesia has included entrepreneurship in the curriculum. However, the implementation has not been good enough in which most of the learning process focus on how to foster and improve entrepreneurship spirit, so that the result is not satisfying yet. Besides, Indonesia has implemented AFTA (ASEAN Free Trade Area) and AEC (ASEAN Economic Community), where one of the impacts is that labors are free to enter a country. If the human resources in Indonesia do not improve, Indonesians will suffer in their own country. One thing that can be done is by integrating entrepreneurship course with other courses. The spirit of entrepreneurship will not be the only thing that is improved. They will also know more about entrepreneurship that will be useful in the future.*

*Keywords: integration; course material; entrepreneurship.*

### I. INTRODUCTION

The future of a nation depends on the quality of human resources. Excellent human resources can be realized through an education in family, society, and educational institution or school. An education system which is responsive towards time changing is needed. It can be started from elementary education, intermediate education, and higher education. Therefore, Indonesia can be excellent in quality, able to compete, and does not left behind in this growing global era.

The number of unemployment in Indonesia every year is still high. It can not be denied that most of the unemployment is college's graduates. Why does it happen? It happens because there is a lack of job opportunity where the number of the labor force is high while the number of the job field is not enough. How do Indonesians face AEC in such condition?

ASEAN Economic Community (AEC) is an economic cooperation between ASEAN countries organization. AEC is an economic integration in ASEAN in the form of agreement to create a free trade area, where there is no tariff barrier (excise tax) for the member countries. It is resulted in a free competition of goods, services, investments, and labors in ASEAN countries. AEC is not a barrier to create Indonesia as a prosperous country, but as an encouragement to improve the competitiveness of Indonesia's human resources.

There are at least 2% entrepreneur in the developed country, whereas, in Indonesia there are only 0.18% entrepreneur. The impact is that the national economy of Indonesia stays in low level. The education system in Indonesia has included entrepreneurship in the curriculum. However, the



implementation has not been good enough in which most of the learning process focus on how to foster and improve entrepreneurship spirit.

Education is a tool to galvanize the human resources becomes the excellent one. However, the result of the implemented education is not satisfying yet. There are some inadequacies in the result; one of them is the high number of unemployment that comes from college's graduates. The process of improvement in education is happening continuously. For example is by fostering and improving the entrepreneurship spirit.

The material about entrepreneurship is stated in Presidential Instruction No.4 year of 1995. However, in its implementation, entrepreneurship is taught as a concept only or the material is not integrated with other materials. The values of entrepreneurship are implemented directly in the learning process of other courses. Therefore, hopefully entrepreneurship values can be internalized and attached to the students. A supporting system is needed to make it happen.

## **II. DISCUSSION**

### **A. Curriculum**

Curriculum is the core of an education. It determines the direction for the students. According to Law No. 20 year of 2003 about National Education System, curriculum is a set of plan and arrangement about purpose, content, learning material, and method as a manual of the implementation of learning activity to achieve certain goals.

The high number of unemployment shows that the on going education system in Indonesia is not satisfying yet. The process of improvement in education is happening continuously. Curriculum management is needed to be done in education process so that the planning, implementation, and evaluation can be effective, efficient, and gain optimum result.

According to Malayu S.P. Hasibuan (1995) in his book entitled "Manajemen Sumber Daya Manusia" stated that management is science and art in regulating the utilization process of human resources and other resources effectively and efficiently to achieve certain goals. Therefore, management is a need which eases the process of achieving goals in organization, also managing some organization resources such as infrastructure, time, human resources method, and others effectively, innovatively, creatively, and efficiently. It can be said that curriculum management is a comprehensive and systematic system of curriculum arrangement in order to achieve the goals of curriculum.

The functions of curriculum management are:

1. Improving the efficiency of the utilization of curriculum resources; the empowerment of resources and curriculum component can be improved through planned and effective management.
2. Improving the relevance and effectiveness of learning in accordance with the student and environment's need; curriculum which is managed effectively gives a chance and result that is relevant with student and environment's need.





3. Improving the effectiveness of the lecturer and student's performance in achieving the goals of learning. Curriculum which is managed professionally, effectively, and integrated motivates the lecturer and student's performance in learning.

The content of curriculum is courses of each semester according to student's needs and ability. The distribution of the courses is arranged to ease the integration of value or entrepreneurship character. For example in Family's Welfare Education Department (PKK), Continental Food Processing course is taught in the same semester as Dining Service course.

## **B. Entrepreneurship**

Entrepreneurship is an attitude, spirit, and ability to create something precious and useful for her/himself and others. Entrepreneurship is a stance which is active, creative, inventive, homely, and attempted to increase the revenue in business.

Entrepreneurship course is needed and important in order to realize Indonesia as a prosperous and tranquil country. The result of entrepreneurship learning hopefully can be an encouragement to strengthen the national economy of Indonesia.

Entrepreneurship is a translation from French which is then accepted by English and Bahasa Indonesia. Entrepreneur is translated into *wirausaha* or *wiraswasta* in Bahasa Indonesia. In some Indonesia literature, the terms *wirausaha* and *wiraswasta* have the same meaning. In Indonesia Dictionary, the two terms have no difference in meaning.

Entrepreneurship is not only used in private company, but also in cooperation, educational area, and Stated-Owned Enterprises (SOE). Therefore, entrepreneurship is not a monopoly of private company. As a result, the universal term of "entrepreneurship" is emerged.

The term "entrepreneur" according to Burch is someone who does not only run or lead a company well, but also someone who has initiative to develop his/her business by using or creating new job fields.

Entrepreneurship is a good ability to work with a spirit of independence, including courage to take risk in business and minimalize the risk into profit. John G. Burch translated *entrepreneoire* which means take a role and chance; fulfilling the needs and wishes through innovation. He/she should take into account of the risk carefully. Some entrepreneurship principles, according to Burch, namely the ability to think and act creatively and innovatively, work carefully, diligent, and productive. These characteristics are able to encourage the individual to take role and control his/her resources into a productive process.

An entrepreneur must be someone with a foresight, careful thinking, and able to choose from some alternative of problems and solutions. An entrepreneur has some characteristics as stated by Buchari Alma (2001:39). The characteristics and nature of an entrepreneur are explained as follow:

### **1. Confidence**

Confidence is a belief to do something based on his/her ability and potential. With confidence, an entrepreneur will be able to do something to develop his/her business.



## 2. Task and Result-Oriented

Task and result-oriented means an entrepreneur needs to have excellent achievement. He/she always wants to be better to achieve his/her goals. Determination, perseverance, and fortitude are needed in business.

## 3. Risk Taker

A risk taker is someone who is able to make or take a decision in uncertainty situation, while considering the chance to be successful or fail. The development of a business requires an entrepreneur to be courageous in making decision and ready to take all the risks, also ready to face a failure.

## 4. Leadership

A successful entrepreneur is a successful leader. Essentially, an entrepreneur is a leader who finds opportunities, gathering human resources, and collecting funds for doing project. In addition, an entrepreneur also leads his members to reach the goal they want. Therefore, an entrepreneur should be able in motivating and maintaining a good communication with their employees, understanding the prior necessity of their employees, and involving the employees in reaching the missions and targets of the company.

## 5. Originality

Originality is related to creative and innovative ideas. In order to do that, an entrepreneur should have a wide knowledge and many networking.

## 6. Future-oriented

Future-oriented, is a motivation of improving capability and performance realized by doing an activity which results is needed in the future whether in a short, medium, or long term period.

There is a correlation of characteristic between one entrepreneur to the others. These characteristics should not be possessed by the entrepreneurs completely. This characteristics and nature is shown by entrepreneurs with behaving and doing something. These characteristics and nature can be identified in their daily live, for instance:

### 1. Discipline

Discipline is the entrepreneurs' commitment accuracy in doing their job. This accuracy is completely related to timing, working quality, working system, etc.

### 2. Honesty

Honesty is the basic morality which is frequently forgotten by entrepreneurs. Honesty is complex. Honesty are shown by entrepreneurs in portraying the product characteristics (service and goods) offered, in doing the promotion, in executing the post payment services promised, and in the whole transaction of product selling done by entrepreneurs.

### 3. Creative and Innovative



Entrepreneurs should have high creativity in order to win the selling competition. This creativity should be based on futuristic mindset with new ideas that is different than the product existed in the current market by being market oriented.

#### 4. Independent

Someone is called “independent” if he/she is able to do something good without any dependency to other people or stakeholders in decision making, including independently financed and not depended to other people.

### C. The Integration of Entrepreneurship Values

Learning process is an essential part of learning. By this statement, teachers are required to teach and empower their students. So, the knowledge given to the students is not only factual, conceptual, and rigid, but the knowledge is flexibly constructed by the students with the help of the lecturers. This thing is in line with the modern learning theory of Peter Sheal (Erman, 2004:7), saying that meaningful learning reach 90% of the learning goals by doing-experiencing and communicating approach.

Current entrepreneurship lesson is not enough to enter the value of entrepreneurship to the students. It is because of entrepreneurship lesson is limited under the conceptual teaching method. In order to make it realized by the students, entrepreneurship lesson should be integrated to other lessons, so, the entrepreneurship education can be fully internalized in all theory and practical lesson. The integration of entrepreneurship values is adapted with the material existed.

Entrepreneurship lesson is directed to three basic competences, the entrepreneurship characters' integration, understanding of the entrepreneur skill and concepts. The integration of entrepreneurship education is undergone in the steps of planning, executing, and evaluating, which is included into the syllabus and lesson plan made by the lecturers. The learning principles used in the development of entrepreneurship education is aimed on making students understand and accept the entrepreneurship value so that they can be responsible on every single decision they make. The process of the students understanding flows with thinking, behaving, and doing. These three process is developing the ability of the students in doing the activity related to entrepreneurship value.

Basically, the learning activity is projected to make the students able to master the material given and make the students understand, aware, and internalize the entrepreneurship value in their life. These steps is done by integrating the entrepreneurship values in other lessons. The integration of character or entrepreneurship values and skills can be executed in the learning process or in the evaluation. The integration process can be done if the current curriculum supports it.

Curriculum is arranged for placing lesson in each semester as what the students need and able to cope. For instance, Continental Food class and Plating class is given in the same semester. Before the lesson started, syllabus and lesson plan has been created with the integration of entrepreneurship values or characters. In the learning process, the students' food made in Continental Food class will be



used as the menu in the Plating class. The students are required to make and serve a delicious continental food because this food will be sold to the students who attend the Plating class. The character or the values of entrepreneurship in the students of Continental Food class is creative and innovative in which the students is trying their best in serving their delicious food in the plating. Never giving up, it means the students will try their best to achieve a good result and redo it again if they are failed. In one group, each member will work together to serve their most delicious dishes. Besides succeeding in internalizing those values and characteristics to the students, the students are able to become an entrepreneur by selling their product.

### **III. CONCLUSION**

Indonesia's economy is not really developed. It can be proved by the existence of many unemployment or people who are not maximizing their potentials. This is because the values and characteristics of entrepreneurship is not internalized to those people. They are stucked in the comfort zone of finding job and doing their job.

Globalization is always moving fast. If there is nothing change, Indonesia will be left by other countries. Therefore, Indonesia should fix their human resources through education whether in their family, society, or in any educational institution, too.

The working ages in Indonesia is high with limited job field. So, the mentality of finding job should be change by creating a job field instead. Entrepreneurship education really supports the increasing number of job field in the country. But, the current entrepreneurship education is not enough by its conceptual teachings.

The entrepreneurship materials should be integrated in the learning process to make students able to realize the value. The integration itself can be done in the other lessons. The values and characteristics of entrepreneurship will be attached and internalized in every single student. They will be creative and cooperative. Besides, these values are also projected in students' practical lesson which enables them to become entrepreneurs. Wherever they are working after graduated, they can perform their entrepreneurship skill well.



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## STRENGTHENING PARTNERSHIPS WITH INDUSTRIES FOR VOCATIONAL EDUCATION EFFECTIVENESS AND EFFICIENCY

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**ABSTRACT** : *The existence of vocational education in Indonesia had an impact on improving labor productivity. In the ASEAN Economic Community (AEC), the industry is looking for labor who has skill expertise. Vocational education challenges are how vocational education can produce skillful creative graduates who have social and adaptability to the working environment. Based on these conditions, the vocational education needs to strengthen cooperation with the industry to improve alignment between the competences of vocational education graduates with the competencies required by the industry. Thus, the educational process is organized in vocational education more effective and efficient. Effectiveness refers to how the vocational education had achieved its objectives, while efficiency refers to minimize the use of all the resources that exist in vocational education.*

*Keywords: partnership, vocational education, effectiveness and efficiency*

### I. INTRODUCTION

Education is a strategic way in improving human resource quality which is able to set a going of economy and improve human's living standard. Vocational education is a kind of education that is particularly aimed at preparing the graduates in the real occupation. Vocational education emphasizes on the mastery of knowledge, skill, and attitude needed in certain work field.

Related to improving vocational education quality, there are some efforts that have been done. It is aimed at making vocational education able to produce competent and competitive manpower. In addition, it is hoped that vocational education that has been held brings multiplier effect to the human quality and to the manpower condition in Indonesia. To improve the vocational education quality meant previously is started by investigating the problems occurred. Governing Board Members of TVET (2004) noted that there are some issues and trends of vocational education in South East including Indonesia as follows:

(1) Limited number of qualified personnel with high quality including commitment and result-focused, (2) Limited capacity in utilization of research and evaluation as tools for development, (3) Unsystematic or lack of staff development programs, (4) Negative image of VTE especially among community members, (5) Inadequate number of qualified teachers, (6) Lack of public-private sector partnership in training teachers and students, (7) Curriculum irrelevancy and the misfit of VTET graduates, (8) Coping with IT explosion and rapid expansion of ICT, (9) Lacking in the development of teaching and learning resources, and (10) Lack of facilities, especially lab and workshops.

Besides, Basuki Wibawa (2005) states that there are some problems occurred in the technology and vocational field including; (1) graduates' quality and competence; (2) graduates' waiting period; (3) relevance between the needs of community and the needs of industry; (4) compatibility between



skill program offered and industrial demand; (5) less care given by industry to technology and vocational education in Indonesia; (6) inadequate learning facilities; (7) accreditation; (8) qualification of teachers and educators; and (9) certification.

The investigation of those problems leads to the low quality of graduates produced vocational education. This condition requires serious attention coming from all sides. Nurhening Yuniarti (2010:129) states that there is a situation occurred in vocational high school that is a gap between education and occupation. The first gap is that the graduates' skill is less appropriate with the qualification standard required in occupation. The second gap is that the numbers of graduates are not in line with the growing of occupation. Based on the condition, it is required to improve the quality and relevance of vocational education to produce the graduates who are ready to be productive in occupation. Ministry of Education (2010:8) states that the effort to improve quality and relevance of vocational education can be done through: (a) harmonization between vocational intermediate education, vocational education, and skill training in building a synergy to give response to the dynamic market need; (b) improving partnership between vocational intermediate education, vocational education, and skill training and industry to strengthen intermediation and to expand the opportunity of internship or apprenticeship and the compatibility between education/training and occupation.

Those two efforts can be applied if there is a strong relationship between vocational education and industrial world. The relationship is based on mutualism symbiosis which means that those two parts (vocational education and industry) obtain the same advantages. By strengthening the partnership of vocational education and industry, it then will contribute to the improvement of vocational education.

## **II. PARTNERSHIP BETWEEN VOCATIONAL EDUCATION AND INDUSTRY**

### **A. Philosophy of Vocational Education**

Charles Prosser (1925) suggests 16 theorems to be practiced to make vocational education more effective. From those 16 theorems, there are 3 principles related to the role of industry. Vocational education will be effective if: (a) the training jobs are carried on in the same operations, tools, and machines as in the work in the occupation itself; (b) training an individual about the habits of thinking and manipulative as required in the work itself; and (c) the environment where the individual is trained is a replica of the environment in which he must subsequently work. Those three principles provides the description of how important the partnership between vocational education and industry to produce effectiveness of vocational education.

Related to the facilities (especially tools and machines), not all SMK are able to provide adequate facilities. The habits of thinking and manipulative skills can also be accustomed if the students are studying in industry. In addition, to create vocational education environment as the replica of industrial world, it becomes the hardest principle to be realized by vocational education. It can be solved if industrial world provides opportunity to vocational education to apply some practical works



in industry. Besides, the management of vocational education must also be based on the main purpose that is preparing the graduates to be ready in occupation and to work. The management of vocational education must be designed to reach education effectiveness and efficiency. The programs in vocational education must also be well designed, in which the curriculum must be designed based on demand driven, the improvement on learning process, the improvement on learning facilities and the reinforcement of networking with industrial world.

Beside Prosser, a philosopher of pragmatism/instrumentalism, John Dewey, states that experience is one of keyword in pragmatism/instrumentalism philosophy. The philosophy of Dewey is “about” and “for” daily experience. Experience is all process influencing (take and give) between living organism and social and physical environment. In his book of Democracy and Education (1916), Dewey offers certain educational concept which is adaptive and progressive to the future development. That concept states that education must be able to provide the learners all they need in their social environment. If the learners graduate, they then will be able to adapt with the society. To realize that concept, Dewey offers method and approach in learning that are problem solving method and learning by doing. In problem solving, the learners are faced to the challenging situation and problems, and they are free in solving the problems. Then, learning by doing concept is needed to facilitate the gap between educational world and society needs. Thus, to make them have existence in the society, they must be provided by practical skills as needed by the social society (Ali Maksum, p 2015:206).

Based on the explanation, it is clearly seen that strengthening partnership between vocational education and industries becomes important to do. Even in the development of education and vocational learning theory, industry can do the role as an effective place to learn. The following are two theories of learning at work place that are situated learning and work-based learning.

#### 1. Situated Learning Concept

Situated Learning is the theory which learns acquisition of knowledge and skill used in the occupation. Situated learning emphasizes the idea that what is learned is specific to the situation (context) in which it is learned. Stein (1998:1) identifies four principles related to situated learning that are: (1) learning takes the root on daily activity (everyday cognition), (2) knowledge is obtained conditionally and its transfer only lasts for the similar situation (context), and learning is the result of social process including the way of thinking, reviewing something, solving problem, and interaction beside the declarative and procedural knowledge, and (4) learning cannot be separated from action but it is existed in the healthy and complex social environment to improve actor, action, and situation. Based on those principles, making industry as the learning place is one way to improve the graduates' quality of vocational education.

#### 2. Work-Based Learning (WBL)

Work-Based Learning (WBL) is a contextual learning form in which the learning is centered to work place and it includes well planned program from formal training and mentoring, and to finding





out work experiences that will earn stipend. Raelin (2008:2) states that WBL merges expressively between theory and practice. WBL recognizes that work place offers a lot of opportunity to learn as in the classroom. Internship or apprenticeship system is included as WBL. Here, the students are learning with the expert or maestro through observation and attitude imitation and the working procedures intensively so that they are able to get specific experiences.

#### B. An Effective and Efficient Vocational Education

Effectiveness of vocational education refers to: (1) how far the results gained from vocational education programs' achievement with its purpose and results expected; and (2) work performance of vocational education which relates to how far vocational education is able to produce graduates who own the condition and status as expected. Vocational education is called effective if it has some characteristics including: (1) powerful leadership, (2) its learning environment supports to achieve the competence goal; (3) its determined policy is oriented to achievement, (4) strengthening learning process, (5) doing evaluation regularly, and (6) determining objectives clearly.

Efficiency of vocational education can be attained if the education process performed optimizes available resources to reach the goal of vocational education. Those available resources are including facilities (tools and equipment for practical work), education facilities, and human resources. It can be seen from how vocational education is able to use the education facilities as optimal as possible. Another indicator is about how to make human resources to perform their duties well which is aimed at improving the quality of vocational education.

#### C. Why Vocational Education Needs to Have Partnership with Industries?

The regulation of Minister of Education No. 0490/1992 about Partnership between SMK and Industries is aimed at improving compatibility of the SMK programs with occupation needs to carry on the equal benefits. It is clearly seen that partnership between school and industries is important to do to support the success of SMK programs. Corporation and Industries must be directly involved in the partnership with vocational school.

There are some points need to consider in building partnership such as: (1) there is equality between two parties; (2) there is openness and trust relationship; and (3) there are mutual interaction and interrelationship between two parties.

#### D. The Goal of Partnership between Vocational Education and Industries

Partnership between vocational education and industries is aimed at reducing gap of graduates ability with qualification required by occupation world so that it can improve vocational school's quality. The partnership can be used as the strategy to overcome restrictiveness of resources available in vocational education.

#### E. Advantages of Partnership between Vocational Education and Industries

There are some advantages of partnership between vocational education and industries. Here are the advantages of partnership:



1. For vocational education: (a) to know the information about competence needed in the occupation; (b) as a tool for distributing man power; (c) as the source of information for school development; (d) to improve the quality of educators (internship, training, etc.); (e) to improve trustworthiness for stakeholder; (f) as the place in students' practice; (g) as the place of students for internship or apprenticeship; and (h) to improve the graduates' quality.
2. For the students: (a) to provide real life skills; (b) to provide real work experience; (c) to train themselves to fulfill the soft skill requirements in the occupation; and (d) to know the development of occupation world.
3. For Industries: (a) as promotion of a company; (b) as community service/dedication; (c) to know the quality of vocational education graduates; (d) to get assistance in human resource/manpower assistance; and (e) to know the potential students to be recruited.

#### F. Pattern of Partnership between Vocational Education and Industries

##### 1. Pattern of Partnership in Apprenticeship Program

Partnership in apprenticeship is done to develop learners' skills in the real industrial work. It is expected to provide benefits for industries to assume the learners as assistance of manpower in the operational level. On the other hand, industries can use this partnership as pre recruitment program of the learners with good job preferment. Technically, vocational education must seize initiative to provide information to industries so that, both vocational education and industries cooperatively make commitment under MoU. The pattern of this partnership will be completed by the more details Operational Procedure Standard as the guidance.

##### 2. Pattern of Partnership in Training Program

Partnership in training program emphasizes to make optimal of available resources in vocational education so that they are ready to perform in the training process for industrial manpower. It can also be used as a tool to make the partnership with industries continually long lasted. The pattern of partnership in training program is expected to make the relationship between vocational education and industries keep intense since it is created mutual and beneficial cooperation.

This type of partnership must be done by doing initial initiative coming from the school, for example, visiting to the industries to find out the competence needs supporting industrial development. To build industries' trust, this pattern can be performed in the more details Guide Line Training and will be protected by a clear MoU.

##### 3. Pattern of Partnership in Production Program (Teaching Factory)

This pattern of partnership in production aspect is a kind of curriculum implementation with Production Base Education (PBE) method. It is expected to improve more competence of learners. It can be performed if: (a) the competence owned by teachers is at least equal with that owned by industrial supervisor, both in hard skill and in soft skill, (b) tools set-up, facility of laboratory and workshop are all sufficient to perform production activity. This type of partnership can be done if the



school convince the industries to become both as partner in production activity and as vendor of the industries in surroundings.

#### 4. Pattern of Partnership in Graduates Distribution Program

The pattern of partnership in graduates' distribution program is the upper ends of all the available programs since it is used as parameter of succeed in the final learning process in which all output are expected to be outcome. It can be done by partnership with industries in the recruitment process of the graduates. Vocational education is able to provide data of all graduates and ensures that the graduates distributed are having sufficient competence which based on industrial requirements standard (knowledge, skills, and attitude).

#### IV. CONCLUSION AND SUGGESTION

Considering the advantages obtained from the partnership between vocational education and industries, this partnership must be continually performed and strengthened. Through the partnership, vocational education is able to develop education concept that are adaptable and progressive to the development of occupation world in the future. To strengthen the partnership, it can be done by pattern of apprenticeship program, training, production, and graduates distribution. Those patterns of partnership can be beneficial for both parties since the partnership is based on mutualism symbiosis, equality, and trust. For vocational education, the effects of strengthening this partnership are: (a) the graduates produced by vocational education are more qualified; and (b) it reduces operational cost in the learning process. Therefore, vocational can be more effective and efficient.

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## **Preparing Educational Institution's Graduates to Compete in ASEAN Economic Community**

Saptriana

**ABSTRACT :** *Now we have been in ASEAN Economic Community (AEC), which officially started on January 1<sup>st</sup>, 2016. AEC is a form of economic integration of ASEAN in terms of their free trade system among the ASEAN countries, of which Indonesia and nine other ASEAN member countries have announced an AEC agreement or ASEAN Economic Community (AEC). The consequence of being the part of ASEAN Economic Community is the readiness of Indonesia to accept the arrival of foreign workers and able to compete with those who comes from ASEAN countries. Currently there are eight areas of work, which have been agreed and will compete in ASEAN community such as: Engineer, Architect, Tourism Personnel, Accountant, Dentist, Surveyors, Medical Practitioner and Nurse. Among those eight areas of work, there are at least five areas of work (Engineer, Architect, Surveyors, Tourism Personnel and Accountant) whose study programs are exist and organized by the Faculty of Engineering or the Faculty of Education and Vocational Technology incorporated in Association of Education and Vocational Technology Indonesia (APTEKINDO). Addressing to the subject, it is the duty of APTEKINDO along with the other components of Indonesian society to prepare the graduates well in order to compete with foreign workers from ASEAN countries. There are many steps and options that could be done to prepare the graduates well, such as by giving them not only the competence of education as a professional educators of APTEKINDO program, but simultaneously also given the provision in the form of professional competence certificates from related Professional Certification Institute (LSP), for example, hospitality certificate for the students of Culinary Art program. With the hospitality professional certificate, a graduate student of Culinary Art program is not only ready to be a professional educator in Culinary field, but also able to compete in tourism field professionally because they have a professional competence in hospitality field. The same thing can also be done for graduates of other courses. In order to equip the graduates with a certificate of professional competence, integral processes must be prepared. Faculty or department should organize laboratories facilitation well and completely, develop cooperation with a relevant LSP to make our laboratory as a Competency Test Place (TUK) as well as managing all administration, infrastructure to support the success of Competence Test for each student who will graduate. Graduates with double certificates in the form of an academic diploma from certain study program and certificate of certain professions competence will give our graduates the complete capability to compete in AEC which has been implemented. They are not only able to work in Indonesia but also in another ASEAN member country. It is a pride when our graduates are not only able to work in Indonesia but also in other countries with adequate abilities.*

**Keywords:** AEC, APTEKINDO, academic diplomas, certificates of professional competence.

### **I. INTRODUCTION**

In this globalization era, education is still considered as the main tools to keep up with the development of Science and Technology. The importance of quality education is realized, because the improvement of developed and independent quality of human and Indonesian society can be realized if the quality of education is improved. However, the quality of education and human resources in our country is still far behind other ASEAN countries, especially comparing to other developed countries.

Today, the weakness of human resources quality is still becoming a main problem in the development and competitiveness of the nation. It causes a low global competitiveness of Indonesia. Whereas, Indonesia is confronted with a wider competition since there are an acceleration of globalization and the establishment of a more opened world market. The inabilities in improving the competitiveness of the national human resources through quality education causes Indonesia's position in global competition go down. It should become a concern considering ASEAN free trade era is taken place.



Nowadays Indonesia and other ASEAN countries have formed an integrated area known as ASEAN Economic Community, which has been started since January, 1<sup>st</sup> 2016. AEC is a realization of the goals of economy integration between ASEAN countries.

There are four things that will be the focus of AEC which can be a good momentum for Indonesia to compete in international world, especially in ASEAN. First, ASEAN countries will be a unity of market area and the base of industrial production through AEC. The unity of market area and the base of industrial production ease the flow of goods, services, investments, and capitals in a large amount; while there is no obstacle in the movement of skilled labor from one ASEAN country to another. Second, AEC will establish ASEAN as an economic area with a high competition level, which is supported by some policies such as competition policy, consumer protection, Intellectual Property Rights (IPR), taxation, and E-Commerce.

Third, with AEC, ASEAN has an equal economy development with Small and Medium Enterprises (SME) as priority. The competitiveness and dynamism of SME will increase, if there is an access to current information, market condition, the improvement of human resources in terms of ability enhancement, financial, and technology. Fourth, in the next step AEC will be fully integrated with global economy by developing a system to ease the coordination between the member countries.

For Indonesia, AEC will be a good opportunity because the obstacles in interstate commerce will decrease, even vanish. It will affect in the increasing of exports which is resulted in the increasing of Indonesia's GDP. On the other hands, there is a new challenge for Indonesia such as the homogeneity of the commodities which are sold, for example agricultural commodity, rubber, wooden product, textile, and electronic goods. In this case, competition risk will emerge along with the large amounts of import to Indonesia which threatening local industries in the competition with foreign products. It will increase the trade balance deficit for Indonesia.

From employment aspect, there is a huge opportunity for job seekers because there are a lot of job fields which requires various skills. Besides, the access to go abroad in order to find a job is easier, even without any obstacles. AEC also becomes a good opportunity for the entrepreneurs to find the best employees with the required criteria.

There are eight occupations, such as: engineer, architect, tourism personnel, accountant, dentist, surveyors, medical practitioners, and nurse which will be affected by ASEAN free trade policy stated in ASEAN Mutual Recognition Arrangement (MRA), in which the MRA of each occupation has determined the standard and competence required in ASEAN. The result of the policy is that Indonesia and other ASEAN countries should be willing to welcome the labors from ASEAN countries to fill the jobs based on the competence standard.

A question that is needed to be answered by the stakeholders of education in Indonesia is whether they are ready or not to face AEC by conducting an education in which the graduates are able to compete in ASEAN and international world. It should be contemplated because the quality of education and productivity of Indonesia's labors is less than the labors from Malaysia, Singapore, and Thailand, where in term of industrial foundation, Indonesia is in the fourth place in ASEAN (Republika Online, 2013). Let us hope that Indonesians do not only watch when AEC is fully implemented in ASEAN countries. Faculty of Engineering or the Faculty of Education and Vocational Technology incorporated in Association of Education and Vocational Technology Indonesia (APTEKINDO) should take responsibility in preparing the graduates so that they are able to compete in AEC



through a program related to Mutual Recognition Agreement (MRA) which has been accepted.

### **A. Implementation of Qualified Education in Educational Institution**

The quality of human resources and the competitiveness of the nation are closely related with the quality of national education, while national education is affected by the development of education in each region (province and regency/city). In order to fix the problem, it should be done by improving the quality of education and the professionalism of the organizers (the educators, especially teachers), and the professionalism of educational institution which delivers the educators started from the arrangement of related elements in each region (province and regency/city).

APTEKINDO is a part of the educational institution which becomes an institution that should be involved in preparing human resources to compete in ASEAN free trade. The involvement of APTEKINDO can be directly through the graduates or indirectly through the process of education where the graduates are involved.

Among the eight areas of work in MRA, there are at least five occupations (engineer, architect, tourism personnel, accountant, and surveyors) in which the educational institution is involved in preparing the quality graduates. It is because the educational institution has some programs that are appropriate for those five occupations. Educational institution has civil engineering, mechanical engineering, electrical engineering, chemical engineering, and architecture programs, also accounting program can be prepared for accountant. There are English and culinary art (hospitality) programs to fulfill the needs in tourism. Surveyors can be fulfilled by civil engineering and geography graduates.

Besides the congruence of the program and the profession in MRA, an important issue that should be solved is the capability of educational institution graduates to compete in getting a job in ASEAN. In order to solve this problem, the important things that should be controlled is the existence of high quality educational institution.

In order to make the graduates able to succeed in getting a job, they should be supported by excellent competence. The excellent competence can only be obtained by the existence of high quality educational institution. According to Dedy Mulyasana (2012), high quality and competitive education can be created by paying attention on; the empowerment of educational institution, guaranteed quality of the education system, and the guarantee of informal and formal education quality.

Many attempts have been done by the government to repair and improve the quality of national education. One of the attempts is the existence of Law No. 20 in 2003 about National Education System, and Permendiknas No. 16 in 2007 about the Academic Qualification of Teacher.

From all of those attempts, the government is still not able to repair Indonesia's education condition; it is proved by the remaining problems of national education practice from its weak process, output, and outcome. All of those problems can be seen from the media through several news, such as, the fights of students (between students, students and teacher, students and their parents, and students and the headmaster), promiscuity, corruption of school operational fund (BOS) done by the headmaster and school officials, the unreadiness of facing 2013 curriculum, students drug abusers, juvenile delinquency, illegal street racing among youngsters, students ditching, until binge drinking party done by elementary students.

Another indicators made the direction of national education practice should be re-examined is shown by the decreasing politeness among students seen by the manner of



communication to their friends, parents, and teacher at school or among the society. There are many dirty words spoken by the students to those people. Student's friendliness is also decreasing in the way of how they respect their teachers and parents nowadays. A student in the school age is using the language which is not appropriate with the societal norms with ethics and gentleness.

In order to solve those problems, the national education standards which consists of: contents standards, minimum competence standards, teachers and education practitioners standards, infrastructure standards, management standards, budgeting standards, and scoring standards that should be managed and executed well by the management of educational institution including APTEKINDO. The failures of educational institution (LPTK) in arranging the education based on the National Standards will become a national disgrace for Indonesian education.

### **B. Qualified Teacher**

In order to achieve high quality educational institutions, educational institutions have to prepare future teachers as many as the nation's need. Teachers, who can teach and lead well, are able to prepare Indonesian human resources to have a high quality as what the dynamic society needs. Society wants quality education which can result graduates who are ready for working or continuing to study. Our schooling system should be able to be equally standardized with schools in other country. Parents wants to send their students to a credible and qualified school. A qualified school is a school which has qualified teachers supported by good infrastructures and good atmosphere of education.

The provision of teachers is the main job of educational institution. In order to create many qualified teachers, there are several requirements needed to make the teaching education works well, as what the standards required. The selection towards future teachers is done selectively to create an excellent quality teacher. Good learning infrastructures theoretically or practically in educational institution should follow the minimum standards of future teacher education supported by qualified lecturers who can translate and transfer the lecturing curriculum to the students well. Social support is also important in preparing the teachers.

In the past, we have ever had good quality teaching education institution called teaching education boarding school. All future teachers were boarded. The teaching process is not only inside of the class, but also outside of the class. In the boarding house, the future teacher focus on strengthening their soft-skill, such as, manner, behavior, communication skills, respecting others, intensive peer teaching activity, life independently, managing and controlling the organization, leadership training, and many more training in the boarding house. All those things are the attempts to strengthen the material they got in the class. Somehow, it needs a high financial supports to continue this program resulted qualified teachers.

Nowadays, boarding house lecturing is exist in RUSUNAWA (Rumah Susun Mahasiswa/ Students' Boarding House). Somehow, this boarding house is limited only for Bidik Misi (Biaya Pendidikan Mahasiswa Miskin Berprestasi/ Government Scholarship for Poorly Financed Background but Academically Outstanding Students) students only. Even, this facility is only given for their first year and the three other years is spent for the private boarding house. Besides bidikmisi students, another boarded teaching education is PPG (Pendidikan Profesi Guru/ Teaching Profession Education) which provides a boarding house facility for the students living in two years.

Prayitno (2007) stated that educational institution graduates who will become teachers should master three profession trilogies: 1) basic knowledge components, 2) profession's



substantial component, and 3) profession's practical components. A basic knowledge component means the substance of subject which will be the subject the teacher taught. This knowledge should be mastered well by every future teacher exceptionally. Future teachers who do not master their subjects well, should not be qualified as future teachers, since, it will only harms the schools themselves. The second components, profession's substantial components, consists of teaching knowledge, such as pedagogical, didactic, and methodic skills of teaching, psychology developments, etc. Every future teacher should master this knowledge in order to be able to provide the best teaching service. Practical components of profession related to teaching performance in the class. Every future teacher should experience many teaching practice in the teaching class before teaching in a real class.

According to the Constitution No. 14 in 2005, teachers have to master four competences to fulfill the requirements of becoming a professional teacher, including pedagogical competence, behavioral competence, social competence, and professional competence or mastering their own subjects. Basic teaching knowledge should be mastered by future teachers. The three first competences will be mastered effectively if the teachers are boarded. The fourth is more effectively learned in the classroom activity.

Besides all those explanations, there is another requirement that should be fulfilled by the future teacher students and their lecturers. There should a clear and firm commitment that students should be able and want to learn more and work harder to become a qualified teacher. Lecturers should be able to work hard in educating the future teachers. This commitment is really important to become an important motivation to build each individual. Strong motivation will ease the attempts of reaching the targets of becoming qualified and professional teachers.

If we see the learning process in educational institution as a system, the systems should work well. Students as the raw-input should do their exercise, responsibility, and rights clearly. Another component that should be functioned well is the instrumental-input or the lecturers, curriculums, infrastructures, and budgeting. The third component is environmental-input, including parents, boarding house, society, etc. All those components should work and function well in the learning systems. The supports of teaching-learning process in the campus, or even house could guarantee the quality of the teachers.

### **C. Competitive Graduates**

In order to face AEC, university graduates should not only be equipped by their graduation certificates, but also be equipped with the certificate of their subject competence based on the standard in the working field.

With standardized competence certificates, university graduates will be able to have competitive ability to enter the national, regional, even international market of job field. Therefore, professional and educated workers in Indonesia will be able to compete in the liberalization of worker in AEC or in ASEAN level.

For educational institution graduates, competence certificates will give double security to them in competing for job field, especially in MEA. This is because they are not equipped enough only by their bachelor degree certificates, but they also need competence certificates in order to apply for a job position not as a teacher, but as an expert in the job field.

One of the graduates who needs double certificates (bachelor degree and competence certificates) is the students of Culinary Education program which certificates are the bachelor certificates to become a teacher and also competence certificate to show their competence in culinary arts or culinary service in tourism. Graduates who have this double guarantee will be





more ready in competing for job vacancy in the job market of the job field, so, they can be both teachers and culinary worker.

Qualified lecturers, practice laboratory, and administration system are needed to prepare the students with guaranteed quality. It will be better if this qualified laboratory will also become the student's competence test place supported by the lecturers who possess competence certificates as competence assessors.

These things is in line with the suggestion of Minister of Employment, Muhammad Hanif Dhakiri, which reminded every students in Indonesia whether in the senior high school level (SMA/SMK) or college students to equip themselves with certification and working competence. It is aimed to make them able to compete in ASEAN Economic Community-era (Pikiran Rakyat, 25-September-2015). "Formal requirement of education is important. But the competence of the students is more important than their title. So, what is required recently by the job field is people who is experts, passing the competence test and getting the competence certificates. This kind of people is able to compete internationally in the job field," said Hanif. He added that in the execution of AEC, the necessity of workers based on the market requirements is plentiful. Therefore, the workers should be prepared first to be ready in competing with other workers from ASEAN countries.

The Minister of Employment also said, in AEC era, there has to be an improvement of human resources competitive competence through the acceleration of Indonesian National Qualification Framework (INQF) and Indonesian National Working Competence Standard (INWCS) so that workers in all working sector in Indonesia can be acknowledged by International market.

In terms of readiness to improve the competitiveness with the execution and acceleration of INQF, educational institution should be ready to execute it since their curriculum is directed to be based on INQF. In order to maximize the result: government, educational institution, and job field should be improved in quality in order to create a qualified and competitive graduate maximally.

## **II. CONCLUSION**

The existence of educational institution as the source of high quality human resources become the first requirement of improving the competitiveness of workers in the job field. All stakeholders should work together in improving the competitiveness of educational institution graduates in AEC era nowadays. If there is no preparation of graduates, the job field will mostly filled by workers from other countries.

Competent human resources is highly needed, that is the human resources who are competent at knowledge aspects (knowledge, science), skills (skill, technology), and manner (affective, attitude) which is needed to improve the performance of working.

Competent human resources are highly needed in a competitive environment. Graduates who have good competence will easily do their responsibility at work and easily adapt with their environment. Organization/institution see human resources as human capital, where human resources competence is the assets of organization to encourage these organization/institution's existence in a competitive environment.



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**Dual System Education Program Review  
With Stake's Countenance Model  
At Vocational High School (SMK) Public School 2 Kupang<sup>1</sup>**

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**ABSTRACT :** *The purpose of this study was to examine to find the impact of policy implementation is a dual system of education about the quality level of the planning, implementation and the quality level of the quality of the Dual System of Education program (PSG) in Vocational High School (SMK). also known by the name Prakerin (Industrial Work Practices) in the Industry partner (Dudi). Quality is concerned: the level of curriculum development, quality level of regulation practices in the industry concerned, the quality level of financing, the quality level of national exam results, exam and exam EBTA competence and inter-relationship between the level of implementation quality in vocational theory and practice in the industry. The assessment will be referred to the concept of PSG is expected there is a link and match between the world of education with the world of work / industry, in which the orientation of vocational education for students training of human resources, which is geared to meet the needs of the working world. It is necessary for the application of the concept of relevance and suitability (link and match) in a variety of policies and educational programs implemented by PSG, where theory lessons held at the school, while the practical training carried out in the industrialized world partner. The results of this study were (1). Can be designed models of rekrutmen learners, productive teacher requirements, the cooperation model with industry partner, the availability of curriculum by involving industry, the financing of the dual system at the input stage (antecedents) at SMK Public School 2 Kupang City, and (2). Plans can be made concerning the vocational learning activities: preparation, implementation and evaluation of learning outcomes in schools, the implementation of the student practices in industry (with industrial partners) in the implementation of the dual system of education at this stage of the process (transactions) at SMK Public School 2 Kupang.*

**Keywords:** Implementation of Dual System in Vocational Education Kupang

## **I. INTRODUCED**

Entering the cooperation of the countries of Southeast Asia through trade area bebasAsean (Asean Free Trade Area / AFTA) since 2015 and welcome the Free Market World in 2020, will lead to fierce competition both finished goods / commodities or goods and services. This means that Indonesia should be able to improve the competitiveness of both the quality of goods and services. Increasing competitiveness starts from the preparation of the Human Resources (HR) quality is a



factor of excellence to be able to face the competition in question. If you can not anticipate the preparation of qualified human resources, among others: education, has the expertise and skills of the workforce in sufficient numbers, then Indonesia will be the victim of free trade. Therefore, the State need to prepare the human resources at the secondary level who have the necessary skills to the needs of the industry or the business world.

Preliminary data from the Central Statistics Agency of East Nusa Tenggara (NTT) in Kota Kupang, that the number of unemployed labor force until the end of December 2014 in the province as much as 243,000. person. Additional unemployment occurs due to an increase in the labor force is greater than the availability of jobs. Total employment increased 150,000 people, ie which of the 567,000 people in July 2014 until January 2015 to 800,000 people according to (BPS-NTT: 2014). This shows that the vacancy has not been able to accommodate all job seekers (Marsudi et al., 2008: 1). Therefore, there needs to be reform in education that produces human resources ready to work. Faced with the above conditions SMK faced various problems, among others: the conception, operational programs and education. Can be described with the following characteristics: (1). Vocational education oriented towards the supply (supply driven oriented), not on demand (demand-driven); (2). Program only school-based vocational education (school-based programs); (3). The absence of recognition of previously acquired learning experience (no recognition of prior learning); (4). Requirement (dead-end) graduates of vocational careers; (5). Vocational teachers are not experienced in the industrial world (no industrial experience); (6). The lack of response only mistaken that education is the responsibility of Kemendikbud; (7). Vocational education more oriented to formal sector employment, and; (8). SMK dependence to the Government, especially on subsidies in financing (Sunaryo: 2013: 223).

In Nusa Tenggara Timur (NTT) there are 56 vocational, consisting of 26 and 30 SMK SMK Private, where about 50% of them in the city of Kupang (BPS-NTT: 2014). From all the SMK in the Kupang City, PSG has organized entirely tailored to each school programs. One vocational school that has been held since 1995 PSG is SMK Public School 2 Kupang, where to find out whether the vision and mission that has been set can be achieved or not? Assessment of student learning aspect, Ebtanas, UN, Competency Test and the National Examination Components Productive approach to project work? To see the effectiveness of the implementation of the program is not only seen on the factors of students, but also of other factors must be considered as well, such as Teacher, Facilities and infrastructure, curriculum, financing, Teaching and Learning in Schools, Events Employment Practices in Industry spouse or other factors.

## **II. FORMULATION OF THE PROBLEM**

This research is important to do because it has specific objectives are: (1). Finding the extent of the procedure rekrutmen student, teacher productive requirements, the model of cooperation with



the industry, the availability of curriculum by involving industry, the financing of the PSG can be implemented at the input stage at SMK Public School 2 Kupang City, and (2). Find learning activities in vocational involves: preparation, implementation and evaluation of learning outcomes in schools, the implementation of practices of students in industry partner in the implementation of PSG at this stage of the process in SMK Public School 2 Kupang City, then be able to provide reports and preparation of recommendations to be submitted to the Head of Education, Youth and Sports Level Kupang and East Nusa Tenggara province and Kemendikbud Republic of Indonesia in Jakarta.

Based on the description of the research objectives in the benefits of this research are: (1). The process of implementation of the programs PSG expected to clarify the concept of link and match as well as cooperation between SMK with the industry in producing the labor-related and commensurate with the development of science and technology, and (2). Can be used in policy-making considerations for the implementation of the decision in vocational education, in order to produce graduates who are relevant and worth in the administration of PSG by the Principal, Head of Department and Director of Vocational School Kemendikbud, as well as industrial partner who received vocational students do prakti.

Based on the description above objectives and benefits of the issues examined in this study are: (1). What is the procedure rekrutmen learners, productive teacher requirements, the cooperation model with industry partner, the availability of curriculum by involving industry, the financing of the dual system at the input stage (antecedents) at SMK Public School 2 Kupang ?, and (2). How does learning in vocational activities concerning: the preparation, implementation and evaluation of learning outcomes in schools, the implementation of the student practices in industry (with industrial partners) in the implementation of the dual system of education at this stage of the process (transactions) at SMK Public School 2 Kupang?

### **III. RESEARCH METHODOLOGY**

#### **A. Design Research**

This research is applied or called operational research consists of two phases over a period of 2 years: Phase 1 Preparation structuring School science and technology cooperation with industry partners to improve the competency of graduates kemanfaatannya. Cooperation between schools and industry partner jointly draft: curriculum, tools, costs, teachers and instructors. Phase 2 Developing the quality of vocational school graduates through PSG, so adaptive to science and technology. Display flow from this study fishbone diagram can be described as follows:

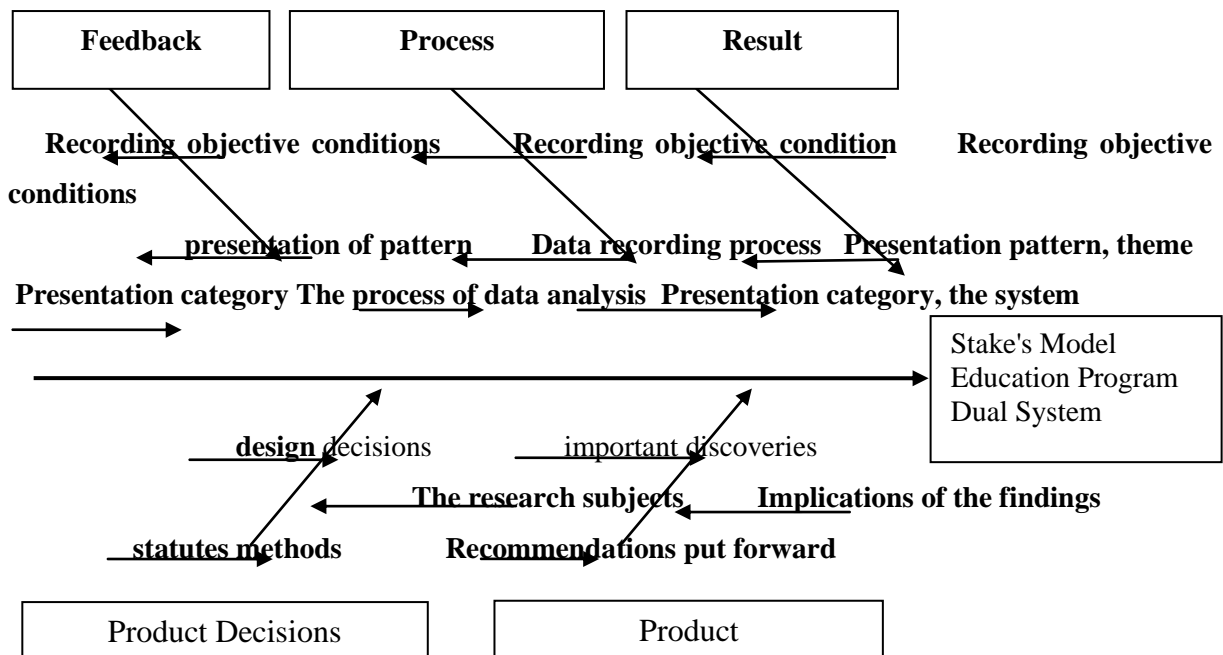


Figure 1. Research Over 2 known

### B. Process Outcomes and Indicators Measured

Design Model outputs theoretical relationship between variables measured were:

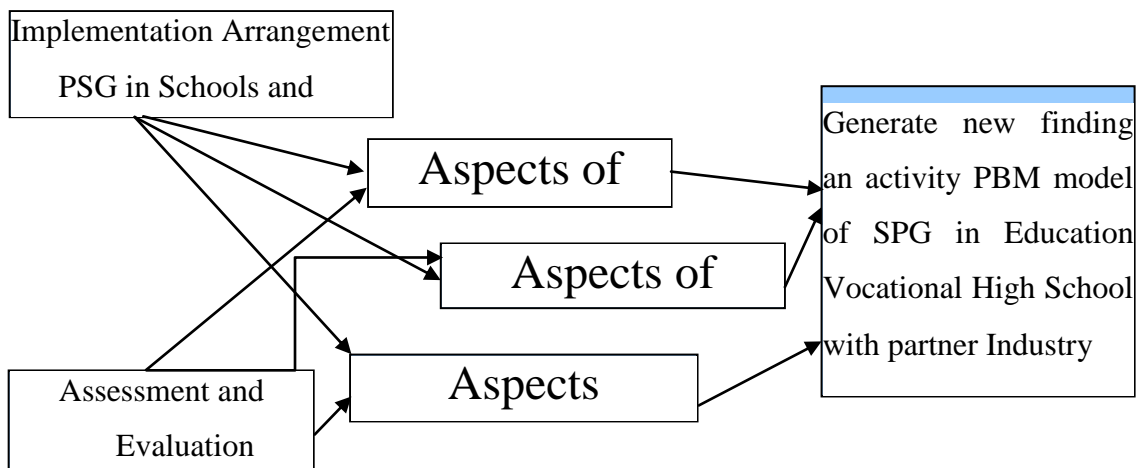


Figure 2. The model outputs theoretical relationship between variables measured

### C. Research Subjects

The subjects of the research conducted at SMK Public School 2 Kupang with industry partner in implementing the PSG. Based on the criteria set out key information qualitative research are: 1 Head of SMK Public School 2 Kota Kupang, 1 head of developer Curriculum and Certification, 2 Guru SMK Public School 2 Kupang, 8 students and 2 instructors in the industry a couple of SMK Public School 2 Kota Kupang in accordance with industry partners, is taken as the subject of research data by using purposive and snowball, as needed.



#### **D. Research Instruments**

The data collection was done by using document research and observation. Observation is used to retrieve data about the implementation of the learning process in vocational theory and implementation practices in the industry pasangan. Guna determine PSG implementation supporting components such as: curriculum, lesson planning in schools and industry partner, financing, cooperation model, and the scoring system created certain criteria.

#### **E. Research Data Collection**

The data collection was conducted by the research observation on the entire PSG activities both in school and in industry partner is the subject of research. The observations were made by the observer who has followed the try out using the observation formats. While the instrument is in the form of documentation provided to the school SMK Public School 2 Kupang and industrial partner, the subject of this study. Respondents were given approximately one week to fill the necessary documentation, support the PSG.

#### **F. Data Analysis Research**

To analyze the qualitative research data used: Stake's Countenance Model, which was developed by Robert E. Stake (2002). Models carried out in three stages or pase namely: input (antecedents), processes (transactions) and results (outcomes). According Sabaguna (2005; 27) said based on the above theory will be used: Stake's Countenance Model.

Studies conducted in the first year the input stages (antecedents), processes (transactions), the stage is divided into two phases, namely a description (description) and evaluation (judgment). Model Stake's pada first year oriented decision-making (desicion oriented) and decision-making techniques aktulitas at every stage in the evaluation or aspect, by performing measurements on each focus evaluation summarized in a matrix which is adapted in order matrix effect.

### **IV. RESULTS AND OUTPUTS ACHIEVED**

#### **A. Results Already Achieved**

Preparations are being made to conduct this study can be described as follows:

##### **1. Preparation**

At this stage there are a few things done by the researchers can be described as follows:

- 1) To submit a license to the Head of SMK Public School 2 Kupang to do this research
- 2) Make a detailed list of the types of documents that must be taken / obtained at SMK Public School 2 Kupang to support the data in the study. The list peririncian types of documents can be seen in the table below:

#### **List Details Types of Documents Must in Download At SMK Public School 2 Kupang**

<b>NO</b>	<b>STAGES</b>	<b>TYPE OF DATA</b>	<b>DOCUMENT</b>	<b>SOURCE</b>
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<b>1</b>	<b>FEEDBACK</b>	1. Student Recruitment	<ul style="list-style-type: none"> <li>a. Implementation of the technical guidelines PSB</li> <li>b. List of participants in the selection of new students TA. 2015/2016</li> <li>c. Material / New Student Selection Test Problem TA. 2015/2016</li> <li>d. Name list of participants who passed the selection comes with Test Scores</li> </ul>	<b>Waka Kesiswaan / Edy Sugiarto, S.Pd</b>
		2. Administrative Requirements Teacher	<ul style="list-style-type: none"> <li>a. diploma</li> <li>b. Professional certificate</li> <li>c. certificate Training</li> <li>d. SK lifter / periodical</li> <li>e. SK Division of Labor Teaching and additional duties</li> <li>f. Syllabus and lesson plans</li> <li>g. Materials / Instructional Module</li> </ul> <p>Absent list, Journal and Values</p>	<b>Waka Ketenagaan / Markus Peni, S.Pd</b>
		3. Curriculum and Education calendar	<ul style="list-style-type: none"> <li>a. Vision, Mission and Goals Schools</li> <li>b. Curriculum Structure per Competency Skills Education calendar</li> </ul>	<b>Waka Kurikulum / Luka Willa, M.Pd</b>
		a. Facilities and infrastructure	<ul style="list-style-type: none"> <li>a. Completeness of ancillary equipment KBM (Tables, Chairs,</li> </ul>	<b>Waka Sarpras / Seran Klau,</b>



			Blackboard, infokus) b. Completeness of student practice equipment (Workshop and Laboratory) c. Completeness of supporting equipment extracurricular activities Iventaris Card Space	<b>S.Pd</b>
		b. Pembiayaan	RAPBS N 2 Academic Year 2015/2016	<b>Kepala Sekolah</b>

Make a list of questions to be asked to the informant during the interview to support the data in this study. The list of the questionnaire can be seen in the table below

**List of Questions Should be Asked To Informant At SMK Public School 2 Kupang**

NO	STAGES	TYPE OF DATA	A LIST OF QUESTIONS	INFORMANT
1	FEEDBACK	1. Student Recruitment	1. Requirements for new student registration 2. The types of tests used for the selection of new students 3. Basic / guidelines / criteria for determining students' graduation in the selection of new students 4. DUDI involvement in the recruitment of new students	<b>Edy Sugiarto, S.Pd</b>
		2. Administrative Requirements Teacher	1. Kompetensi Teachers and Education Teacher of Productive Minimal 2. The average service life of Guru Productive 3. Forms - forms of education	<b>Markus Peni, S.Pd</b>

			and training that followed Teacher of Productive and organizing institute TRAINING 4. The provisions / requirements Guru follow TRAINING Using a learning tool when teaching	
		3. Curriculum and Education calendar	1. Vision, Mission and Objectives of each Competency Skills 2. The structure of each competency Skills Curriculum DUDI involve in the preparation of curriculum	<b>Lukas Willa, M.Pd</b>
		4. Facilities and infrastructure	1. Availability of sarpras per competency skills in favor of KBM 2. The procurement procedures sarpras / lab equipment 3. System maintenance and care of lab equipment 4. KIR financing Sarpras	<b>Seran Klau, S.Pd</b>

## 2. Stage New Student Recruitment

System rekrument new students or known by the name of New Student Reception hereinafter abbreviated PSB at SMK Public School 2 Kupang done through the stages as follows:

### a. Socialization

SMK Public School 2 Kupang is one of the secondary vocational school owned by the government of the oldest in the province of East Nusa Tenggara (NTT), particularly in the city of Kupang, which this year will celebrate the birthday of 52, because it has long been active in the world of education that aims to generate / print medium level skilled manpower so as to make the school environment is already very well known to the NTT Kota Kupang.

Based on observation, documentation and interview study conducted by researchers with the vice principal of student section Mr. Edy Sugiarto, S.Pd as an informant, investigators found that



socialization is done over the years is through the parents who send their children to the schools and also through alumni. By looking at these facts, the authors suggest that although it is already very well known in the community NTT Kota Kupang in SMK Public School 2 Kupang should continue to disseminate the existence itself as a vocational institution intermediate level that produces skilled mid-level who are ready to work in the business world and industry (Dudi). Forms of socialization disaran by researchers that can be conducted by the school is socialization through pamphlets, brochures, and not when the importance is in order menjawab hand advances in the field of information and communication technology, the school must have a website as a digital media campaign.

#### **b. New Student Admission**

As one of the educational institutions owned by the government, of course, all the space and the development of educational institutions should follow the mechanisms and rules made by the government in this case the Department of Education, Youth and Sports (PPO) Kota Kupang. In connection with Admission (PSB) at this school have in recruiting new students always follow the technical instructions (JUKNIS) of PPO services Kota Kupang. At the time of registration of prospective students are given the right to select only 2 choices competency skills of 10 competencies that have expertise in these schools, the first choice is the choice of priorities. As for new student enrollment JUKNIS PSB regulated in Chapter II, Article 5 of pesyaratan and selection of new students can be described as follows:

Verse 1: Admission of Students New SD / MI / SDLB, SMP / MTs / SMPLB, SMA / MA / SMALB done through selection. Special vocational school, admission of new students is done through Selection and Skills competency tests. The basic consideration is that the test for vocational level at SMK majors began in class X so as to put learners at the appropriate majors talents / interests owned by the need to test competency skills.

Verse 2: Requirements for registration of new students SMK as follows:

- a. Registration Form prepared by the Committee
- b. Photocopy of diploma SMP / MTs or its equivalent which has been legalized by bringing / showing the original
- c. Photocopy SKHU / UN has been legalized by bringing / showing the original
- d. Fitting black and white photograph size 3x4 cm 3 sheets
- e. Copy of Family Card by bringing / showing the original
- f. Age of the students as high as 19 years of age on July 1, 2014
- g. For students from outside the region must attach a letter from the Head of rayon move PPO District / City of origin and certificate of domicile move from village / lurah origin
- h. Can select a maximum of two (2) program expertise in accordance with expertise in demand at the same SMK



- i. Pesrta students who pass the selection tests should follow competency skills
- j. Weight rating on the average value of a pure UN is 60% while the value of Skills Competency test results were weighted 40%
- k. Learners would be eligible for membership of the competency test is the learners that the average number of UN its pure value not less than the minimum limit set for these schools
- l. Learners who passed the average value set by the UN pure school but did not take the test competency skills disqualified
- m. Registration is free of charge

From the JUKNIS given rights and authority back to school to translate the JUKNIS accordance with the conditions of the school. For prospective students in exploring information about PSB, then the prospective student and parent / guardian must read the announcement tacked on the bulletin board at school, so it can mengeathui and set up requirements (administration) for registration.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal of student section Mr. Edy Sugiarto, S.Pd as an informant, investigators can say that public confidence would NTT SMK Public School 2 Kupang quality is very high, this can be proved by the data of public interest (parents) students who enroll their children in these schools is increasing each year. This can be seen from the data registration of new students last 3 years ie in 2015 as many as 673 people prospective students, in 2016 as many as 809 people prospective students and by 2015 as many as 915 prospective student, or an average annual increase by 14.20 %.

### **3. Selection**

To get input (new students) grade / quality then one technique to do this school is the selection process. There are two types of selection that was done that the administration and academic selection. Selection of Administrative emphasis on completeness of registration and the minimum limit of the average value of at least 6.0 SKHU. While academic selection are given for prospective new students who pass the selection and administration. Academic test materials were tested in prospective new students are math, science, Indonesian and English.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal of student section Mr. Edy Sugiarto, S.Pd as an informant, investigators found that in the implementation of the selection is still slightly deviates from the given JUKNIS of PPO services, it can be seen from the data their prospective students whose average value below 6.00 SKHUnya graduated in the selection and administration so that it can participate in the selection of candidates academic and graduate students concerned received at the school. This is done to meet the quota of capacity that have been established by the Department of Kupang City PPOs according to its competence the expertise available. In connection with the academic test material, the researchers



suggested that the test material on the basics of competency skills should also be tested so that the school can receive input (students) who qualified / qualified for the field of expertise / talent of prospective students are concerned. Researchers also suggested that in the process in order DUDI PSB could also be involved in the selection process is mainly concerned with the manufacture of the test material on the basics of competency skills. Should cooperate with DUDI woven from the beginning PSB and thus will continue to partner up implementation of PSG (Prakerin) even until the employment after completing their education the students of SMK Public School 2 Kupang.

#### **4. Capacity**

In connection with the power tamoung also been arranged in JUKNIS PSB Chapter III of chapter 7 is the capacity for vocational maximum 34 persons / class. Capacity of students at SMK Public School 2 Kupang annually is 20 study groups with an average of one group to learn as much as 39 people. The 20 study groups can be described based on competency skills as follows: Mechanical Construction Wood 1 study groups, Engineering Construction Stone and Concrete 1 study groups, Architecture Engineering Building 2 study groups, Engineering Surveying and Mapping 2 study groups, Mechanical Audio-Video (TAV ) 2 study groups, Mechanical Power Installation 3 study groups, Engineering Machinery 2 study groups, Welding Techniques 2 study groups, Lightweight Vehicle Engineering 3 study groups and Multimedia 2 study groups.

Based on observation and documentation study conducted by researchers, researchers found that of the 20 study groups are in the learning process can run well because it is supported by the availability of the room adequate learning and teaching staff were adequate as well and equipment laboratory work in the workshop / laboratory of each competency inadequate expertise anyway.

#### **5. Orientation School (MOS)**

Orientation School (MOS) is one of the activities that must be performed by a single set of education as an orientation for new students to get to know the school environment and all the components that exist in the school as a place he was demanding and technical knowledge and skills.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal of student section Mr. Edy Sugiarto, S.Pd as an informant, investigators found that the implementation of the MOS at SMK Public School 2 Kupang performed each at the beginning of the school year and has aligned with JUKNIS of duty PPO Kota Kupang. The material of the material provided on this MOS activities among others on school discipline, vision, mission and objectives of the school, berlalulintas regulations, and the introduction of competency skills in each competency skills.

#### **1. Observations Infrastructures SMK Public School 2 Kupang**



Make a detailed list of things that must be observed (checklist) as auxiliary data for this study.

The list peririncian observation can be seen in the table below:

**Discussion List Observation Infrastructure Should in  
Checklist At SMK Public School 2 Kupang**

NO	TYPE SARPRAS	OBSERVATIONS		CONDITION		KET
		THERE IS	THERE IS NO	GOOD	BROKE N	
1	Soil					
2	Building and Building					
3	Equipment and Machines					
4	Irigasi road and Networks					
5	Other Fixed Assets					
6	Inventory cards Goods					
7	Inventory Card Space					
8	Cards Care and Maintenance					

## **B. Outcomes Already Achieved**

### **1. Administrative Requirements Master Data Collection**

Based on Law No. 14 Year 2015 on Teachers and Lecturers Chapter IV Article 8 which states that "Teachers are required to have academic qualifications, competence, teaching certificate, physically and mentally healthy, and have the ability to realize the goal of national education" and article 9 which states that "academic qualifications as referred to in Article 8 obtained through a higher education degree program or diploma program four". With the enactment of the Act it is obligatory for a teacher to be eligible for qualification, competence and teacher certification.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal part of human resource development Mr. Markus Peni, S.Pd as an informant, investigators found that the number of education personnel (teachers) that existed at SMK Public School 2 Kupang as many as 175 teachers comprising 121 teachers with the status of Civil Servants (PNS) and 54 teachers with Master status Variable (GTT). Judging from the level of educational qualification (diploma), it can be said that 97.71% of the teachers in SMK Public School 2 Kupang has met the minimum requirements set by the law on teachers and lecturers.

More terperincinya can be described in terms of the percentage related to the level of educational qualification of teachers as follows:



- a. Diploma S2 level of 9.14%, equivalent to 16 teachers
- b. Diploma level S1 of 88.57%, equivalent to 155 teachers
- c. Diploma DIII level of 2.29% or the equivalent of 4 people

For more details can be seen in the table below:

NO	SCHOOL NAME	TOTAL THEACHER					STUDY				
		PN S	CON TRACT	HELP	GTT	JLH	DIII	S1	S2	SMA	JLH
1	SMK PUBLIC SCHOOL 2 KUPANG	121	-	-	54	175	4	155	16	-	175

In connection with the compatibility between science / competency skills taught with diplomas being owned by teachers of SMK Public School 2 Kupang can be said that 94, 29% or the equivalent of 165 teachers teaching competence appropriate expertise with diplomas held temporarily 5.71% or the equivalent of 10 teachers teaching does not fit between its diploma with competence skills being taught. 5.71% from 3.43% the teacher is a teacher with the status of temporary teachers (GTT) while the remaining 2.28% is a teacher with the status of civil servants (PNS). Based on interviews conducted by researchers with the vice principal part ketenagaan Mr. Markus Peni, the mismatch between the certificate possessed by the field of competence skills taught by the teacher because there are some competence skills are experiencing shortages as happened in competency skills Multimedia and Engineering welding.

To overcome the shortage of teachers on the program expertise Multimedia is then assigned one teacher from building expertise competence on behalf of Mr. Dominggus D. Haga, S.Pd the civil servants, an assistant teacher at Multimedia competency skills. In addition there are 4 people in the name of the teacher GTT Rafidin Malailegi, S.Pd, Marlin Ch. Pate, Amd, Chriser Lukuaka, S. Pd, and Khornelia D. Ne'a, S.Pd the background knowledge of Electrical Engineering Education seconded Multimedia also on the program expertise to address the shortage of teachers in the skill competency. Meanwhile, to overcome the shortages in the Welding Engineering program expertise seconded by

some teachers of the educational background of the building on behalf of Mr. Mr. Dominggus D. Haga, S. Pd, Yunus Y. Mboeik, S.Pd and Peter Justin Lusi, S. Pd civil servants, an assistant teacher in Welding Engineering competency skills.

In connection with the teaching experience of teachers, based on documentary study conducted, the researchers can say that the experience of teaching the teachers of SMK Public School 2 Kupang over 2 years is 100%. This can be evidenced by the rank and class possessed by teachers of SMK Public School 2 Kupang where 63.64% of teachers diversified IV / A. More terperinci can be described in terms of percentage with regard to the rank and class teachers as follows:

- a. Group V / B of 1.65% or the equivalent of two teachers
- b. Group V / A amounted to 63.64% or the equivalent of 77 teachers
- c. Group III / D amounted to 13.22% or the equivalent of 16 teachers
- d. Class III / C amounted to 13.22% or the equivalent of 16 teachers
- e. Class III / B of 4.13%, equivalent to 5 teachers
- f. Class III / A of 4.13% or the equivalent of 5 teachers

For more details can be seen in the table below:

No	OFFICE	Gender		GROUP												
		L	P	II				III				IV				
				A	B	C	D	A	B	C	D	A	B	C	D	
1	Headmaster	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
2	Teachers Training	81	3 0					4	5	16	16	68	2	-	-	-
3	Religion teacher	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- Kristen	2	4									6				
	- Katolik	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	- Islam	-	2	-	-	-	-	1	-	-	-	1	-	-	-	-
	- Hindu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	- Budha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<b>Total</b>	<b>85</b>	<b>3 6</b>	-	-	-	-	<b>5</b>	<b>5</b>	<b>16</b>	<b>16</b>	<b>77</b>	<b>2</b>	-	-	-

Be related with internship experience / training competency skills for teachers productive, based on the results of interviews with Mr. Mark Peni said that given the limitations of funds held by the school training activities / internships for teachers productive lately started soon, but at in





previous years has always given the opportunity to teachers, especially teachers productive to follow the training / internship at the Center for Development and Empowerment of teachers and Education Personnel (P4TK) Cimahi Bogor West Java and at VEDC Malang.

## **5. Curriculum Used**

Learning activities at SMK Public School 2 Kupang using the Curriculum Unit Level Curriculum (SBC) in 2006. As mandated by Government Regulation No. 19 Year 2005 on National Education Standards, National Education Standards Agency (BSNP) has completed CONTENTS Standard, Standard Competency, Standard Process, Standards Assessment of Education who later confirmed as Minister of National Education No. 22 and No. 23 of 2006, No. 41 of 2007, No. 20 of 2007 and No. 24 of 2006 on Implementation Provisions. National Education Standards Agency (BSNP) has published the Guidelines for Developing Education Unit Level Curriculum (SBC) levels of Elementary and Secondary Education. Compilation Model Unit Level Curriculum in Vocational High School (SBC - SMK).

Based on these guidelines, the principal deputy under the responsibility of curriculum areas Drs. Luke Willa, M.Pd together all the teachers and stakeholders from the business and industrial world (Dudi) jointly develop curricula for the 10 competencies that have expertise in SMK Public School 2 Kupang namely Competency Technical Expertise Construction Wood, Stone and Concrete Construction Engineering, Engineering image Building, Engineering Surveying and Mapping, Power Installation Engineering, Engineering Machinery, Welding Techniques, Light Vehicle Engineering, Mechanical Audio-Video and Multimedia. Based on a study of the School Committee, principals and stakeholders from the industry as well as the endorsement of the Department of Education East Nusa Tenggara province, the Models (SBC) on 10 Competence Skills at SMK Public School 2 was officially introduced on Learning Year 2009/2010.

Based on documentation study and interviews conducted by researchers with the vice principal curriculum areas Drs. Luke Willa, M.Pd as an informant, investigators found that the curriculum document has been prepared with reference or based on SKNI and relevant to SKSI. Curriculum documents it contains important things like purpose vocational secondary education (Vision and Mission School), the purpose of program membership, objectives competency skills, competency standards SMK (Basic Competency Vocational / DKK and Vocational Competency / KK), competency standards subjects, local content, diagrams achievement of competence by DKK and KK, the standard of competence (SK) and basic competence (KD) of each eye pelajaran normative, adaptive and productive class X - XII and structure of the curriculum.

The following will be presented some important parts of the curriculum documents of Competency Technical Expertise Power Installation which includes such destinations vocational secondary education (Vision and Mission School), the purpose of program membership, objectives



competency skills, competency standards SMK (Basic Competency Vocational / DKK and Competence Vocational / KK), as follows

## **CURRICULUM SMK STATE 2 KUPANG**

### **COMPETENCE OF EXPERTISE: POWER PLANT ENGINEERING**

#### **I. Purpose of Education SMK**

The purpose of vocational secondary education is to improve intelligence, knowledge, personality, character, and skills to live independently and to follow further education in accordance with the vocational.

##### **a. Vision,**

Mission and Objectives SMK Public School 2 Kupang vision. Since 2010 proved to be one of the leading educational institutions in Indonesia that strives to meet the needs of the business / industry through vocational training middle-level technical excellence and global perspective

##### **b. Mission**

1. Produce graduates who have a high devotion to God Almighty and have a high awareness of environmental harmony.
2. To produce graduates who are extremely competent, able to compete in the labor market nationally and internationally.
3. Produce graduates who are able to meet the demands of science and technology as a basis for developing himself.

Provide education and training in the field of technology for society. Aim

1. Prepare students to become productive human beings, able to work independently, to fill vacancies in DU / DI as a middle-level manpower, in accordance with competence in the skills program choice.
2. Equipping students to be able to choose a career, tenacious and persistent in competing, adapting the work environment and develop a professional attitude in the area of expertise interest.
3. Provide students with science, technology and art to be able to develop themselves in the future either independently or through higher education.

#### **II. Interest Tehcnik Power Electrical Skills Program**

Interest Tehcnik Power electricity membership program is to equip students with the knowledge, skills and attitudes to be competent in the field of Electrical Power Engineering



### III. Interest Competency Technical Expertise Power Installation

Objective Competence Power Installation Engineering expertise is to equip students with the knowledge, skills and attitudes to be competent in the field of Mechanical Power Installation referring to the Graduates Competency Standards:

1. Analyze the electrical circuit;
2. Using the measurement results;
3. Understand the measurement of electronic components;
4. Improving household electrical appliances;
5. Installing building electric lighting installation is simple;
6. Installing the Power Building Simple installation;
7. Install installation of electric lighting-rise buildings;
8. Operating the electromagnetic control system.

#### **6. Education Calendar**

Education calendar is made by an educational institution with the purpose and intent into guidelines and directions for educational institutions so that all activities performed on an educational institution that will be implemented as predetermined. Calendar of education at SMK Public School 2 Kupang made each year based on the education calendar issued by the department of PPO Kota Kupang.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal curriculum areas Drs. Luke Willa, M.Pd, researchers menemukan that all activities in this regard the implementation of learning activities carried out in accordance premises educational calendar that has been created, it can dibukikan from the time of initial enrollment, implementation of teaching and learning activities, the implementation of the mid-semester and final exams and pembagaan report all carried out in accordance scheduled on the education calendar.

#### **7. Infrastructures Education**

Facilities and infrastructure is one important component in supporting the continuity of learning in an educational institution. Based on the guidelines of the National Education Standards Agency (BSNP) at the point on the infrastructure facilities required an especially vocational education institutions are required to have a minimum of lab equipment so that the learning activities that will run on that institution can run well.

Based on the results of documentation studies and interviews conducted by researchers with the vice principal fields of infrastructure Drs. Honorius Klau Seran, S.Pd as well as the results of observations at each workshop competency skills, researchers found that all practice equipment has



met the minimum requirements set by the National Education Standards Agency (BSNP) even researchers can say that the lab equipment that dimiliki this school very, very complete. Relating to the availability of space for the learning activities are also very adequate because of the 20 study groups that exist in the schools each have classrooms for instructional activities for subjects nomatif and adaptive (theory) while the subjects of productive teaching and learning activities carried out in the workshop / laboratory ,

In connection with the administration of the infrastructure and facilities is also very well documented, this can be evidenced by the Card Inventory Items (KIB) and the Inventory Card Space (KIR). SMK Public School 2 Kupang has 5 KIB namely KIB A (Land), KIB B (Equipment, Machinery and Furniture), KIB C (Building and Construction), KIB D (Roads, Irrigation and Networks) and KIB E (Fixed Assets Other) and has 15 KIR namely Hall, Library, ISO, space Committee, space Working Group Curriculum, Living TAV, Living Las, space Power, Multimedia room, room of Headmaster, Living Architecture Engineering Building, room Wood Construction, Living Light Vehicle Engineering, space Engineering machining and space Engineering Surveying and Mapping. Where each space on competency skills in dalamnya there KIR for space theory and workshop / laboratory, headroom competency skills, and others.

## **V. CONCLUSIONS AND RECOMMENDATIONS**

### **A. Conclusion**

The conclusion that can be given of this research activity is as follows: (1). Can be designed models of rekrutmen learners, productive teacher requirements, the cooperation model with industry partner, the availability of curriculum by involving industry, the financing of the dual system at the input stage (antecedents) at SMK Public School 2 Kupang City, and (2). Do design learning activities in vocational involves: preparation, implementation and evaluation of learning outcomes in schools, the implementation of the student practices in industry (with industrial partners) in the implementation of the dual system of education at this stage of the process (transactions) at SMK Public School 2 Kupang.

### **B. Suggestions**

Discussion of the results of research activities and is based on the conclusions that can be described, then the proposed suggestions are as follows: (1). Should be a model of cooperation with industrial partners (Dudi) clarity availability of curriculum, the financing of the dual system between SMK Public School 2 Kupang City each year should be revised and improved based on the activities of PSG in Dudi, a year earlier, and (2). Plan learning activities in vocational involves: preparation, implementation and evaluation of learning outcomes in schools, the implementation of the student practices in industry (industrial partner) in the implementation of a dual system of education with SMK Public School 2 Kupang.



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## **EVALUATION OF PROGRAM WORK PRACTICE IN INDUSTRY (PRAKERIN) IN THE ERA OF CENTRALIZED VOCATIONAL EDUCATION IN THE WEST SUMATRA USING CIPPO MODEL**

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**ABSTRACT:** This study aims to reveal the context, input, process, product, and impact on work practices industry (prakerin) at SMK in West Sumatra. Program evaluation model used to evaluate prakerin is CIPPO (Context, Input, Process, Product, Outcome). The findings of the study in terms of the context of the environment are for prakerin students of SMK N 2 Sijunjung categorized for enough, while for students SMK 5 Padang, Pariaman SMK 1, SMK 1 Bukittinggi, and N 2 Payakumbuh was in good category. Component input for Human Resources (HR) including tutor, students, facilities and infrastructure, and the relevance of the program to the needs of the opinion is good, while HR instructors in prakerin places or industry is not so good (enough) and the source of funds for prakerin was categorized as enough. Then in terms of the process relating to the preparation includes both categories. For students N 2 Sijunjung in terms of monitoring of the implementation was categorized as enough. While it is generally students SMK experience obstacles in implementing prakerin. Relating to the variable products, for all SMK is in good category. Similarly, the impact (outcomes) including unfavorable category, because most (almost 70%) of the vocational school graduates want to go to college to increase knowledge and skills, so the interest in entrepreneurship is still low. The same category of information pertaining enough about the world of work directly from entrepreneurs who have been successful.

**Key Word:** Vocational Education, Prakerin, Program Evaluation, and Model CIPPO.

### **I. INTRODUCTION**

To day there are still many problems in the national education system; low quality of education, the lack of equity in gaining access to education, lack of efficiency in the delivery of education, and lack of democratization of education so that the community's role in education is still very limited. Good quality education must always accommodate changes and developments in society, both the development of norms of social values, culture, politics, economy and technology. Efforts to improve the quality of education is essentially an effort to improve the competence of graduates of the educational unit, not least vocational education (Vocational education).

Expectations are so high and the role of the vocational education in the development of qualified human resources can not yet be realized optimally. In fact there is still a gap between expectations and reality, especially with regard to a mismatch between the capabilities of the graduates to the demands of the workplace or industry. This is one of the main problems of national education, especially vocational education.

Vocational education held in the school system and school education, is a very important part of the national education system. The vocational education has a direct connection with the process of industrialization, especially if associated with functions that provide skilled labor, flexible and mastering technology continues to increase at the secondary level.



Problems with vocational education graduates they are not ready to be employed, received considerable attention from the government. One form of the policies issued by the government to tackle it is education policy Dual System (Dual Base System). Dual System Education (PSG) is one form of organizing vocational education and training in the industry is done in a systematic way to achieve the desired competence profile and behavior in the labor market. At school, while students learn the basic provisions that are theoretical and basic vocational skills in an institution or company partner, students can practice the right way and do things that are tangible and the practical results can be consumed by the public.

Realization of the Dual System Education is the implementation of Industrial Work Practices (Prakerin). Prakerin implementation meant that the education program at school refers to the achievement of professional capability in accordance with the demands of the business / industry (Dudi), which requires a qualified workforce and experts in the field to operate equipment that is technologically advanced.

Implementation of the program industry practice (Prakerin) in several vocational schools in West Sumatra have a significant impact on the improvement of skills of graduates. Prakerin are expected to improve the skills (skills), motivation and work ethic graduates not yet achieved well. It can be seen from thirteen thousand graduates of vocational schools in West Sumatra, the number of vocational schools recorded is 230 schools, only 20% who enter the workforce (Burhasman Bur, Head of Education, Youth and Sports of West Sumatra in Padang Ekspres, 2009). Meaning from 13,000 vocational graduates 20% of graduates of vocational schools in West Sumatra are entering the workforce, more than 80% may enter the State / Private and most certainly does not work a.k.a unemployed.

From the survey conducted by the author to several vocational schools in West Sumatra and short interviews with some of the teachers, students and alumni of Prakerin obtained information that implementation has again yet run as expected. In terms of context and input; students not yet equipped with the knowledge and adequate information about the world of work before prakerin, students are not mentally ready to plunge into the world of business / industry (Dudi), students participate Prakerin not well selected according to the requirements that have been determined, prakerin students sometimes do not match their interests and talents of the students, and not to mention the determination of the supervising teacher meet clear criteria, means facility at school not to be ready to support the students' knowledge in science before plunging into the business / industry.

In the process of implementation; tutor often no monitoring or supervision to the prakerin, students at prakerin not given work experience that is adequate they are just more often watch technicians when they practices of the participating works so experience of work they get is very minimal, instructor in DUDI not know what to give to the students because they are not included in the planning prakerin from the beginning, students are not well controlled by the supervisors and the school.





The process of evaluation are the results by the students prakerin DUDI not done well. Student given scores are not following the correct procedure, only to taste of the instructors, there is no test of sufficient competence to students by the school after the program prakerin implemented, so it is very difficult to quantify the increased competence (soft skills and hard skills) students after executing prakerin in the business / industry. From some of the above conditions then it is feared that the product of the implementation of the program Prakerin form; changes in behavior, skills, insights, soft and hard skills that lead students to the competence of the students after executing Prakerin program is not changed significantly.

Prakerin programs in several SMK in West Sumatra carried out by X semester students with varying periods of time and place. For prakerin location which is at the area around the West Sumatra prakerin execution time is approximately 3 months, outside of West Sumatra as to the province of Riau, Riau Islands province and Jakarta between 4 to 6 months. With so much time to implement Prakerin of the results of a survey conducted on some of the students at SMK as well as some alumni turns Prakerin program implementation has not impacted significantly to improving the competence of graduates. Besides not many among them who may enter the workforce, the performance is able to work in accordance with skills not improved significantly. Many among them are likely to continue their education to pursue Universities and less interested in entrepreneurship.

Implementation of the program industry practice (Prakerin) at SMK in West Sumatra require the evaluation process. Evaluation as one component that can not be ignored. Evaluation role in supporting the success of a program. As is known Prakerin a national education program for CMS to provide work experience for students in the industry, so it is expected that students have the motivation and a high work ethic.

Employment Practices Industry (Prakerin) is part of the learning program to be implemented by each learner in the workplace, as a concrete manifestation of the implementation of the system of vocational education, namely Dual education system(PSG). Prakerin program developed jointly between the school and the world of work in order to meet the needs of learners and the world of work as a contribution to the development of vocational education programs. By prakerin learners can fully master the aspects of competence required curriculum, and in addition recognize early work world soon after graduating.

The purpose of the evaluation is to obtain an accurate and objective information about the program. Such information may include the process of program implementation, impact / results to achieved, the efficiency and utilization of the results of the evaluation focused on the program itself, which is to take a decision whether to continue, corrected or discontinued. In addition, it is also used for the benefit of the preparation of the next program and the development of policies related to the program.

The education sector in terms of objectives, evaluation can be seen from macro and micro. Evaluation of the macro objective is the education program, a program that is planned to improve



education. Evaluation of the micro is often used at the class level, especially to know the students' learning achievement. Achievement of this study not only are the cognitive, but also includes all the existing potential in students. So target micro evaluation is learning programs in the classroom and the teachers supervisors (Mardapi, 2000: 2).

Evaluation models CIIP is a model that is widely known and applied by the evaluators. CIPP Model was developed by Stufflebeam and colleagues (1986) at Ohio State University (OSU). CIPP is an acronym for: Context, Input, Process, and Product. The fourth word that is mentioned in the acronym CIPP is the target of evaluation, which is a component of a process of a program of activities. CIPP Model is a model of evaluation that looked at the program being evaluated as a system. This model coupled with Outcome (impact), so it called CIPPO.

### **III. METHODS**

This study is an evaluative research using quantitative descriptive approach. Evaluative research to determine the end of a policy program that determine the final outcome of a policy to determine the policy over the last recommendation, which the ultimate goal is to determine the next policy (Suharsimi, 2009: 7).

The subjects of this study is, the Principal, the Chairman of the Work Group Prakerin, Prakerin Working Group Finance, Teacher mentors Prakerin, Adaptive Coordinator, Coordinator Normative, Parents' and Students SMKN XII class technology that has implemented the TP Industry Work Practices. 2011/2012. The total number of study subjects was 305 students. This research samples using proportional random sampling technique. The sampling of the subjects the students in this study was 50% of the total population.

Data was collected in collection of primary data, secondary data collection and testing of data validity of research findings. Secondary data collection through observation, questionnaires, scale of measurement, the test instrument validity and reliability as well as interviews. The collection of secondary Data done with the study documentation. Data analysis techniques were analyzed quantitatively with stage 1) do tabulating the data to the questionnaire has been filled in by the respondent, 2) calculating the score for each indicator, 3) a count of the total score, 4) analysis further processed with the average level of attainment. To analyze the interview data researchers used data analysis interactive model of Miles and Huberman of data reduction, data presentation and conclusion or verification.



	3.1 Preparation of implementation prakerin	3,1	G	3,2	G	3,2	G	3,4	G	3,2	G
	3.2 Implementation of the program in an industrial area	3,1	G	3,1	G	3,3	G	3,4	G	3,3	G
	3.3 Monitoring the implementation prakerin	2,9	E	3,1	G	3,4	G	3,3	G	3,1	G
	3.4 Barriers to implementation prakerin	2,9	E	2,8	E	3,9	G	2,1	E	2,5	E
4.	Product Competence enhancement students and Change insights, behavior, and emotions of students	3,3	G	3,2	G	3,7	G	3,4	G	3,5	G
5.	Outcome	Enough, because 70% of vocational school graduates want to continue their education to college, 10% are interested in entrepreneurship, and 20% are ready to enter the		Enough, because 70% of vocational school graduates want to continue their education to college, 10% are interested in entrepreneurship, and 20% are ready to enter the		Enough, because 70% of vocational school graduates want to continue their education to college, 10% are interested in entrepreneurship, and 20% are ready to enter the		Enough, because 70% of vocational school graduates want to continue their education to college, 10% are interested in entrepreneurship, and 20% are ready to enter the		Enough, because 70% of vocational school graduates want to continue their education to college, 10% are interested in entrepreneurship, and 20% are ready to enter the	



		world of work	work	work	world of work	work
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Note:

G = Good

E = Enough

## B. Discussion

Vocational education is one form of the education system in Indonesia, the purpose of vocational education is not regardless of the purpose of education in general, which prepares a person to afford a career in public (to prepare people to adjust to improve the society in the which the exist). Rupert Evans (1978) states vocational education aimed at: (1) meeting the manpower needs of society, (2) increasing the options available, to each student, and (3) serving as a motivation.

Employment Practices Industry (Prakerin) is part of the learning program to be implemented by each learner in the workplace, as a concrete manifestation of the implementation of the system of vocational education, namely education system Ganda/Dual Education System (PSG). Prakerin program developed jointly between the school and the world of work in order to meet the needs of learners and the world of work as a contribution to the development of vocational education programs.

Prakerin learners can be fully master the aspects of competence required curriculum, and in addition recognize early work world, soon after graduating. SMK as an educational institution which is expected to deliver its graduates into the world of work needs to be introduced for early social environment prevailing in the workplace. Experience interacting with the World of Work and directly involved.

### i. *Purpose and Environment Program Places Prakerin*

Mastering of competencies with learning in school is determined by learning facilities available. If availability is limited, schools need to design learning competencies outside the school (partners working world). The competence of learning not be left entirely to the world of work, but the school needs to give direction on what should dibelajarkan to learners.

Abilities that learners already have, through training and practice in schools need to be implemented in practice so that the growing awareness that what has been useful to themselves and others. With so learners will be more confident that others can understand what he understood and accepted by the public knowledge.

Based on the findings of research conducted concluded that the environmental objectives and prakerin already in either category, however Mean values of each school is different. There are findings in SMK N 2 Sijunjung of analyzes student responses through questionnaires found Prakerin students about the environment are in the unfavorable category. This is due to less precise placement Prakerin place in accordance with the interests and desires of students. Nevertheless the results of interviews with teachers stating placement and Prakerin environment this is in conformity with the provisions so as to support the achievement of objectives Prakerin.



## ii. *Strength Owned Program Prakerin*

In the era of globalization we often hear the words of fierce competition in the world of work. This means that all students must improve its competitiveness both quality, and expertise. Increased competitiveness starts from the preparation of the Human Resources (HR) which is a quality factor of excellence in competition in question. If we can not anticipate the preparation of qualified human resources, among others, education, expertise and skills, especially for workers in sufficient numbers, the prospective workers will Indonesia will lose when competing with other countries. Therefore, our country needs to prepare the human resources at the secondary level who have the necessary skills to the needs of the industry or the business world. To address all of the implementation of the Job Training Industry (Prakerin) in Kejuaruan Secondary School (SMK) so is important.

HR will greatly affect the achievement of the objectives of Prakerin. In this study there were four human resources should be reviewed. Among it Students as participants of Prakerin, Prakerin staff in Industry, HR counselor, instructor HR industry. The findings of research on human resource indicators covering student competency of students before plunging implement Prakerin, students' adaptability to the environment industry, the personality of students and student communication with people in the industry. Overview of student responses through a questionnaire distributed as a whole has been in both categories.

Human resources management of staff Prakerin in the industry include students' views on the structure and management between Prakerin by staff managers in industry and communications management staff with the various parties concerned with the implementation of Prakerin. Overview of student responses through a questionnaire distributed there reveals that there are two schools that have unfavorable category include SMK N 5 Padang and SMK N 2 Sijunjung. Meanwhile, SMK N 2 Payakumbuh, SMK N 1 Bukittinggi, and SMK N 1 Pariaman are in good category. Students of SMK N 5 Padang and SMK N 2 Sijunjung prakerin managers in the industry feel less able to provide information in accordance with the needs of students.

HR tutor includes the competence and the information can be given the teacher to the students about the world of work. This will be very important because students often interact with the teacher should be a source of information for students. Overview of student responses through a questionnaire distributed by whole has been in both categories. Mean value of the highest of SMK N 2 Payakumbuh that is equal to 3.28.

HR instructor industry include the ability to guide and be the source of learning for students Prakerin. Overview of student reveals responses through a questionnaire distributed there are two schools that have unfavorable category include SMK N 5 Padang and SMK N 2 Sijunjung. Meanwhile, SMK N 2 Payakumbuh, SMK N 1 Bukittinggi, and SMK N 1 Pariaman are in good category. Students of SMK N 5 Padang and SMK N 2 Sijunjung feel HR industry instructors are less able to provide information and experience relevant to the needs of students.



### ***iii. Facilities and Infrastructure Support, Funding and Relevance Program with Needs Students in the Program Implementation Prakerin in Industrial Area***

Facilities and infrastructure are needed to support the implementation of Prakerin for students to apply the knowledge gained in school to the world of industry. Availability of equipment which are in industry will reflect development of the industry, so it is expected that students are able to recognize and operate the facilities and the facility. From the research findings a whole school already are in the good category. It can be interpreted that the industrial world the students had the opportunity to recognize and use the existing facilities and infrastructure in the industry.

To carry out an activity is certainly needed funds to support the ongoing activities. For the implementation of Prakerin source of funds can come from various sources. From parents, schools and industry. The fund management should be done in a transparent manner. Of the overall response to the research findings of the students are in the unfavorable category. This is due to Prakerin funding sources the majority come from the parents. Surely the distance and the place chosen for the implementation Prakerin students will affect the nominal must be spend. However, there are differences in SMK N 1 Bukittinggi. From interviews with teachers of SMK N 1 Bukittinggi, the SMK is applied cross-subsidies. That is the distants of Prakerin places not affect the implementation of the nominal paid students.

Indicators for Prakerin program relevance to students' needs is the information required students in the industrialized world. It obtained by through debriefing as early information before plunging directly into the world of work. Students need information about the world of work in which they carry out Prakerin. Conformity areas of expertise of the students with a place of execution Prakerin is the most important factor. From the research of the relevance Prakerin student responses to the needs of the students are in good category unless SMK N 2 Payakumbuh who are in the unfavorable category.

Results of interviews with teachers Prakerin overall coordinator of the school concluded that debriefing for students before Prakerin is mandatory for students who will carry out Prakerin. This briefing material related to purposes and information about the world of work. Do not miss the K3 also included briefing material. The source for this material is often from productive teacher.

### ***iv. Role and Obstacles in Implementation Program Instructor Prakerin Students in Industrial area***

At this variable starts with the preparation for the review of Prakerin. This preparation emphasis on debriefing. At the debriefing the students need information about where they will carry out Prakerin. Briefing material from the mentor gets better combination between school teachers with industry players place Prakerin implemented. The results showed indicators of the overall preparation of the implementation Prakerin are in either category. This proves the teacher provides information about the world of work to students according to the needs that will be undertaken students at Prakerin.



After preparation, the next indicator is Prakerin program implementation in the industry. The beginning of the introduction or adaptation is required for students to the industry. The industrial world would have been different from the industrial world, so students will need time to adapt in advance. Based on the study concluded that the implementation Prakerin in the industry go well or the whole school is in good category.

In the implementation, the Prakerin students will be monitoring by schools. As students carry out Prakerin teacher will monitor the implementation Prakerin into place. At the time of this monitoring students the opportunity to convey the problems with the constraints faced by the students to the teacher, besides teacher also monitors information from the industry towards student activities in the industry. From the research conducted found the schools that are in unfavorable category, is SMK N 5 Padang. Other schools such as SMK N 2 Sijunjung, SMK N 2 Payakumbuh, SMK N 1 Bukittinggi and SMK N 1 Pariaman are in good category. Student responses SMK N 5 Padang was a teacher at the moment less motivating monitoring and provide guidance to students. From interviews with teachers concluded, the monitoring carried out during the mid Prakerin implementation. Monitoring is only done once.

Prakerin activities that involve various stakeholders would pose obstacles and barriers for participants. Not all industries or company willing to accept Prakerin students. This is due to the company or the industry assessment of students who do Prakerin will disrupt the activities of the company or the industry. Another obstacle is the difficulty of adapting the student with the industry, so the students dont have the opportunity to try out and experience the world of industry is not well realized. From the findings of research conducted concluded many obstacles found when implementing Prakerin. Schools in good category just SMK N 2 Payakumbuh. Other schools such as SMK N 5 Bukittinggi, SMK N 2 Sijunjung, SMK N 1 Bukittinggi, and SMK N 1 Pariaman are in the unfavorable category. Most responded stated that because it difficult to interact with people in the industrialized world. Students are also not given the opportunity to recognize and try to operate equipment in industry world.

v. ***Students Competence Enhancement and Change Insights, Behavior and Emotions Student***

Prakerin is one part of the curriculum in vocational school, every child at least prepare for prakerin for six months for attending vocational school, or at least a minimum of three months. This is a form of vocational schools treatment in ordering workforce. Prakerin aims to provide and also teach students to be and how life in the world of work. Through prakerin student should be able to understand how procedures and rules in the industry / business, so that when he eventually graduated he was really ready to work both scientifically, psychologically and mentally. Through prakerin least benefit to be taken by the vocational students are taught he would need passion and great discipline, as in the world of work. To determine the extent to which knowledge and science as well as the skills he had, so that he fullfill it when he had gone back to school. Teach him how the real life.





Prakerin should be something that is a priority for every SMK, to develop and create graduates who are reliable and ready to work, in accordance with the spirit of SMK itself, and to achieve prakerin with the desired objectives, the pre prakerin are required to held as an activities to provide preparation for students before plunging into the field. includes the preparation abilities, skills, attitudes, behavior, mental and administration.

Results of research conducted on the whole school already concluded in both categories. Results of interviews with teachers reveal students who are ready to implement Prakerin will be very different from the previous ones. In conducting the students practice more nimble and skilled in completing the task. Students are also more disciplined and responsible for what he did.

*vi. Outcome (impact)*

Real outcomes obtained after running the Prakerin is when students are given a certificate. This certificate contains the given value diindustri and combined with the value of the guidance counselor at the school. However prakerin certificates of the students and plus certificates obtained by the students after completing his education at the vocational school, has not yet deliver a good impact. This is due to the students feel the knowledge and skills possessed was not enough for work, either working as an employee in business and industry or civil servants as well as being an entrepreneurship. Therefore, the purpose of vocational education has not been achieved, because the graduates are not ready to work. The graduates (almost 70%) want to continue with a high keperguruan various reasons. Of course, one reason is the knowledge and skills possessed still inadequate.

This makes the impact of the image of SMK be declining in the eyes of stakeholders and the public. Most people or parents of students want them to work after graduating from vocational school. It turns out the students do not brave to go to work because the knowledge and skills possessed are insufficient. Eventually the parents will think twice to put children into vocational today. This condition is compounded by the lack of facilities and means to practice for students in their respective schools still lacking the number of students there, so it did not have sufficient opportunity to implement practices in school. Not to mention the technology advances so rapidly and new machines are more sophisticated. This machine is not owned by the school and to enable it will be costly. Therefore, the knowledge and skills of students are getting outdated. Moreover, the demands of business and industry are growing more and more.

Referring to the above conditions, the government hope to expand vocational with a ratio of : 60 vocational and 40 SMA (60: 40), but getting less response from the community or parents.

**V. SUGGESTION**

Suggestions can be put forward in connection with the findings of the research include: (1) Schools, students should be placed for prakerin in a company or industry that can managed it more professionally, (2) The need for well-prepared briefing material for prakerin to be more representative,



(3) review of the funding for prakerin, (4) clarify the role of the prakerin instructor, and (5) Increasing interest in entrepreneurship.

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**EI-04-005**

## **THE APPLICATION OF PROBLEM BASED LEARNING MODEL IN VOCATIONAL EDUCATION IN ORDER TO SET ENTREPRENEUR MENTAL**

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**ABSTRACT :** *Problem Based Learning (PBL) model is a problem-based learning approach, which students involved in the problem solving that is done through the stages using the scientific method. PBL sets a problem that happens in the real world. It allows students to learn critical thinking in problem solving. In vocational education, the students are required to master the knowledge and skills that have high economic value which are adapted to the labor market needs. Rapid technological developments have consequences in improving the quality of Human Resources (HR) that have world level of quality to face the globalization era. To face the tight global competition, the competent mental of human resources are needed. The graduates in vocational education are not only prepared as a ready workforce in the industry but also prepared as an entrepreneur that capable in providing an employment. Here the strong mental of an entrepreneur is needed. An entrepreneur is a leader who always face the problems that require fast decisions. PBL learning model that applied in vocational education should be able to prepare students' mental to face the problems and competition in the real world.*

**Keywords :** *PBL Model, Vocational, Entrepreneur Mental*

### **I. PREFACE**

The strict job competition results in the increasing of unemployment in Indonesia nowadays, around 7 million people in 2016 (BPS data in 2016). While the number of workforce in Indonesia, especially in Central Java, increases around 249.000 people in 2014 compare to 2013, around 17.47 million people. This condition should be an attention for us. Vocational education is one of the answers to solve the unemployment problem. Graduates of Vocational High School are expected to be independent entrepreneur that can create new job vacancies to address the challenges. The vision of national education is creating education system as a strong and authoritative social institution to empower and develop Indonesian citizen so they can be proactive in facing the challenges fluctuation (Law No 20 Year 2003).

Curriculum of vocational education is expected to prepare good quality workforce, optimize the country's wealth, and increase the society welfare. Moreover, it is also expected to give competencies or skills for the needs of society and work life. The graduates in vocational education are not only prepared as a ready workforce in the industry but also prepared as an entrepreneur that capable in providing an employment. Here the strong mental of an entrepreneur is needed to face the strict global competition.

The development of the curriculum has been done in order to realize the vision of national education. However, it will not realize if there is no change in the learning process. Several effective learning models have been developed in education. The statement problem of this research is whether Problem Based Learning (PBL) could solve the existing problem; to prepare Vocational High School graduates with entrepreneur mental vocational education. PBL model is model is a problem-based learning approach, which students involved in the problem solving that is done through the stages



using the scientific method. PBL sets a problem that happens in the real world. It allows students to learn critical thinking in problem solving.

## **II. DISCUSSION**

### **A. Problem Base Learning (PBL) Model**

Several methods, strategy and learning model, are introduced in education as an effort to make effective learning activity. One of them is Problem Based Learning (PBL) that firstly developed in medical education. According to Charles I. Arends in Warsono and Hariyanto (2004), the essential of PBL is a constructivism-based learning model and involving student in learning process and contextual problem solving. To get information and develop science concepts, the student learns how to build problem framework, examine, collect data, organize the problem, arrange facts, analyze data, arrange argumentation related to the problem solving, solve the problem in group or individually. Constructivism theory understands learning as a student knowledge formation process. Knowledge exists in knowledgeable people and it cannot be transferred by the teacher to the student (Eveline Siregar, 2010).

PBL has several characteristics as follows:

- 1) Learning from existing problem.
- 2) Ensuring that the problem relates to the student's reality.
- 3) Organizing lesson about the problem, not about the focused science.
- 4) Giving responsibility to the student, creating, and running their own learning process.
- 5) Using small group
- 6) Requiring the student to demonstrate what they have learned in the form of products or performance.

PBL model involves the student in solving the problem so they are skilled enough. It will enrich the student's experience in problem solving so they can apply in their real life. If PBL is a student-based learning model, what is the role of the teacher? The responsibilities of the teacher in PBL application as follows:

- 1) Defining, planning, and presenting the problem.
- 2) Helping the student to understand the problem and deciding together with the student on how to examine the problem.
- 3) Helping the student to interpret the problem, how to solve the problem, and to find the argument for underlining problem solving.
- 4) Agreeing the organization form of report with the student
- 5) Accommodating presentation activity
- 6) Evaluating process and product (Warsono and Hariyanto,2014)

In constructivism theory, teacher's role in PBL model is as a mediator and facilitator for the activity. Some of the teacher's activities here are providing learning experience that makes the student



has responsibility, providing or giving activity that stimulates student's curiosity, helping the student to express their idea, monitoring, evaluating the thought of the student.

The strengths of the PBL model are: (1) the student becomes more sensitive to face the problem and be able to solve it whether in education or daily life, (2) the student increases their social life and respects to others' opinion, (3) the students able to cooperate with others (team building), (4) establishing confidence, (5) the student has strong mental in facing the problem.

Moreover, according to Tamblyn (1980) and Engel (1977) in Eveline Siregar (2010), there are several purposes of PBL. Among of them are increasing discipline and succeed in: 1) adaptation and participation of changes, 2) application from the problem solving in the new or upcoming problem, 3) creative and critical thought, 4) holistic data adoption for problems and situations, 5) appreciation of point of views, 6) success team collaboration, 7) identification of learning the weakness and strength, 8) self-directed progress, 9) basic explanation and knowledge argument, 10) leadership ability, 11) utilization of various and relevant sources.

## **B. Vocational Education**

In article 15 of the Law on National Education System No. 20 of 2003, it is described that vocational education is secondary education that primarily prepares student to work in a particular field. While vocational education in higher education, prepares the student to have a job with their applied specified maximum skills equivalent to the degree program.

In this case, vocational education is vocational education in Vocational High School. Its curriculum contains the answer of workforce needs in industry. In Ministry of National Education Indonesia decision No 053/U/2001, it is explained that the purpose of Vocational High School is to improve the student knowledge and skills in order to prepare them as middle-level manpower skilled, educated and professional, and able to develop themselves equal with the development of science, technology and art.

As time goes by, the Vocational High School as an education sub-system always grows, changes, and develops in order to anticipate the future needs and challenges. The improvement of Vocational High School is expected to create a skilled workforce to meet the needs of business and industry as well as produce entrepreneurs that can create their own jobs.

Training program in Vocational High School is divided into three groups: 1) **Normative**. It creates the student to be a person who has norms of life as an individual and social creature, both as an Indonesian citizen and as a citizen of the world. This program is given so that the student can live and thrive in harmony in personal, social and stateless. Normative group consists of training subject that focus on the norms, attitude and behavior. They must be taught, planned and trained to the student. 2) **Adaptive**. It serves to produce widely and strong knowledgeable student in order to adapt with the changes of social environment and working environment. Moreover, they are expected to develop themselves in accordance with the development of knowledge, technology, and arts. This group of training is focused on giving an opportunity to the student to understand and master concept and basic



knowledge and technology that can be applied in their daily life. 3) **Productive**. It serves the student to have working competencies according to Indonesian National Standard Competence. This group serves the working market needs so it is more determined by industrial or business. It is specifically taught according to the each group skill needs. In this training group, the student is given the appropriate skills as decided in Indonesian National Standard Competence (In Sabri 2005). If we examine the content of the vocational education curriculum, in this case is Vocational High School, the curriculum is a merger between theory and practice with a balanced comparison between normative, adaptive and productive groups. It is oriented to the needs of the business/ industry. With sufficient knowledge of the basic concepts and principles of science and technology, the ability of a good skill based on the norm, mental attitude and good behavior, students are able to create new jobs and become an entrepreneur.

### **III. ENTREPRENEUR MENTAL**

. Joseph Schumpeter defines entrepreneur as the person who destroys the existing economic order by introducing new product and services, by creating new forms of organization, or by exploiting new raw materials (in Buchari Alma, 2000). Entrepreneur is a creative and innovative person. He is able to see an opportunity and create an organization to exploit that opportunity. Entrepreneur is someone who is responsible for organizing, managing, and taking a risk of the business. The carefulness of an entrepreneur to see the opportunity will largely determine the success of a business.

There are four main important points of entrepreneurship. They are:

- 1) Element of knowledge characterizes the level of reasoning of someone. It is generally determined by their level of education, both in formal and informal. The higher and more extensive education obtained, so the higher and more extensive knowledge are possessed. However, in many cases, knowledge alone often cannot cope with the problem.
- 2) Element of skills is more associated to the physical to work. The level of someone's skill is determined by the experience gained. Good mastery of skills will provide good jobs, as well as providing a high confidence. Many jobs require skills. Someone needs to master one or more skills to undertake and complete the tasks.
- 3) Element of mental characterizes someone's response or behavior in facing specific situation. It will characterize the mental attitude, such as sense of responsibility, honesty, firmness, courage to take initiative action and other action.
- 4) Element of awareness is compounded of cognitive and mental attitude. Awareness is thought or actions against something that may or suspected to be happened. In the business world, the element of awareness is very important, the success of business is often determined by the accuracy and predictions about what might happen.



These four elements are available on the daily life and cannot be separated. An entrepreneur needs to have a strong element of mental attitude to face the challenges, obstacles and problems that will always exist in business and in everyday life. Mental attitude of an entrepreneur is manifested in several characters as follows:

- 1) Commitment and perseverance. An entrepreneur usually has a strong willingness to achieve the objectives. With this character, he will be able to overcome various difficulties and challenges.
- 2) Calculated risk taking. The ability of entrepreneur to take a risk will increase because there is a confidence in the knowledge and skills.
- 3) Integrity and reliability. An entrepreneur needs to have honest and trustworthy mental. Many people fail in the business because they do not have those mental. These mental can be developed by self-teaching so that can get the high moral.
- 4) Creativity. Creativity is an ability to develop an idea and realize it. It can improve the efficiency and effectiveness of a system. An entrepreneur should be creative, able to produce bright idea fast, sensitive, and able to see an opportunity. Moreover, creative is also defined as a person who can create something new, both in idea or real product.
- 5) Self-confidence. Self-confidence is someone's characteristic that has a strong belief on his strength. Someone believes that he can overcome his weakness, find a solution of any difficulties and there is a willingness to continuously improve the ability. He will be stride, persevering, patient, and do not hesitate in his daily action.
- 6) Independence. Someone who has independence attitude will not wait for someone else to do something. He does not even want to rely on nature. He tries to survive from the pressure of nature or try to subdue it.
- 7) Team Building. It is an entrepreneur's characteristic to build a solid cooperation in order to achieve the vision and run the mission. An entrepreneur in forming a strong team cannot be separated from the willingness to understand the weaknesses of others and trying to direct his orientation to achieve the goal.
- 8) Managerial and leadership. It is someone's characteristic who can find an opportunity, start a business, collect resources, decide the goal, supervise, and lead to achieve the organization's goal. The ability of managerial and leaderships is not only acquired from formal and non-formal institutions, but also can be learned from various sources, especially from direct experience.
- 9) Long oriented. An entrepreneur should have an ability to determine the objective and plans within a certain time, analyze the situation ahead, including changes that may occur and determine their business strategy. The success of entrepreneurs depends on the ability to anticipate what will happen in the future, such as changes in market structure, consumer behavior, government policies, economic conditions and competitive conditions.

A strong-willed entrepreneur should have initiative to start as well as ready for the challenges. Someone who is hesitant and afraid to overcome the risk of failure will never start and never manage to become entrepreneur. An entrepreneur must be able to analyze the





factors that may be driving or inhibiting, as well as how it can enlarge and reduce the driving factor inhibiting factors.

#### IV. CONCLUSION

Entrepreneur is someone who is responsible for organizing, managing and taking the risk of the business. Moreover, he is also creative, innovative, and able to see the opportunities and then create an organization to take advantage of these opportunities. To become an entrepreneur, it needs a strong mental in facing every problem both in business and in everyday life. Mental of someone can be established through formal education, non-formal, the challenges, and experiences of everyday life.

Vocational education aims to produce skilled work force through curriculum that consists of three training groups; normative, adaptive, and productive. It purposes in providing knowledge and skills for the graduates to enter the work. Moreover, it also produces skilled workforce for the society and able to create the job vacancy (entrepreneurship).

Problem Base Learning model makes the student sensitive in facing the problem and able to solve it, increase their social life and respects to others' opinion, able to cooperate with others (team building), establishing confidence, has strong mental in facing the problem. In line with the entrepreneur mental, the student should be able to overcome problem and finish it fast, but cooperate with others, and has a strong confidence.

Through the PBL model in vocational education, it is expected to produce skilled entrepreneur with specific skill who has strong mental in facing problem and challenge, also can find the solution. With the strength of PBL, it can be applied in vocational education in order to form entrepreneur mental attitude.

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EI-04-006

## THE PLACEMENT MODEL AND THE SELECTION OF INDUSTRIAL WORKING PRACTICE PLACE THAT RELEVANT AS AN EFFORT TO PREPARE STUDENTS OF VOCATIONAL HIGH SCHOOL PROGRAM FASHION EXPERTISE TO FACING ASEAN ECONOMIC COMMUNITY

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**ABSTRACT :** *The competition skilled labor that recognized into Indonesian capital, especially Vocational High School to facing ASEAN Economic Community (AEC). This research aims to describe the placement model and the selection of industrial working practices place students of Vocational High School Program Fashion Expertise in Malang Raya. Descriptive research with a population of 10 schools, 329 students, with a total samples and percentage descriptive analysis techniques. The result showed 2 placement model: a) placement model through an the selection of the school as 70 % and b ) school with students combined model as 30 %. The relevance of the selection of industrial working practice place: 83 students (25,23%) in couturier, relevant categories 30 students (36,15%), 95 students (28,87%) in boutique, less relevant categories as 40 students (42,10%), 52 students (15,80%) in taylor, quite relevant categories as 26 students (50,00%), 85 students (25,83%) in garments, quite relevant categories as 45 students (52,94%), 9 students (2,73%) in handy craft with relevant categories as 7 students (77,77%), 3 students (0,91%) in production unit, quite relevant categories as 3 students (100%) . Conclusions are 2 placement model of industrial working practice students, and there are 6 types of industrial working practice place: 2 relevant couturier and handy craft,3 quite relevant taylor, garments and production unit while 1 less relevant is boutique.*

**Key word:** placement model, selection industrial working practice place , AEC .

### I. INTRODUCTION

Asean economic community issued 2016 , bring the impact of good negative and positive .One side is an opportunity for indonesia , relating to graduates smk as workers ready-made .But can also become a threat to labor in indonesia if labor in indonesia is not being able to compete with workers from outside .The amount of labor indonesia in august 2014 reached 182,99 million people , with unemployment open reached 7,24 million . The open unemployment rate the most is vocational high school graduates 11,24 % or of 813.776 persons ( suryamin , 2014 ) .The number of students program expertise of fashion is an opportunity and strength in face the challenges the community economic asia ( AEC ) which was founded passage by 2015 ( suroso , 2015 ) .

Smk as an institution education produce labor ready-made have a big role in skill capable of competing with global market .Student skills obtained in the real world is the through work practices industry ( on the job training ) .Model placement students and selection place prakerin become important to prepare students in order to compete in the global market particularly by the implementation of the community of the asean economic ( AEC ) .The results of the study various views of of dudi about smk , so far only view as institute of secondary education who educates their students with work practice , that their students later know work environment .They do not know or do



not want to know that a student graduates smk is expected to be a worker who reliable .( widiyanto and utaminingsih , 2013 )

Place on the job training ideal not only seen from he received students implement work practices , but how large place in prakerin is able to students being in labor in accordance qualification needs labor market .Pp no. 8 th 2012 about kkni , explained that graduates secondary education the lowest equivalent with outstretched qualification 2 , where the level of qualification 2 is: 1 able to carry out of the roles of the specific , by the use of a , and information , and procedures work customarily done , and points performance by the quality of the measurable , under the supervision of direct his superior; 2 ) having knowledge operational primary and knowledge factual the field of work specific , so that is capable of choosing a available of the problems customarily arising; 3 ) is responsible for own work and can be given responsibility guide others .

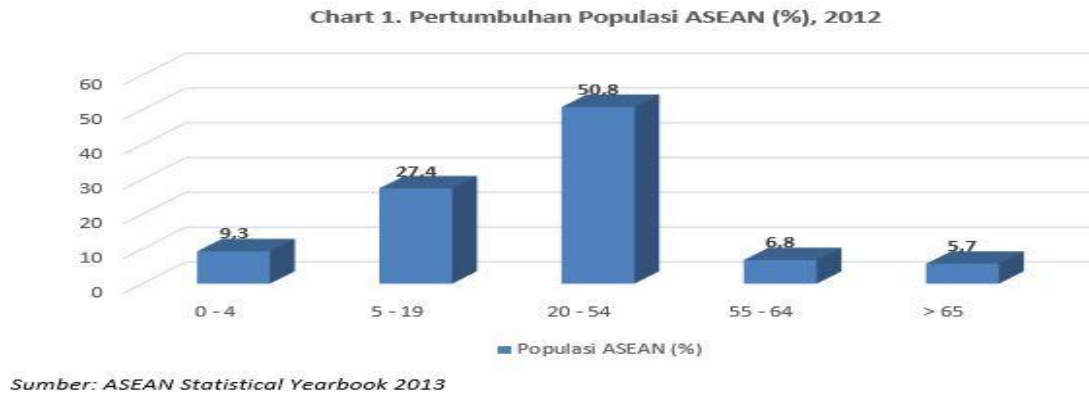
Relating to background problems , it can be formulated problem , viz: ( 1 ) how their model placement on the job training student will program expertise of fashion in malang , ( 2 ) how election place prakerin student will program expertise of fashion in Malang .The purpose of this research is: ( 1 know model placement on the job training student will program expertise of fashion in malang , ( 2 ) analyze election place on the job training student will program expertise of relevant fashion in Malang.

## **II. THE THEORY STUDY**

Opportunities and challenges the community of the asean economic (AEC). At the end of 2015 indonesia as one of asean countries, have to meet attendance of the asean economic mea ) agenda this alone drafted by leaders asean countries in bali through the declaration of bali concord in 2003.The community economic asean is one of the pillars of to build integration asean or community the asean community, who has already mentioned in a vision asean 2020.( sastro, 2015 ).Four the main pillar AEC include: 1 asean as a single market and based production single supported with an element the free flow of goods investment services, labor educated and capital flows more free, 2 asean as the area with high economic competitiveness with an element regulation competition, consumer protection, intellectual property rights, development infra structure taxation and e-commerrce, 3 asean as the area with economic development the spreading with an element developing small and medium enterprises and initiative integration asean to the state country Cambodia, Myanmar, Laos, dan Vietnam, 4) ASEAN as the integrated in full with the global economy with an element coherent approach economic relationships outside of the , and enhance the role of in a web of global production ( Sastro , 2015 )

The implementation of AEC would give the impact of positive or negative arising from the community of the asean economic AEC the, the flow of goods services, investment and labor a skilled free and capital flows free among states in asean.The positive side which can be used opportunities is the population in indonesia in 2013 reached 248,8 million with the number of labor force in february

2014 reached 1253 million ( the central bureau of statistics, 2014 ).While population growth asean in 2012, can were presented in this Figure 1,



**Figure 1.** ASEAN population Growth

The condition workforce who is have skills refined through sertifikasi will can cause an (Sumber: ASEAN Statistical Yearbook 2013 dalam Sastro 2015) can be dangerous because had to compete against foreign staff of foreign already has recognition legal about competence or their skills.

Vocational high school ( SMK ) is educational institution that men- print human resources to direct entering the workforce being in labor professional , namely workers have skill and expertise professional and productive .To menghasil right graduates skilled and professional of course could not be separated from the role of school and industry as the industrial work . But still found participation industry or school readiness yet optimal in the implementation of the practice of industrial work .This evidenced by often critic graduate vocational high school who are considered less able to follow change , because of lack of get provision basic skills to learn – “basic learning tools “( sisi , 2002 ) .In addition there are faces obstacles congruity qualitative and quantitative so there gap competence owned graduates pendi dikan vocational with competence who dibutuh right by industry , ( sumarno , 2008) .Congruity qualitative occurred because development technology in the very rapidly while congruity quantitative was due to the balance of the number of job exists with the number of output education seek jobs ( Syahril is , 2012 ) One of the aims of the practice of industrial work is to provide work experience which was actually that participants competency skills to take control of the productive .The results of research various views of dudi about SMK , so far they do not know or not want to know with the existence of the concept of education double system where students later on graduates vocational high school is expected to be workers are reliable .( widiyanto and utami ningsih , 2013 )

Place on the job training relevant expected to give work experiences in the real world as expected.Hamalik (2007:21) On the job training is a financier the training that was held he, aimed to provide skills needed in a given job in accordance with the demand the ability for work ( 2007; 21 ).At least election place on the job training relevant will give the required length of experience. Experience

is one of a part of the process education as noted by Wardiman ( 1998: 80 ) of them are ( 1 in labor quality, and ( 2 ) offered recognition and the prestige of the work experiences as part of the process of education. With a place on the job training for students smk program expertise of fashion is highly dependent on the model placement..

### III. RESEARCH METHODOLOGY

The kind of research this is research descriptive with the quantitative approach. According to Sugiyono ( 2010: 11 ) “research descriptive” is that research be held to find out variable values mandiri, good one variable or more ( independent ) without making comparisons, or links between variable one with variable another. The study is done in SMK program expertise of fashion in Malang in the 2014. Way data collection use chief closed, the method of analysis data using technique descriptive analysis the percentage

### IV. THE RESULTS AND DISCUSSION

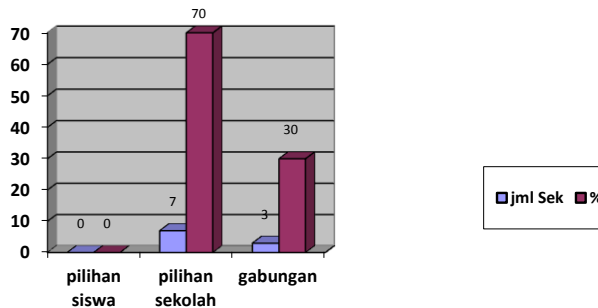
#### A. Model Placement Students On The Job Training

Model placement students on the job training consisting of 3, viz: ( 1 ) model choice students, ( 2 ) model alternatives of schools, ( 3 ) model joint. Model placement students prakerin can be seen in Table 1.

**Tabel 1.** Model Placement student of On The Job Training

	model placement		
	Alternative student	Choise School Alternatif	Joint model
Total	0	7	3
%	0	70	30

Based on table 1 that of the ten school for 7 school ( 70 % place students on the job training based on alternatives of schools , and 3 school ( 30 % place students on the job training with a model joint .The percentage distribution clearly can be seen in Figure 1



Sumber : Irianti AHS 2014

**Figure 1.** Diagram Placement On The Job Training Model for Student

## B. The election of the On Job Training

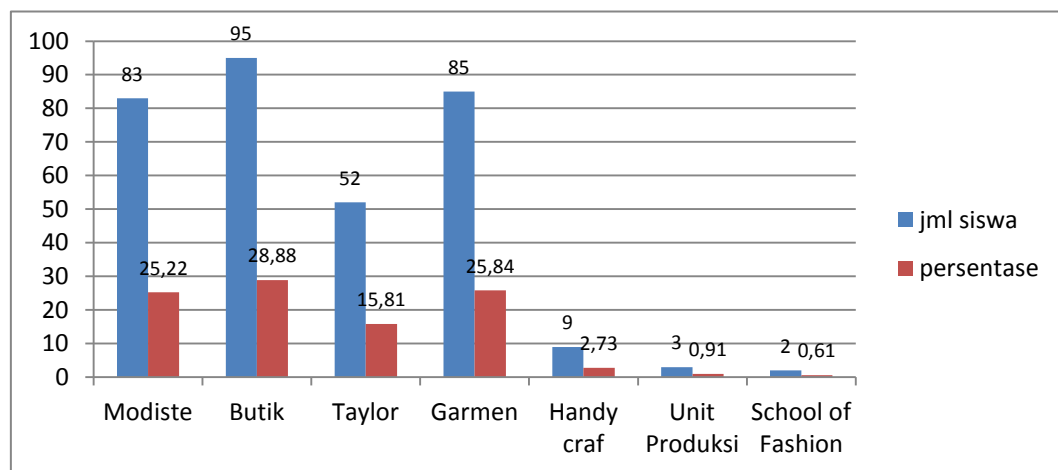
The election of the industrial work by 329 students it in groups right in 7 type of industry , namely: ( 1 ) couturier , ( 2 ) boutiques , ( 3 ) taylor , ( 4 ) garment , ( 5 ) handy ceraf , ( 6 ) production line school , ( 7 ) school of fashion .Results of an election place prakerin can be presented in Table 2 the following

**Tabel 2. The Election of The On Job Training**

No	Type industry	Total student	Percentace (%)
1	Modiste	83	25.22
2	Boutique	95	28.88
3	Taylor	52	15.81
4	Garment	85	25.84
5	<i>Handy ceraf</i>	9	2.73
6	Unit produksi	3	0.91
7	<i>School of Fashion</i>	2	0.61
	Total	329	100%

(Sumber:Irianti AHS 2014)

Table 2 that of 329 students who prakerin , eighty-three students ( 25,22 % ) prefer in couturier; as much as 95 students ( 28,88 % ) prefer in boutiques , 52 students ( 15,81 % ) prefer in taylor , 85 students ( 25,84 % ) prefer in a garment; as much as 9 students ( 2,73 % ) prefer in handy ceraf; as much as 3 students ( 0,91 % ) prefer in unit the productions of a school; as much as two students ( 0.61 % ) prefer in school of fashion; percentage distribution clearly can be seen in Figure 2 .



Sumber Irianti AHS, 2014

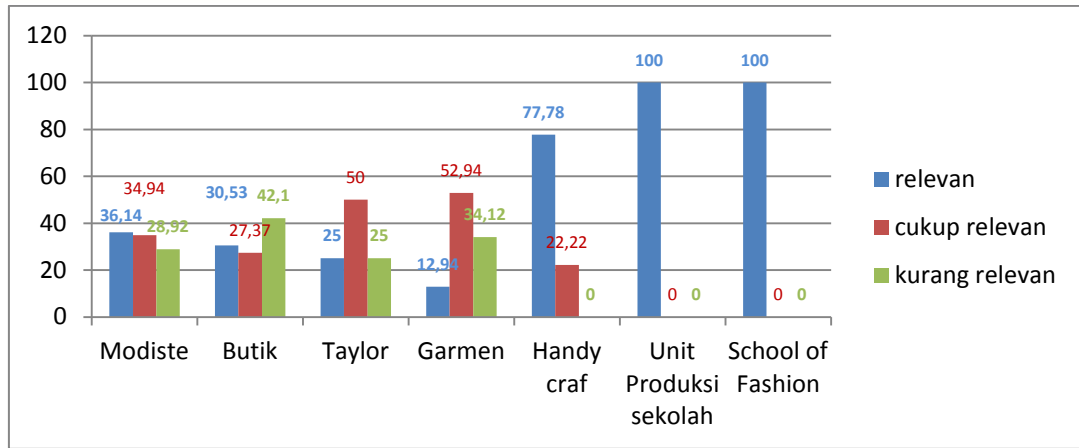
**Gambar 2.** Diagram The election Placement of The On Job Training

**Tabel 3.** The Relevance Of Election Placement On The Job Training

No	Type of Industry	Total Student	Relevant	%	quite relevant	%	less relevant	%
1	Modiste	83	30	36,14	29	34,94	24	28,92
2	Boutique	95	29	30,53	26	27,37	40	42,10
3	Taylor	52	13	25,00	26	50,00	13	25,00
4	Garment	85	11	12,94	45	52,94	29	34,12
5	Handy craf	9	7	77,78	2	22,22	0	00,00
6	Unit Produktion	3	3	100,00	0	00,00	0	00,00
7	School of Fashion	2	2	100,00	0	00,00	0	00,00
	Total	329	95	28,87	128	38,91	106	32,22

*Sumber: Irianti AHS, 2014*

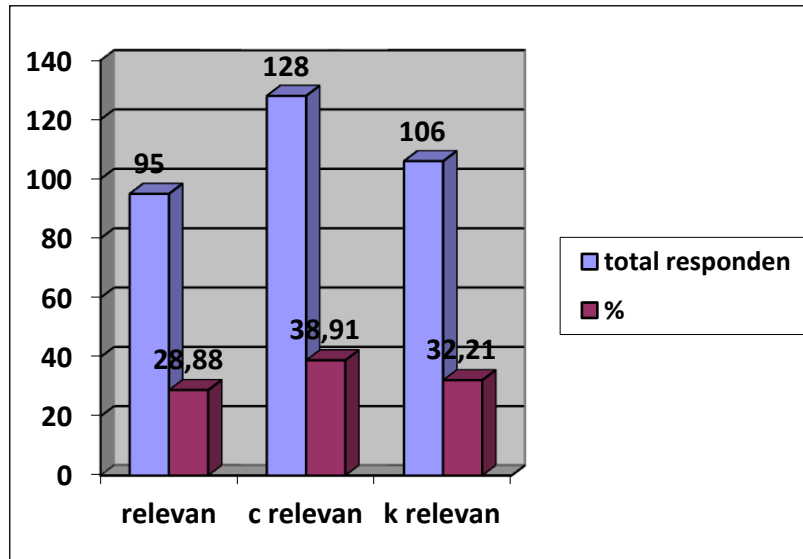
Table 2 that of 329 students who on the job training , eighty-three students who vote in couturier show 30 students ( 36,14 % ) relevant , 29 students ( 34,94 % is relevant , 29 students ( 28,92 % ) less relevant; by 95 students who vote in boutique 29 students ( 30,53 % ) relevant , 26 students ( 27,37 % quite relevant , 40 students ( 42,10 % ) less relevant; 52 students who vote in taylor 13 students ( 25,00 % ) relevant , , 26 students ( 50,00 % quite relevant , 13 students ( 25,00 % ) less relevant; as much as 85 students who chose in a garment 11 students ( 12,94 % ) relevant, 45 students ( 52,94 % quite relevant , 29 students ( 34,12 % ) less relevant; as much as 9 students who vote in handy craf , 7 students ( 77,78 % ) relevant , two students ( 22,22 % quite relevant , 0 students ( 00,00 % ) less relevant; As many as three students who vote in unit of production school three students ( 100,00 % ) relevant, 0 students ( 00,00 % quite relevant , 0 students ( 00,00 % ) less relevant; as much as two students who vote in school of fashion two students ( 100,00 % ) relevant, 0 students ( 00,00 % quite relevant , 0 students ( 00,00 % ) less relevant .The percentage distribution clearly is presented in figure 3 and 4 below.



Sumber: Irianti AHS, 2014

**Gambar 3.**Diagram Relevant of election Place on The Job Training.

The job training program students expertise of fashion obtained from places prakerin is presented in Figure 4 the following



(Sumber: Irianti, A. H. S. Et all. *International Journal of Education and Information Studies* 5(1)1-16.

**Gambar 4. Relevance Skills Obtained in the Practice of Industrial Work in Many Places Work Practices Industry**

## V. DISCUSSIONS

The research results show that model assignment used school in putting students on the job training is the kind of alternatives of schools. This is most appropriate, because schools know better conditions an industry that will occupied, however it would be better if model choice the school as well followed by cooperation between schools and industry place prakerin. Data on schools that have an mou ( memorandum of understanding ) with industry shows that of 10 schools smk program expertise of fashion, there are 70 % of schools, but the result tracking deeper than 7 schools that have an mou, 1 schools that had all documents cooperation, 3 schools to the majority of the documents, 2 schools, . it has a small proportion of documents and 1 the school does not have a document ( irianti,





2014: 70 ). Relating to cooperation , research a kind of suggest let school relationships either by the industry that industry wants to more involved better for the continuity of the implementation of on the job training SMK( yasaroh , 2010: 80 ) .

Election place on the job training categorized to 7 type of industry , : couturier , boutique , taylor , garment , handy ceraf , unit of production schools and school of fashion .In scientific place on the job training selected having fields of expertise of relevance to program expertise students of fashion , but more important thing is the what was given by industry of students on the job training .Relevance of any place prakerin are varied , from to seven places on the job training only three places on the job training who relevance high , namely handy ceraf , unit of production and school of fashion , four races prakerin other , couturier , boutique , taylor , and garment relevance low That was between 12 % to 35 % just .Relevance election place prakerin supposed to give penga-laman work practices in accordance with the demand competence required at the world of work and demands competence learned at the school .Aranmus ( 2012: 114 ) concluded the implementation of the prakerin can encourage higher motivation students .On the job training is a financier the training that was held he , aimed to provide skills needed in a given job in accordance with the demand the ability for work ( hamalik , 2007: 21 ) .Election place prakerin relevant will give the required length of experience .Experience is one of a part of the process education as noted by wardiman ( 1998: 80 is , ( 1 in labor quality , ( 2 ) strengthen link and match between smk with the world of work , ( 3 ) improve the efficiency and effectiveness the process of education and training labor quality , and ( 4 ) offered recognition and the prestige of the work experiences as part of the process of education .( Reeve and Gallacher , 2005: 13 ) also mentioned four concept is an important part of of the prakerin , one of them is relevance

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

There are 3 model placement students practice work industry smk program expertise of fashion in malang , namely model choice students , model alternatives of schools and models joint .The results of the study are 2 the model used the model alternatives of schools and models joint

Advice for schools in putting students who will implement Election private practice of industrial work student will program expertise of fashion in malang, are widely scattered in seven types of industry, : couturier, boutique, taylor, garment, handy ceraf, unit of production schools and school of fashion.Relevance industry as a prakerin very came from various to seven places prakerin only three places prakerin who relevance high, namely handy ceraf, unit of production and school of fashion, four races work practices industry other, couturier, boutique, taylor, and garment relevance low, that was between 12 % to 35 % just.

The practice of industrial work more attention to a cooperative relationship between schools with industry, focusing on the implementation of the work practices industry and evaluate relevance private practice of industrial work especially competence given students.This is to used reference in putting students who will implement work practices industry on industrial relevant



## Expression Thank You

Greeting thanks addressed to ( 1 ) The Dean FT UM which has given the opportunity writer join the aptekindo on the field , ( 2 ) deputy dean of 1 , 2 , and 3 who facilitated in the scientific in the atekindo on the field , ( 3 ) the principal smk program of fashion expertise in malang that has become respondents in research , so can be achieved this paper , and all friend by , dear child beloved , students have inspired in every my steps.

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## THE DEVELOPMENT OF ENTREPRENEURSHIP CHARACTERISTIC BY INTEGRATING GOOD CHARACTER BASED PROJECT “THE SIX” IN BUSINESS MANAGEMENT

(Study of strong-willed to success; action and result oriented; and consistent)

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**ABSTRACT.** The aim of this study is to perceive the result of entrepreneurship development model implementation that integrated good characters in Business Management Learning (Basic Concept of Business Management) through project-based learning. There are three psychological process in applying good characters that linked each other: moral knowing, moral feeling, and moral behavior (Lickona, 1992) while project-based learning applied six steps (The Six) from Steinberg (Steinberg's A) (1997): (1) authenticity; (2) academic rigour; (3) applied learning; (4) active exploration; (5) adult relationship; (6) assessment. The data collection is used, tests, observation and interview. Quantitative-qualitative description for the analysis. The teacher's PBL process and students' response to the lesson scaled 1-5 that converted on 0-100 and qualitative it to Very Good (VG), Good (G), and Good Enough (GE) categorized. While for the test which scored 0-100 with percentage 75% mastery individual and 80% for mastery class is converted to 0-100 and qualitative to Mastery (M) and Not Mastery (NM). The character analysis technique scored 1-5 that converted to 0-100 and qualitative to VG, G, and GE. The result points: (1) PBL-The Six process integrated entrepreneurial characteristic by teacher with rate score 80,4 (Good), it contains authenticity score 4,11/82,2 (Good); academic rigor score 4,2/80,37 (Good); applied learning rate score 4,09/81,77 (Good); active exploration rate score 4,17/84,17 (Good); adult relationship rate score 4,01/80,13 (Good); assessment rate score 3,86/77,1 (Good); (2) the test result learning test shows mastery from 29 students or 83% > 80% (Good). (3) students' response to PBL Model integrated to character development shows 14 students (40%) very like and 21 students (60%) like with score about 4,1/82 (G); (4) Characteristic built, 'high willingness to be success' shows score rate is 4,11 or 82,2 (G); action-oriented rate score is 4,43 or 88,6 (VG) with a descriptor; result-oriented rate score is 4,02 or 80,2 (G); consistence in commitment shows about 4,12 or 82,48 (G). All the characteristic rate score is 4,09/81,70 (G).

**Keywords:** character development instructional, entrepreneurship, good character, project-based learning, The Six

### I. INTRODUCTION

Education is designed to transform learner's capabilities through learning process. SMK (vocational) in curriculum 2006 is very clearly explained that allow opening an entrepreneurial class to produce the next self-employee. Until now, several vocational schools in East Java are still organizing entrepreneurial class; because they viewed the graduates have a better level of independence, such SMKN 3 Malang, SMKN 2 Jombang, and SMK 1 Buduran Sidoarjo. Data percentage of graduates from those schools shows in 2010 and 2011 who work independently is rate about 3,6% and 6,4% while 23,2% and 29,3% work out of their background.

Previous research shows that the majority of entrepreneurial class program students only know four kinds of entrepreneurial character and some of them feel have 3 types of entrepreneurial character (<sup>9</sup>Sutiadiningsih, 2014). There are 8 vocational school achievement indicators for entrepreneurship: (1) independent, (2) creative, (3) take risks, (4), action-oriented, (5) leadership, (6) hard work, (7) concept, and (8) skill, but it is not rigid and interconnected (<sup>5</sup>Mulyani, et al. 2010: 56-57).



Entrepreneurship practicing for vocational students on Management of Business Subject which has some sub-materials and one of is Management Business Basic Concept. Entrepreneurship needs complex ability, knowledge and insight, ability to implementation the concept into real work, and be able to act as entrepreneur. Management business is close related with mentality and soul which always active to make the business working efficient and effective to achieve the target. Entrepreneurship also needs systematical thought, creativity; futures oriented and do it quickly and rightly. Practicing entrepreneurship capability, it needs a model learning that can growth strong mental and character.

One of learning models that competent to activate the student *Project-Based Learning* (PBL). Here, students to be trained responsible to solve any problems in their work through PBL. The independent is shown if students competence finishing their work properly and on time (<sup>1</sup>Barnawi & Arifin, 2012: 136). Meanwhile the result of the previous research is shown that Management Business Basic Concept in Vocational School is less emphasizing the awareness of entrepreneurial characteristic (Sutiadiningsih, 2014).

## II. ENTREPRENEURIAL CHARACTERISTIC

Entrepreneurial characteristic is one's metal or soul that related to one's opinion or ideology to decision (attitude), action and behavior as well in entrepreneurship. Lickona (1992) states the term 'character' as 'good character' and refers to Aristotle's opinion that "... *the life of right conduct-right conduct in relation to other persons and in relation to oneself*" or life good or virtuous<sup>4</sup> - is if people behave toward others (the Almighty God, man and the universe) and included themselves.

Entrepreneurial characteristic is close connected to entrepreneurship "values cultivation", and applied it continuously and next become a habit. Lickona (1992; 2004) explains a good character substantively is connecting to psychological; or mental process and behavior. They are : (1) *moral knowing (knowing the good*; (2) *moral feeling (desiring the good)*, and (3) *moral behavior (doing the good—habit of the mind, habit of the heart, and habit of action)*. After that the writer called it 3moral/3M. Cambers in Kemendiknas (2010) states that dignity must be scouted by mental process and rationale in education.

### a. The concept of a strong-willed to success

A strong desire to succeed can be done through these four basic characters emotional strength (<sup>3</sup>Hendro and Widhianti (2006: 56), namely: (a) a determination of the Vision and Mission; (b) has accuracy / precision; foresight good (persistence) in a decision is made efforts to achieve the vision, mission and objectives; (c) have the confidence / courage of the capability and high creativity to implement and achieve a success (power of mind); and (d) be unyielding or ductile (struggle).

### b. The concept of action-oriented

The Action-oriented is an effort to make the activities as planned without waiting for a command or a pressure situation. The important features of these people are: (a) a thirst for achievement - make



efforts to get an accomplishment; (b) profit-oriented or outcome; (c) diligently and; (d) having determination, hard work, and motivation; (e) energetic; (f) full of initiative.

**c. Results-oriented / interpretation**

Orientation to result is focusing on actions that relevant to the goal. Someone who takes the task and the result is a person who always put the values of achievement motive, profit-oriented, perseverance and fortitude, determination, hard work, have a strong encouragement, energetic, and initiative. This character can be assessed with the descriptors, which are able to meet or realize the achievement of accomplishments / results, by seeing and acting on opportunities / achievement).

**d. Persistent and consistent commitment**

Is an act diligently and consistently make habits continuously to improve and develop learning / business. This character can be judged from the three descriptors, they are: (a) the habit to learn and continuously develop their business; (2) the habit to give the best service; and (3) make it a habit to evaluate their work, etc.

**A. Project-Based Learning (Pbl)**

Joel L. Klein et. al in Widyantini (2014) states that Project-Based Learning is the instructional strategy of empowering learners to pursue content knowledge on their own and demonstrate their new understandings through a variety of presentation modes<sup>9</sup>. Cord et al (Khamdi, 2007) states that project-based learning is a model or innovative learning approach, which emphasizes contextual learning through some activities that are complex in the form of projects. The projects put the students in a role as problem solvers, decision-making, the observer, and the author of the document. Project-based learning has great potential to provide a learning experience more interesting and meaningful for students (Gear, 1998).

*Buck Institute for Education* (1999) states that project-based learning has the characteristics, those are: (a) students as decision makers, and to create a framework, (b) there is a problem whose solution is not predetermined, (c) the students as a process designer for achieve results, (d) the student is responsible for obtaining and managing information collected, (e) to evaluate continuously, (f) students regularly look back at what they do, (g) the final result of the product and evaluated quality, and ( h) classes have an atmosphere that provides fault tolerance and change.

There are some steps that teachers should noted in implementing PBL. <sup>6</sup>Santyasa (2006: 12) states that PBL should implement the following five steps: (1) establish the theme of the project; (2) establish the context of learning; (3) planned activities; (4) processing activities; and (5) implementing activities to complete the project. The writer is used *Steinberg's Principe* (1997) that known "*The Six*". Andria Steinberg in Patton (2012: 40) defines that *The Six* contains: (1) the authenticity; (2) adherence to academic values; (3) learning in the real world; (4) active independent; (5) make contact with the expert / specialist; and (6) make an assessment. Moreover there is strategy in every step that will motivate and guide the students.



## B. Entrepreneurship characteristic development

Character development is related to 'values', implementation measures, and to the next can be a habit in every action. Lickona (1992; 2004) explains that substantively to apply the virtues (*good character*) consists of a process of psychological and behavioral performance are linked<sup>4</sup>: 1) *moral knowing (knowing the good)*, 2) *moral feeling (desiring the good)*, and, 3) *moral behavior (doing the good-habit of the mind, habits of the heart, and habits of action)*. The founding of the entrepreneurial characteristic can be done by the acculturation approaching, that is the educational process. Cambers in the Ministry of National Education (2010) states that the dignity of the noble (dignity) should be established through a mental process and rationale in education.

This study aims to determine the formation of character through character building models that are integrated in the Basic Concepts PUB-based learning Project (PBL). Focus research problems are: (1) the implementation of learning Basic Concepts PUB integrated with character building; (2) Basic Concepts PUB learning outcomes by integrating character building; and (3) students' response to learning that is integrated with character building.

## III. RESEARCH METHOD

This study was conducted descriptive quantitative. The object of research is students' entrepreneurial class of SMK 3 Malang.

1. **The collection of data.** The collection is taken by observation, questionnaire with scale, and test.
2. **Technique of analysis.** Data learning implementation and students' response is done by using the percentage of Arikunto (2009).

$$P = \frac{d}{N} \times 100 \%$$

Information  
P = Percentage  
d = Data Expected  
N = Number of subyek

The result of learning and students' characteristic is used descriptive quantitative like below.

$$Skor = \frac{(SO1 + SO2 + SO3)}{3}$$

Note: SO = observer score

Category Assessment			
4,3 – 5	86 – 100	:	Very Goog (VG)
3,8 - 4,25	76 – 85	:	Good (G)
3,3 - 3,75	66 – 75	:	Good Enough (GE)
2,3 - 3,25	46 – 65	:	Poorly (P)
0 – 2,25	0 – 45	:	Bad (B)

3. **Steps of research.** The implementation of this research: (a) the determination of the characteristics that become the focus of research; (b) descriptor formulation characteristics through the study of literature; (c) prepare the learning tools: syllabus, lesson plans, teaching materials, assessment sheet; (d) preparation of research instruments; (e) validation learning devices and research instruments; (f) data collection and data analysis; (g) make reports.
4. **Learning model and characteristic development** (Steinberg, 1992). The learning is integrated to characteristic development used the model such below.

No.	PBL Steps and Good Action (Characteristic Development)	STRATEGY
A	<b>Opening Learning</b>	
B	<b>Core Learning</b>	
1.	AUTHENTICITY	
a	<i>Moral knowing</i>	Drive and guide students to understand the meaning of learn/task/work that they do, to understand the important oh self-motivate in work.
b	<i>Moral feeling</i>	Drawn task that appropriate with student's capability some time to work on it, so it can growth the happiness and motivate to learn
c	<i>Moral behavior</i>	Drive and guide students to get an output from their work/task.
2.	ACADEMIC RIGOUR	
a	<i>Moral knowing</i>	Drive and guide students to be able applying knowledge in finishing their job.
b	<i>Moral feeling</i>	Drawn and develop tasks that will challenge students to use any methods for solving problems.
c	<i>Moral behavior</i>	Drive and guide students to make them think higher in solving problems.
3.	APPLIED LEARNING	
a	<i>Moral knowing</i>	Drive and guide students to make them be able working on the real issues/problems.
b	<i>Moral feeling</i>	Drive and drift students to make them be able working on a high technology organization
c	<i>Moral behavior</i>	Drive and drift students to make them be able managing their own skills.
4.	ACTIVE EXPLORATION	
a	<i>Moral knowing</i>	Drive and drift students to finish their work due to schedule.
b	<i>Moral feeling</i>	Drive and drift students to observe with any methods, media, and sources.
c	<i>Moral behavior</i>	Drive and drift students to communicate with other people by presenting or doing other activities.
5.	ADULT RELATIONSHIP	
a	<i>Moral knowing</i>	Drive and drift students so they can learn from another that have more relate insight.
b	<i>Moral feeling</i>	Drive and drift students to work/discuss each other to solve problems.



c	<i>Moral behavior</i>	Drive and drift students to ask/engage another party to assess their work.
<b>C</b>	<b>Closing</b>	
6.	ASSESSMENT	
a	<i>Moral knowing</i>	Drive and drift students be able to evaluate their own work in every task they do.
b	<i>Moral feeling</i>	Drive and drift students to invite another party to involve in developing standard operating that relate to their job
c	<i>Moral behavior</i>	Drive and drift students to assess their work.

#### IV. RESULTS AND DISCUSSION

##### A. The Observation result of Management Business Basic Concept Integrated to Characteristic Development

The Learning has done for three times with different materials but it uses the same learning model. The result from those three observers shows different rates. Learning one, two and three each scored 77,5 (G); 80,3 (G); and 83,5 (G). it is shows differences score rates between learning one, two, and three. It is 77,5 (G); 80,3 (G); and 83,5 (G) with rate 80,4 (G). The results point that there are increasing number. The achievement is been affected from scoring of the learning process.

1. **Authenticity** with: (a) teaching goodness (*moral knowing/knowning the good*) - teachers motivate and guide students to understand the significance of learning, task/job, the importance of mindset, motivation in studying / working. The average score is 76 (G); (b) taught to love and want goodness (*moral feeling / desiring the good*) - the teachers set the task according to students' ability and time for work, so it may turn up a sense of pleasure and motivation to learn/work, average score is 4,21/84,2 (G); and (c) do good things (*moral behavior/doing the good-habit of the mind, habits of the heart, and habits of action*) - teachers encourage and guide students to be able to think complexly to problem solving tasks / work, an average score is 4,34/86.7 (VG). The average score of in whole is 4.11/ 82.2 (G)
2. **Academic rigor** values with: (a) *moral knowing* - the teacher encourages and directs students to apply a range of knowledge / concepts in completing tasks / work an average score of 4.18/ 83.6 (G); (b) *moral feeling* - teacher developed a task that can be challenging students by using various methods of solving the problem, the average score is 4.11/82.2 (G); and (c) *moral behavior* - teachers encourage and guide students to be able to think of complex problem solving tasks / work an average score of 3.61 or 72.2 (GE). The whole average score is 4.2/80.37 (G).
3. **Applied learning** with: (a) *moral knowing* - teachers encourage and guide students to be able to work in the context of real problems, the average score is 3.72/74.4 (GE); (b) *moral feeling* - the teacher encourages and directs students to be able to work in the context of high-tech organizations, the average score is 4.27/85.3 (G); and (c) *moral behavior* - the teacher encourages and directs





students to be able to manage their personal skills, the average score is 4.32/86.3 (VG). The whole average score is 4.09/81.77 (G)

4. **Active exploration** with: (a) *moral knowing* - the teacher encourages and directs students to complete the task/job according to schedule, the average score is 4.11/82.2 (G); (b) *moral feeling / desiring the good* - the teacher encourages and directs students to observe in any variety of methods, media, and sources, the average score is 4.35/86.9 (VG); and (c) *moral behavior / doing the good* - the teacher encourages and directs to communicate with others through presentations or other activities, the average score is 4.07/81.3 (G). The whole average score is 4.17/84.17 (G).
5. **Adult relationship** with: (a) *moral knowing/knowing the good* - teachers encouraged and directed students able to learn from others who have relevant knowledge, average score is 4.12/82.3 (G); (b) *moral feeling/desiring the good* - the teacher encourages and directs students to observe in any methods, media, and sources, the average score is 3.86/77.1 (G); and (c) *moral behavior/doing the good* - the teacher encourages and directs students to ask another party to assess their works, the average score is 4.07/81.3 (G). The whole average score is 4.01/80.13 (G)
6. **Assessment:** (a) *moral knowing/knowing the good* - the teacher encourages and directs students to be able to evaluate their own performance in each job, the average score is 3.96/79.1 (G); (b) *moral feeling / desiring the good* - the teacher encourages and directs students to ask for another parties to be involved in the development of SOPs task/job, average score is 3.93/78.6 (G); and (c) *moral behavior / doing the good* - the teacher encourages and directs students to assess their work, the average score is 3.68/73.6 (GE). The whole average score is 3.86/77.1(G).

Result analysis shows the highest point is on the 4<sup>th</sup> step is he active exploration” followed by the authenticity and applied learning. Good behavior is very likely to occur because at each stage of learning activities teachers are providing motivation and guidance, so that any problems can be resolved immediately. The lowest value is in the assessment. This is possible because it has not happened either habituation mainly to involve others (outsiders).

## **B. The Result of Students’ Management Business Basic Concept**

Knowledge test analysis result about the basic concept of Management Business with 10 objective items and 5 subjective items. The analysis showed that 29 students (83%) worked completely  $\geq 75$ , the remaining 6 students (17%) has not been completed it. Students’ success due to work on the problems cannot be separated from their motivation and guidance/direction of the teacher constantly to build good study habits. While it is possible not mastery because there are some questions use term foreign language (English) considered difficult by students who are not familiar for vocational students.



### **C. The Observe Result of Students' Response to Management Business Basic Concept Learning Integrated to Characteristic Development**

PBL student response data to be integrated with the development of the character shows that 14 students (40%) stated quite liked, and the remaining 21 students (40%) like with the average of like is 4.09/81.81 (G). The writer uses 5 things to find students' response as follow response to:

1. Management of the learning facility with two descriptors, settlement of learning facilities and preparation of learning devices very well preferably by 23 students (66%), well preferably by 8 students (23%), and quite preferably by 4 students (11%). The average score is 4.24/84.86 (G).
2. Implementation of learning activities with six descriptors: (a) clarity learning objectives submitted by teachers; (b) clarity initial briefing submitted by teachers; (c) the clarity of the final delivery of learning outcomes that must be achieved; (d) ways to motivate students to understand the material in order to do the exercise and oral communication; (e) ways to guiding process thought in solving problems; and (f) ways to motivate finding other relevant materials, very well preferably average by 14 students (40%), preferably well by 20 students (57%), and is favored by one student (2.9%). The average score is 4.08/81.62 / Good.
3. Management of classroom interaction with four descriptors, (a) the clarity of the instructions relating to the content of the lesson / assignment; (b) clarity initial briefing submitted by teachers; (c) the urge to solve the problem of task / job, there are penalties, and given sufficient time to finish; (d) the urge to communicate the results of the task / job, very well preferably by 26 students (74%) and well preferably by 9 students (26%). The average score is 4.24/84.71/Good.
4. The attitude of openness and development of a positive attitude in learning with five descriptors: (a) how the motivate to learn, teachers' hospitality and openness to understand the difficulties students; (b) by giving the opportunity to respond self-problems/other groups; (c) how to provide interaction opportunities; (d) ways to realize self of the advantages and disadvantages; and (e) ways to guide and foster self-confidence, very well preferably by 11 students (31%), preferably well by 17 students (49%), preferably quite well by 7 students (20%). The average score 4,0/80,0/Good.
5. Acceptance characteristic development model that integrated to Basic Concept Management Business based on PBL character with seven descriptors: (a) providing an opportunity to communicate and argue; (b) the encouragement to actively resolve the real problems; (c) the urge to gain knowledge from other sources; (d) the provision of training to the process, think and work according to SOP; (e) the provision of training for managing time at work; (f) the encouragement to complete the task independently, quickly and accurately; and (g) the encouragement to be responsible and ready take risk for the work performed, average preferably very well by 8 students (23%), preferably well by 20 students (57%), preferably quite well by 7 students (20 %). The average score is 3.89/77.88/Good.



The students' goodness to respond learning activities very possible because of the control and drive high and constantly to students, according to the model designed

#### **D. The Result of Students' Characteristic Observe Result on Management Business Basic Concept Learning Integrated to Characteristic Development**

The results of observe analysis data students' character to the four strong-willed character or behavior to be successful, action and result oriented, as well as the commitment of total average score = 4.09 / 81.70 / Good , The results of the analysis are detailed as follows

1. Demonstrate strong-willed behavior for success, known from three descriptors, (a) conduct foresight (persistence) or thoroughness in deciding the efforts for achievement of learning objectives / work, 11 students (31%) do with very well, 20 students (57%) do with good, and 4 students (11%) conducted quite good; (b) have the courage to creativity in achieving success (*power of mind*). This is done very good by 10 students (29%), with good by 18 students (52%), and quite good by 4 students (11%), and do poorly by 3 students (8.6%); and (c) being unyielding / ductile (*struggle*) in achieving the goal of learning is done very good by 15 students (43%), and good by 18 students (57%). Overall, the average behavior of strong willed to success wisely do very good by 10 students (29%), with good by 21 students (60%), and poorly by 4 students (11%).
2. Show wise 'action-oriented' behavior known by a descriptor is conducting the goal of learning / working on their self. This is done very good by 25 students (71%) and good by 10 students (29%). Average score is 4.43/88.6/Good.
3. Demonstrate behavior 'results-oriented / achievement', known from six descriptors, (a) make efforts to capture new opportunities, looking for tutoring assistance, providing learning materials carried very good by 10 students (29%), good by 24 students (69%), and poorly by one student (2.9%); (b) a results-oriented learning/work, have the ability to do all the exercises, diligent, and zealous in completing tasks/work done good by four students (97%), and very good by one student (2.9%); (c) took the initiative to work efficiently - faster, less time and cost, done good by 23 students (60%), and very good by 12 students (34%); (d) took the initiative to produce / resolving product / tasks / services with high quality, well done by 18 students (51%), with very good by 15 students (43%), and quite good by 2 students (5.7%); (e) prepare a work plan systematically, outlining the work into tasks / objectives operationally, and anticipate barriers to, and assess alternative, done good by 27 students (77%), very good by five students (14%), and quite good by 3 students (8.6%); and monitoring by implementing appropriate procedures, and (f) conduct monitoring by developing and implementing standard operating procedures that ensure a job/task has been resolved in good quality, made very good by 7 students (20%), good by 22 students (63 %), and quite good by 6 students (17%). Overall the students who perform 'results orientation' very good by 24 students (69%), and good by 11 students (31%). Average Score characters is 3.68/73.58/Quite Good.



4. Show 'diligent or consistent commitment behavior, known from three descriptor, namely: (a) do a good habit to learn or develop a continuous effort, conducted very good by 11 students (31%), good by 22 students (63%), and quite good by 2 students (5.7%); (b) make a habit of providing good services/communicate, done very good by 13 students (37%), and good by 21 students (60%); (c) evaluate their work habits, conducted very good by 10 students (29%), good by 22 students (63%), and quite good by 3 students (8.6%). Overall student behavior consistently with very good by 8 students (23%) and good by 27 students (77%). The average score is 4.12/82.48/Good.

The students' goodness to respond learning activities very possible because of the control and drive high and constantly to students, according to the model designed.

## V. CONCLUSION

This study shows that the model of development of the characters 'strong-willed weeks to success, action and results-oriented, and consistence on commitments' made through PBL 'The Six' which integrated with wise behavior '3 Moral' results Good, include:

- a. The Six-PBL implementation that is integrated with the development of the characters 'moral 3' done very well by teachers, with an average score of 4.47 or 89.05 (VG).
- b. Student learning outcomes of knowledge tests obtained the number of students who pass ( $\geq 75$ ) in the learning of a number of 29 students ( $83\% \geq 80\%$ ).
- c. The response of students to PBL-The Six models are integrated with the development of the characters 'moral 3' indicates 14 students (40%) stated very like, and 21 (60%) like, with an average rate is 4.09 / 81.81 / Good
- d. Fostering entrepreneurial character through PBL Basic Concepts PUB show; (A) strong-willed to success with three descriptors done very good by 10 students (29%), good by 21 students (60%), and quite good by 4 students (11%); (b) action-oriented behavior by one descriptor is done very good by 25 students (71%) and good by 10 students (29%); (c) the behavior of 'results-oriented' is well done by 16 students (46%) and quite well by 19 students (54%); (d) consistent behavior or diligently done very good by 8 students (23%) and good by 27 students (77%). The average total score of characters is 4.09 / 81.70 / Good.



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## SYNERGY OF SKILLED LABOR PREPARATION: A CASE STUDY IN BUILDING ENGINEERING PROGRAM VOCATIONAL HIGH SCHOOL

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**ABSTRACT:** *Indonesia as the largest construction market in ASEAN has a number of serious challenges that must be addressed immediately. The low quality of vocational high school graduates in Indonesia due to some constraints in the implementation of vocational education such as: the challenges and problems of Vocational High School, relevance of vocational high school with industry, the quality of graduates, competitiveness, and support from business and industry community are still low. Preparation of a skilled workforce for ready to work in construction services, required improvements governance implementation of vocational high school more effective and efficient with graduates getting certified skilled personnel before entering the workforce. Improvements governance of vocational high school need support as like: synergies / collaboration business and industry community, intensive internship, teaching factory, development / strengthening of soft skills, cooperation with Ministry of Public Work And Housing, cooperation with Institute of Development Construction Services, and cooperation with the Association of Corporate Services Construction.*

**Key words:** Synergy, skilled labor preparation, vocational high school

### I. INTRODUCE

Indonesia as a developing country that has large demographic bonus productive labor force, has a design for the development of human resources through vocational education as stipulated in Government Regulation No. 17/2010. Where in these regulations outlined that the vocational education through vocational high school can play an active role in the economic growth of the country that it can compete in the global economic arena. Where Vocational High School (SMK) has a role to prepare students to be ready to work after completing education, whether working independently or fill existing vacancies (Mulyani, 2009). The development of vocational education oriented towards the fulfillment of the labor market demand and the introduction of entrepreneurship, so as to produce professional graduates as expected by the world of work and the business community (MONE Strategic Plan, 2014). However, if the population number of productive age are large and not fully developed in various competence areas of work will become development burden.

An irony for vocational high school in Indonesia at this time, because of the low quality of graduates of vocational competence becomes a hot issue today (Wiyarsi, 2015). As an indicator of the decline the quality of vocational high school graduates in Indonesia are high number of unemployment vocational high school graduates due to the lack of specialty skills, work ethic and creativity decline, loss of sense of responsibility, and weakening of the competitiveness of graduates of vocational high school (Rahman, 2013). This reality corroborated by the Central Statistics Agency (BPS), which shows the number of unemployed in Indonesia in 2015 are 7.56 million people, and increase of 320 thousand persons compared to the same period last year. The unemployment rate, when disaggregated



according to education type showed was dominated by graduates of vocational high schools sharing 12.65 percent of the total, followed by those of General High School with 10.32 percent. Meanwhile the graduates of diploma degree, bachelor degree, junior high school, and elementary school (include not educated) contributed 7.54 percent, 6.40 percent, 6.22 percent, 2.74 percent respectively (BPS, 2015).

The low quality of vocational high school graduates in Indonesia is because several constraints in the implementation of vocational high school education (Arif, 2012). Some of these obstacles include: the challenges and problems of vocational, vocational relevance and graduates are still low, the quality and competitiveness, and support from business an industry community are still low.

According to the Directorate of Vocational High School (2007) there are eight issues and challenges in the implementation of vocational education in vocational high school, there are: (1) obsolescence of equipment / facilities and infrastructure; (2) quantity and quality of teachers; (3) technological developments; (4) the concept of economic globalization; (5) changes in the structure of the economy / labor market; (6) population growth; (7) changes in employment patterns; and (8) the concept of local excellence. If these problems and challenges are not managed effectively, will rise new problems in vocational education, there are: (a) increase the capacity and open new vocational high school needed large equipment investment, while lot of vocational high school equipment that now exists are obsolescence, (b) opening new vocational high school base on needs-based and environmental potential will require teachers in large numbers, especially productive courses (vocational) teachers, (c) cultivation vocational teachers productivity by teacher training (university) not sufficient to meet the needs of the development of vocational capacity, (d) study program in vocational teacher training not all suitable with competence in vocational high school programs are so fast change, (e) availability and growth of jobs in the industry are not comparable with increase the number of vocational school graduates, (f) internship of vocational students in industry often not matching with their competence, (g) some industry community still think that internship students are considered a burden and interfere with productivity, (g) competence and number of graduates are not in accordance with the needs of labor market, and (h) ability of entrepreneurial students and alumni of vocational high school has not shown sufficient results and has not reached all areas of competence in vocational education. Besides that quality, relevance, competitiveness of graduates of vocational and support from industry community still low ( Isnandar, 2014; Mulyati, 2012; Arifin, 2012; Scharman, 2007; Allen, 2007).

In construction market, Indonesia has the largest market in ASEAN but has a number of serious challenges that must be addressed by all stakeholders, so Indonesian people can manage of this potential (Ministry of Trade, 2015). According to Ministry of Trade of Indonesia (2015) the challenges that must be addressed are (1) Output formal education are not ready to work; (2) The quality of human resources is not evenly distributed in Indonesia, which is still a gap between the western and eastern Indonesia; (3) The quality of workforce competence (education, experience, language, etc.) is

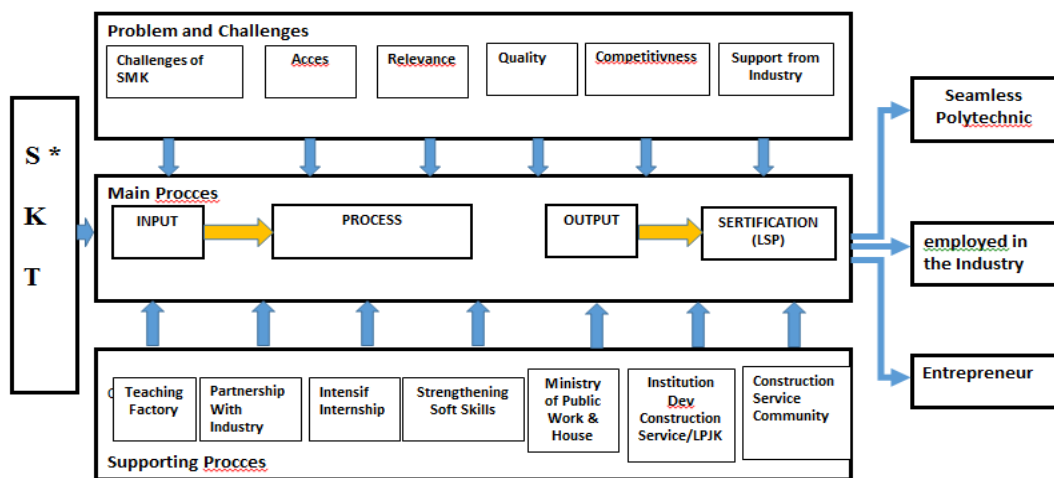
still low; (4) Not all industries recruit employee based on competence; (5) The procedures, requirements, and qualification / professional standards and labor service suppliers construction sector have not comprehensive.

Creation of high quality of human resources and meet the challenges of quality construction services market is a long-term program should be realized as soon as possible. Vocational high school with specialize in building construction as an educational institution creator of skilled labor construction services in Indonesia is expected to more optimalize in creating high quality workforce (Iskandar, 2007). However, the preparation of high quality skilled labor in construction services is not only a responsibility of vocational high school itself, but need synergy between the Directorate Vocational High School with business / industry community, Ministry of Public Work and Housing, Institute of Development Construction Services, Construction Services Association, and relevant stakeholders.

## II. DISCUSSION

### A. The Main Process of Implementation Vocational High School

In preparing for vocational high school graduates are ready for work, especially at Building Engineering program, process is needed start from input, process, and output followed by certification of competence to obtain a certification of skilled construction workers, see Figure 1.



\*SKT : Certification of Skilled Construction Workers

**Figure 1.** Process of Preparing Skilled Labor Construction Services For Ready To Work

The main process in the implementation of vocational refers eight National Education Standards in accordance with Government Regulation No. 19 of 2005 which include: Graduates Competency Standards, Content Standards, Standard Process, Education Standards and Teachers, Infrastructure Standards, Standards Management, Funding Education Standard, and Standards of assessment.

Especially about the standard of the learning process refers to the National Education Standards (NES), chapter 19, it is stated that the process of learning in the educational unit organized in an





interactive, inspiring, fun, challenging, motivating the students to actively participate and provide enough space for innovation, creativity, and independence in accordance with their talents, interests and physical and psychological development of learners.

In connection with issues above, the learning paradigm in vocational high school must be move to new paradigm that the learning takes into account demand-driven, ie learning refers to the competency standards in the business or industry community in accordance with the Indonesian National Work Competence Standards (INWCS). Therefore, learning in vocational high school must be implemented with multiple systems in schools and in industry or business, in the form of concrete activities. Learner-centered in competence learning, meaning students as subjects and individual differences appreciated objectively. Thus, learning in vocational should use the outcome approach that what competencies that must be students have.

According Isnandar, et al (2015), the characteristics of competency-based learning are as follows: (1) a competency-based learning utilize all resources as a source of learning. With traits that there are consequences that have arisen, namely optimizing resources and readiness of teachers is an absolute must to do, (2) learning based on competency should provide insight and deep understanding to students about the importance of using a variety of information, especially obtained directly through the learning activities which directly experienced by learners at school or in the industrial partner, (3) a competency-based learning trying to increase motivation to learn by displaying varied materials, working methods, media to communicate, and learn according to limit the ability of learners. Even more important is how to learn to develop themselves, (4) based learning competencies provide learning opportunities according to the speed and ability of each, so that possible differences in the speed of acquisition of knowledge and skills of learners thoroughly, (5) based learning competency is more flexible in the use of a time and a place to learn, because it can be designed integrated with the industrial partner, (6) learning competency-based emphasis to equip competence completely to the learner, which includes aspects of attitudes, knowledge, skills, and values, (7) learning competency-based nature contextual and response to developments in the industrialized world, and (8) a competency-based learning is a learning process of planning, implementation and assessment focuses on the competence of the ability of learners.

Competency-based learning patterns held in vocational high school and industry community through a dual system of learning, competency exam, and national exam to obtain graduation. After pass above process, students continued with take the certification test conducted by Professional Certification Institute to obtain Skilled Labor Certificate was recommended by the Institute of Development Construction Services based on Indonesia National Competence (INC).

Graduates of Vocational High School in Building Engineering program which have gained skill certificate can be directly employed in the Industry. Other schemes vocational graduates who have received skill certificate can move on to vocational colleges through the regular program or through a seamless pattern. Pattern seamless, a pattern continued where students who have passed the admission

to vocational colleges and competency testing of the material basis of vocational overlap between vocational and vocational colleges can be recognized as an award has taken several courses and credits, especially in the 1st and 2nd semester. Scheme of entrepreneurship are graduates of vocational choice as a career path after graduation and get a certificate of skilled construction services.

**B. Supporting Process in Implementation of Vocational High School**

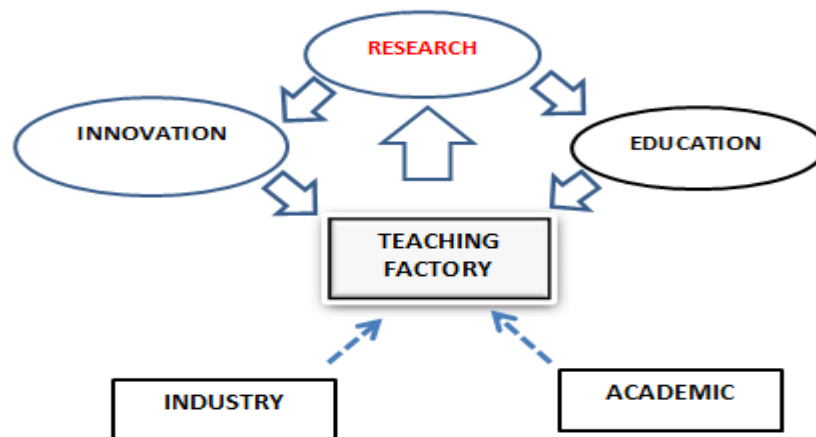
The process for effective and efficient vocational education in order to prepare skilled workers ready to work needs supporting the implementation from establish a school culture including: teaching factory, cooperation with industry, intensive internship, strengthening the skills 21st century through the development of soft skills, support regulation of Ministry of Public Work and House, Institute of Development Construction Services, and the Association of Construction Services.

1. Teaching Factory

Teaching factory, in principle, the development of production units of vocational high school into business units in schools that produce goods and services, so that a production model school. Learning teaching factory involving students directly perform activities of production of goods or services in the school environment. Implementation of vocational teaching factory in Indonesia by Moerwishmadhi (2009), by establishing a business unit or enterprise in schools. Schools produce products or services that meet the quality standards in accordance with customer expectations.

Teaching factory brings industry environment to the school environment to prepare graduates who are ready to work and increase sustainability. According Isnandar (2008), teaching factory is a partnership between industry, educational institutions and government (tri partite) in preparing graduates entering the workforce.

Application of teaching factory adapted to the needs of competence to be achieved by learners to prepare them to enter the workforce. The concept of teaching factory according Chryssolouris (2006), the academic world as a catalyst interaction with the industry, with a scheme that can be shown in Figure 2.



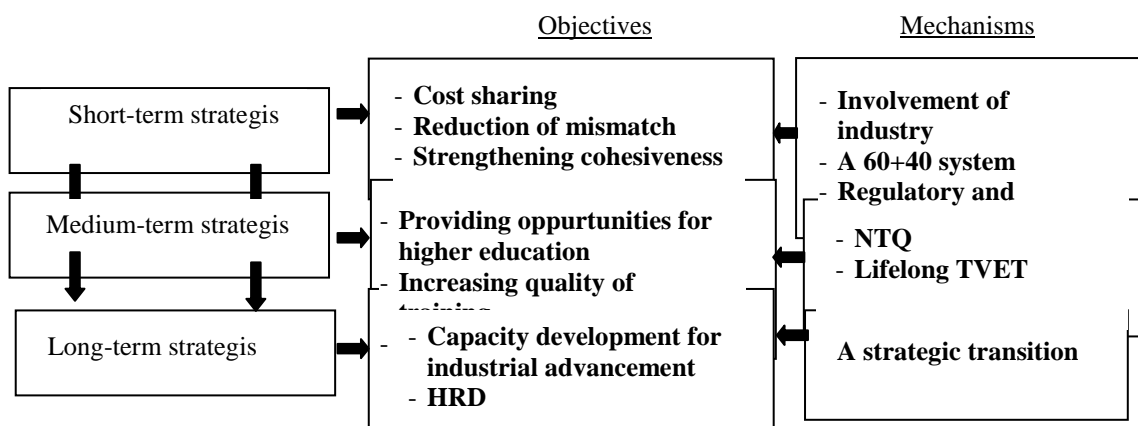
**Figure 2.** Scheme *teacing factory* model adopt from Chryssolouris (2006)

Teaching factory as a new approach to learning and one of the solutions to prepare candidates for skilled labor and excel in engineering. Briefly, the key is teaching factory model of integration, namely research, innovation, education, industry and academia. If implemented correctly not only strengthen the quality of teaching, but also shaping the attitude and mindset of the students in the culture of innovation and industry.

## 2. Partnership with Industry

Cooperation with industry urgently needed to support the implementation of primary vocational high school, to minimize the gap in technology, design, product, process equipment novelty, the production system to strengthen competitiveness in line with the demands of a rapidly changing consumer. This is important because vocational high school will have difficulty to match the changing demands of the market is so rapid that demand changes in technology, materials and equipment. With good cooperation with industry, vocational high school will always follow the changes and capable of adaptation and competitiveness on the market changes so rapidly, so that the delivery of vocational effective.

According to Lee (2010), a strategy to improve the strengthening of partnerships that effectively and efficiently with industry, through mechanisms: (1) Short-term: the involvement of the industry in the development and expansion of vocational school, implement training systems 60 + 40 (60 in vocational schools and 40 in industry) to improve efficiency and productivity, prepare regulations and frameworks that systematically; (2) medium term: developing national qualification system technology (NTQ) and strengthening lifelong philosophy of education and vocational career development; and (3) Long-term: developing a strategic transition (see Figure 3)



**Figure 3.** Adaptation Strategies Strengthening Vocational high school with industry  
(Source: Lee, 2010)

Based on Figure 3 can be explained about the purpose of the partnership which is based on short-term goals, medium term and long term. Short-term planning goals for sharing the financing, reducing the gap among vocational high school with industry, and strengthening cohesion. Medium-term planning purposes to provide a gap of cooperation with universities, improving the quality of



training, and undertake retraining for increased capacity. Long-Term Goals for capacity development and advancement of industry Human Resources Development

### 3. Intensive Internship

Obstacles often arise in the internship experience during that internship disrupt industrial productivity and implementation of apprenticeship that does not comply with the agreed competency. According to Nelly (2013) occurred some phenomena on the implementation of internships at this time include: (1) industry that is a couple of practice the industry has not had a program of education and training together with educational institutions (SMK), (2) low knowledge of the instructor / mentor students in practice, (3) placement of students practice incompatible with membership program (competence), (4) willingness to accept again students who have carried out internship at the place of business / industry still low.

Synergy of educational institutions and the industrial community in the process of apprenticeship often do not go well and satisfying, even a fairly ironic industry feel the presence of students who do internships are considered disturbing. According Ratnata (2013: 9) that:

*“The linkage between vocational education and industry in Indonesia not satisfactory, as evidenced by the many complaints coming from the vocational education side, saying that it is difficult to cooperate with industry due to various constraints. Similar complaints about the weak responsiveness of vocational schools stem from the industry communities, admitting that the capacity of the industry to accept students for internships or apprenticeships is very limited and sometimes perceived as a disruption to the production process.”*

The synergy between the two institutions is less harmonious, it is because there are a lot of complaints from both institutions. In terms of educational institutions (vocational high school), explain that a difficult obstacle is getting the opportunity to work with the industry. In terms of business / industry institution explained that the limitations to receive student internships based on the limited areas that can be entered by students and sometimes their apprentice considered a disruption to the production process of goods and / or services in the business / industry.

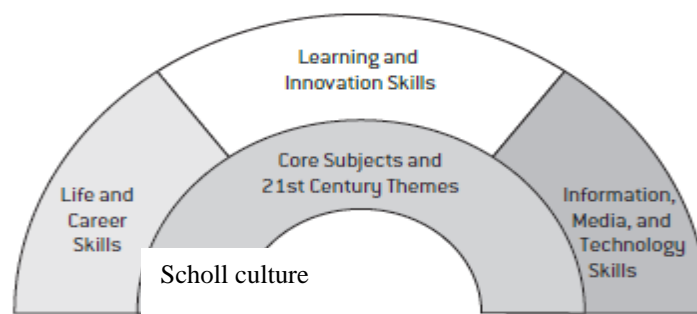
Intensive internship is meant is the learning process of students in industry community in scheme Industrial Work Practices (internship) is constructed with a strong commitment to cooperation and mutual understanding between vocational high school and industry. The concept is different from the apprenticeship program Industrial Practice program which has been widely implemented in education today. Internships are some of the activities of the vocational training system (professional education) that integrates training at a training institution (education) to work directly under the guidance and supervision of an instructor or workers who are more experienced in the production process of goods and / or services in an enterprise (industry), in order to have particular skill or competence (Regulation of the Minister of labor and Transmigration No. 22, 2009)..

Function internships for business / industry according to the ILO and APINDO (2015) is to get workers who have skills in accordance with the qualifications required by the business / industry, in

addition to internship this activity to gain the necessary skills to get a job in accordance with skills acquired in internship. Therefore, not a relation employers and job seekers, but the relationship between skill seekers with skills providers who do in the work environment.

#### 4. Strengthening Soft Skills

Build excellence and professionalism in order to enhance the nation's competitiveness is required integrated cultivation soft skills in learning and through extracurricular activities as well as through a healthy school culture. According to Stephen et. Nasir al in (2012), the cultivation an adequate soft skills will form a strong character so that it has the ability to compete on a regional scale and global scale. Trilling, et al (2009) suggested the mastery of 21st century skills rainbow that will guarantee a successful life and career, see Figure 4.



**Figure 4.** The 21<sup>st</sup> Century Knowledge and skills Rainbow

The role of soft skills are so important in the 21st century that has equality with understanding of content. The phenomenon will happen, if the person who only understanding the content but not overwhelm the ability of soft skills, it is difficult to have the ability to compete. At least vocational students to be able to compete need to be cultivated to strengthen the ability of learning and innovation skills that include: creativity, innovation, critical thinking, problem solving, communication, and collaboration.

#### 5. Ministry of Public Work and House

Ministry of Public Works and House, constitutionally is the institution responsible for the development of construction services (Ministry of Public Works, 2011). Related to human resource development in the field of construction, the Construction Development Agency of Ministry of Public Works and House also got the mandate of Law No. 13/2003 on Manpower in Article 18 that the construction workforce training and competency recognition. In addition, Law No. 20/2003 on the National Education System Article 61 mandates that the recognition of the competence of the construction workforce is evidenced by issuing a certificate of competency.

In order to carry out the mandate of the laws and regulations, the government issued Presidential Regulation No. 24 Year 2010 on Positions, Duties, and Function of State Ministries and the Organizational Structure, Duties, and Function of Echelon of State Ministries have formed a new body in the Ministry of Public Works under the name Development Agency construction led by a Head of



Echelon I level and is equipped with an organizational structure consisting of the Secretariat of the Agency, centers construction Development, and equipped with a facilities as a technical implementation unit.

And based on the Minister of Public Works regulation No. 08 / PRT / M / 2010 on the Organization and Administration of the Ministry of Public Works, Construction Development Agency has the task of carrying out development of construction, among others: (1) Preparation of technical policies, plans and programs of development of construction and investment in infrastructure includes business and institutional, implementation of construction, investment resources and competency and training in construction; (2) The guidance includes business and institutional construction, implementation of construction, investment resources and competency and training in construction; (3) The monitoring, evaluation, and reporting on the implementation of construction and development of infrastructure investment include enterprises and institutions, implementation of construction, investment resources and competency and training in construction; and (4) The administration of Construction Development Board.

In his duties as policymakers, monitoring, and evaluating the implementation of the promotion and development of construction services Ministry of Public Work and House needs to synergize with directorate of vocational high school and construction services to create construction services of competent human resources and standardized, especially at the level of skilled workers. The actions that can be done in this synergy is to create a device certification system for vocational graduates construction services involving Construction Services Development Board and the National Professional Certification Board, so that later graduates have vocational skills in accordance with the National Competence Indonesia construction services.

In 2016, Directorate of Vocational High School and Ministry of Public Works and House agree to prepare 200 vocational high schools become Professional Certification Agency First Party (LSP-P1), and to support the preparation of LSP-P1 is the Ministry of Public Works and House also prepared 600 assessors to assist LSP-P1 (Directorate of Vocational High School , 2016). In addition to setting up a Professional Certification Agency (LSP) The Ministry of Public Works and house should facilitate the implementation of the Job Internship or Practice for the whole vocational high school in government projects.

In addition the Ministry of Public Works and House needs to create a policy aimed at the business / industrial construction services which refers to the development of vocational graduates qualified construction field. As for policies that can be applied, among others: (1) issuing a policy requiring workers with the same level of skilled workers (foreman, draftsman, technicians survey mapping, etc.) working in a company or project must be certified (a certified skills); (2) issuing a policy requiring the business / industrial construction services provide space for vocational students to carry out internships at the company; (3) issuing a policy requiring the business / construction industry

to take back apprentices who have completed vocational education, and has been certified skills to work.

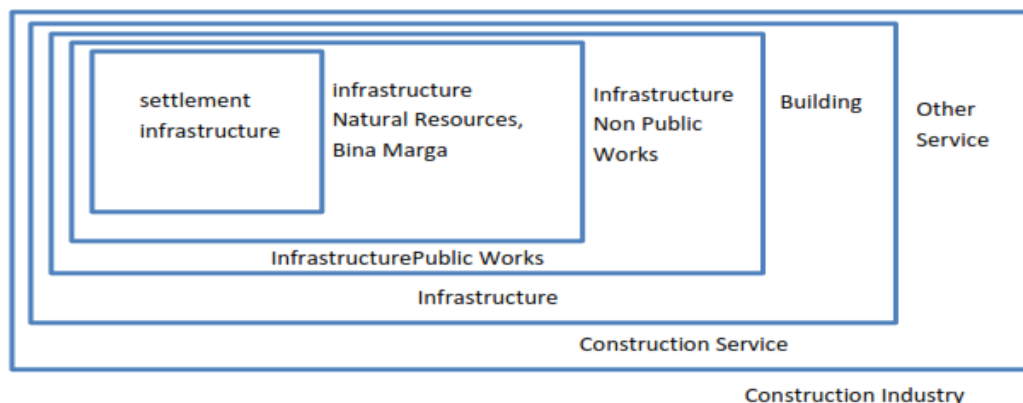
6. Institutions Development Construction Services (IDCS/LPJK)

Act NO. 18/1999 on Construction Services workers who carry out the work as the planning, implementation and supervision of the construction must have a certificate or expertise and work skills. Institutions Development Construction Services (IDCS/LPJK) has several roles and functions as follows: (1) provide the role of the status of equivalence certificate of membership of foreign workers and foreign business entities, (2) to supervise the implementation of a certification system on Unit Certification including LSP-P1 is being prepared by cooperation of the Directorate of vocational high school with Ministry of Public Works and House , (3) monitor and evaluate the performance of the units of certification, (4) providing advice to Ministry of Public Works and House in the development of construction services, and (5) various coaching duties of the Agency for Construction services and labor services construction.

In connection with the role and function of the IDCS, Directorate of Vocational High School need to cooperate with IDCS to conduct training and synchronization areas of expertise and competence of Indonesia National Competence (INC) translated into the curriculum. This cooperation is important to have a systematic in giving direction that will produce effectiveness and efficiency of vocational Engineering Program Building, before graduates are certified through the LSP-P1. Given the strategic role of IDCS as well as the developer institutes Enterprises Construction Services, collaboration with IDCS a bridge to channel directly vocational graduates who have got the certification of skilled workers through the LSP-P1. Cooperation with IDCS becomes important because it has the authority and role in the development and workforce development construction services. According to Tatang (2015), IDCS have done MoU with National Agency for Professional Certification (NAPC) in harmonizing the development of competency standards, certification schemes competence, coordination with other countries, carry out Indonesia National Competence Plan verification and certification of skills and expertise in construction services performed IDCS.

7. Construction Services Association

Construction services is an industry cluster that includes infrastructure and buildings, see Figure



**Figure 5.** Cluster Construction Service (Source: Ministry of Public Work, 2011)



Construction services have a role end of a building or physical shape in the form of facilities and infrastructure that support the growth and development of various fields, particularly economic, social and cultural to realize a just and prosperous society that is equitable material and spiritual, based on Pancasila and the Constitution 1945 (Ministry of Public Works, 2011).

In an effort to enhance the optimal role in the construction services cluster in Indonesia's development required the organization as a forum coaching members, together with the government and other stakeholders. Indonesia has been established in a number of Construction Services Association National Level are eligible Regulation of the Minister of Public Works No. 51 / PRT / M / 2015. Association of construction company has been growing with a total of 13 institutions and totaled 118 institutions at the provincial level. For example GAPEKSINDO (Association of Construction Services Indonesia) in East Java Province has a membership of more than 1400 construction services companies.

In preparing a skilled workforce ready to work in construction services, required tri-partite cooperation between the Directorate Vocational High School, IDCS, and the Association of Construction Services. Cooperation with the Association of Construction Services is a strategic effort to prepare vocational graduates Engineering Program Building ready to work.

### **III. CONCLUSION**

To solve the problem in the implementation of vocational high school and in order to improve the competitiveness of vocational high school to produce graduates who are ready to work the way administration required the development of vocational high school. Providing vocational development of governance ranging from the input, process and output as well as certification through the implementation of the LSP-P1 untuk obtain certification of skilled construction personnel need effective support from the various components of the work and cooperation with various stakeholders. The main process in the implementation of vocational high school refers eight National Education Standards in accordance with Government Regulation No. 19 of 2005 which include: Graduates Competency Standards, Content Standards, Standard Process, Education Standards and Teachers, Infrastructure Standards, Standards Management, Standard Funding Education, and Standards assessment. The main process continued with graduate certification process to obtain certification of skilled construction workers as a condition of weeks to work on company services, construction company and consultants.

The process for implementing of effective and efficient vocational high school in order to prepare skilled workers ready to work needs to be done support the process of the implementation of vocational high school to establish a school culture including: cooperation with industry, intensive internship, teaching factory, strengthening the skills necessary 21st century through the development of soft skills (creativity , innovation, critical thinking, problem solving, communication, and collaboration), supported the regulation of Ministry of Public Work and House, Construction Services Development Institute, and the Association of Construction Services.





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## STUDY ON MARINE CURRENT WITH APPROACH OF A NUMERICAL MODEL FOR MARINE CURRENT POWER PLANT IN THE BANGKA STRAIT NORTH SULAWESI

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**ABSTRACT :** *Study on marine current with approach of a numerical model or marine current power plant (PLTAL) in the Bangka strait North Sulawesi has been investigated. Construction of power plant is needed to overcome the shortage of electricity in North Sulawesi. Before building the electrical energy it would require a feasibility study which aim to ensure the certainty of the construction of power plant. One of them is through the study of marine currents in the design of a numerical model. The objective of this investigates for long-term is to get a profile of marine current turbines as one component in the construction of marine current power plant in the Bangka strait. Specific targets to achieve are to get the first; data such as tide, sea water and air temperature on the surface, the wind speed above sea level, a map of the Bangka Strait and bathymetry, the second; a design of numerical model. The method used was initially literature study, survey in the research location, measurements of data such as tide, temperatures of sea water and the air above the surface, wind speed above sea level, bathymetry of the Bangka strait, finally are the analysis of data measurements and design of a numerical model in the form of numerical program. The results showed that the numerical program will be a product in analyzing potential kinetic energy as the prime mover of turbines for marine current power plant in the Bangka strait. These analyzes could be used in developing entrepreneurship pedagogy in the business of electrical energy production on vocational education and partnerships between the state electricity company and educational institution of educators in technological and vocational education for the development of vocational education.*

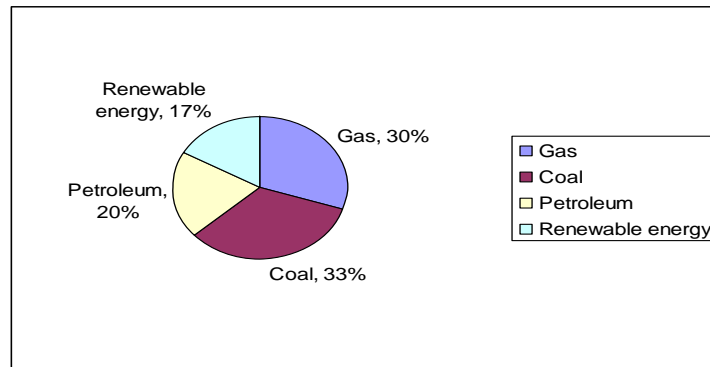
**Keywords:** ocean current, numerical model, marine current turbine, PLTAL

### I. INTRODUCTION

Availabilities of basic infrastructures such as water resources, roads; street basic facilities, bridges, land transportations, river transportations, crossing places and lakes, air transportations, electricity power, telecommunications, residents and houses, water, sanitation, waste treatment, drainage, waste and other medium facilities. The basic infrastructure is extremely required to accelerate local development and as core forced the investors.

Development of electricity power plant is a part of a whole development in North Sulawesi because the electricity consumption would go up along with the increasing of public activity and a prosperous people (as the economy has grown rapidly in North Sulawesi the last years, so has the demand for electricity). Public utilizes electricity for many purpose such as household requirement as well as economics trade. Therefore supplying adequate amount of electricity and existence of continuities electricity power should help to maintain conducive social and economic activity, and to motivate public economic growth. When the electricity is insufficient, the electricity power will be put out to balance the supply for consumer. Putting out of electricity has been occurring several times in North Sulawesi, this case has influenced by the development and investment.

President Regulation No. 5 Year 2006 on National Energy Policy.<sup>18)</sup>, in 2025 (see figure 1) composition usage of national energy will become petroleum of 20 %, gas of 30 %, coal of 33 %, and renewable energy of 17 % such as bio fuel of 5 %, geothermal of 5 %, alternative energy (biomass, nuclear, hydro, solar cell, wind, and marine current) of 5 %, and coal liquefaction of 2 %.



**Figure 1.** National energy mix in 2025

Marine current energy is a good prospect for Indonesia regions. Because of Indonesia has many strait and islands that has been affected by the interaction of earth-moon-sun natural acceleration. Moreover, Indonesia are the place meeting of resulted sea current which tide constantan of M2 the dominanttness in Indian Ocean with period around 12 hour of constantan ebb of K1 the dominanttness in Pacific Ocean with period is more or less than 24 hour. M2 is tide constantan that affected by motion Moon of encircling Earth; while K1 is resulted by tide constantan skewness of orbit Moon of moment encircle Earth. Interaction of earth-moon estimated to yield energy of energy tide current which every day equal to 3.17 TW, a few bigger from attached power station capacities in all the world in the year 1995 equal to 2.92 TW.<sup>11)</sup> But, for the region of Indonesia, the capacities of the marine current energy have not yet to predict.

According to Fraenkel, P.L.<sup>8)</sup> that the ideal locations for power station installation of the current energy have velocities of current two directions (minimum bidirectional) 2 m/s. The ideal is 2.5 m/s or more. One way (river/current of geotropic) is minimum 1.2-1.5 m/s. The deepness not less than 15 m and the most at 40 or 50 m. Close to coast so that energy can be channeled with low expense. They have add for wide that more than one turbine can be attached, not sea transport and the fish arrest area.

Construction of power plant is needed to overcome the shortage of electricity in North Sulawesi. Before building the electrical energy it would require a feasibility study which aim to ensure the certainty of the construction of power plant. One of them is through the study of marine currents in the design of a numerical model. The objective of this investigates for long-term is to get a profile of marine current turbines as one component in the construction of marine current power plant in the Bangka strait. Specific targets to achieve are to get the first; data such as tide, sea water and air temperature on the surface, the wind speed above sea level, a map of the Bangka Strait and bathymetry, the second; a design of numerical model.



The Bangka strait is a small strait which has many potential that is not only the sea garden in the underwater with many multifarious sea animals of type manner and the corals but also marine current occurring at depth mean of 40 m such tides and tidal currents that occurring every day for the exploiting of energy. It is located between the Pacific Ocean and the Sulawesi Sea (Celebes Sea). In its Westside, near Likupang Town there is a large bay with lots of sea grasses (Figure 2.1). Also, it is the largest of the five islands around it where seawater flows from the Pacific Ocean to the Indian Ocean (Indonesian Throughflow) through it. The water moves through the Sulawesi Sea to the Makassar Strait, bringing with it enough nutrients to support a large fish and marine mammal population. Region around the Bangka Islands is one of the migratory paths of these giant mammals. This migration has only recently been studied but the research already turning up some fascinating information.

Currents in the Bangka strait are very influenced by the global surface current system<sup>4,21)</sup> and Indonesian throughflow.<sup>14,15,20,22)</sup> Despitefully, more special again influencing by current variability at the Pacific entrance of the Indonesian throughflow.<sup>12)</sup> and currents in the Celebes and Maluku Seas.<sup>13)</sup> The role of tides and tidal currents is very important in the Bangka strait current circulation.

The located of the Bangka strait on course from 125°04'40"E until 125°11'18"E and from 1°41'25"N until 1°44'03"N which encircled by the islands of Talise and Kinabuhutan in northwest, the islands of Gangga, Tindila, and Lehaga in west, the southwest Pacific ocean and Maluku sea in east, and the island of Sulawesi (town of Likupang) in south (see figure 2). The Island of Bangka located on course from 125°06'48"E until 125°11'18"E and from 1°44'03"N until 1°50'46"N with the maximum height of sea level.<sup>10)</sup> (elevated) equal to 239 m which abut on the island of Biaro and the sea of Sulawesi North side, the island of Kinabahutan North side West, the island of Gangga and the sea of Sulawesi Westside, the island of Sulawesi (town of Likupang) Southside, and Ocean of Pacific Eastside. The station of the measurement of tides is located western the Bangka strait (TS).

The governing equation of three-dimensional, primitive variable equations describing constant density which is not account temperature and salinity, free surface flows in the Bangka strait can be derived from the Navier-Stokes equations after time averaging and under the simplifying assumption that the pressure is hydrostatic. The Navier-Stokes equations, the cornerstone of all fluid mechanics, are, after all, only a form adapted to the fluids of fundamental relation of dynamics. The vast literature published since shows at the same time the importance of these equations in numerous scientific areas and their difficulty due in particular to the phenomenon of turbulence. At the beginning of the third millennium, we still do not know, except in some special case, if these equations admit regular solutions.<sup>9)</sup>



**Figure 2.** Location of the Bangka strait in Indonesia and numerical area Under the assumptions of hydrostatic pressure, and by using the decomposition of preceding Reynolds, the realized average Navier-Stokes equations are written.<sup>3)</sup>:

*Continuity equation*

$$\frac{\partial \bar{u}}{\partial x} + \frac{\partial \bar{v}}{\partial y} + \frac{\partial \bar{w}}{\partial z} = 0 \quad (1)$$

*Momentum equation*

$$\frac{\partial \bar{u}}{\partial t} + \bar{u} \frac{\partial \bar{u}}{\partial x} + \bar{v} \frac{\partial \bar{u}}{\partial y} + \bar{w} \frac{\partial \bar{u}}{\partial z} = -g \frac{\partial \eta}{\partial x} + \text{div}(\nu_{\text{eff}} \overrightarrow{\text{grad}}(\bar{u})) + f_{\text{cor}} \bar{v} \quad (2)$$

$$\frac{\partial \bar{v}}{\partial t} + \bar{u} \frac{\partial \bar{v}}{\partial x} + \bar{v} \frac{\partial \bar{v}}{\partial y} + \bar{w} \frac{\partial \bar{v}}{\partial z} = -g \frac{\partial \eta}{\partial y} + \text{div}(\nu_{\text{eff}} \overrightarrow{\text{grad}}(\bar{v})) - f_{\text{cor}} \bar{u} \quad (3)$$

*Free surface equation*

$$\frac{\partial \eta}{\partial t} + \frac{\partial}{\partial x} \left( \int_{-h}^{\eta} \bar{u} dz \right) + \frac{\partial}{\partial y} \left( \int_{-h}^{\eta} \bar{v} dz \right) = 0 \quad (4)$$

where  $\nu_{eff}$  is an effective diffusion taking of account turbulent viscosity and dispersion,  $\nu_{eff} = \nu + \nu_t$ .

This effective diffusion is given by means of a model of turbulence adapted to the problem considers.

The equations 1 to 4 will be those considered in the continuation of the report.

Power is just energy divided by time, so the power available from the seawater current can be expressed as.<sup>1,2,7,16,17,24</sup>,

$$P = \frac{E_k}{dt} = \frac{1}{2} \rho \cdot v^3 \cdot A \quad (5)$$

where  $P$  is the power available from the seawater current in Watt.

In this study we will calculate *the power of marine current* in the Bangka strait per unit cross-sectional area ( $m^2$ ), thus, from equation 5 we can be obtain:

$$P_A = \frac{P}{A} = \frac{1}{2} \rho v^3 10^{-3} \quad (6)$$

where  $P_A$  is the power per cross-sectional area in  $kW/m^2$  and  $v$  is the velocity resultant of marine current that defined as  $v = \sqrt{\bar{u}^2 + \bar{v}^2 + \bar{w}^2}$  with  $\bar{u}$ ,  $\bar{v}$  and  $\bar{w}$  respectively are scalars of the velocities  $\bar{u}$ ,  $\bar{v}$  and  $\bar{w}$  respectively, and  $\rho = 1024 \text{ kg/m}^3$  (at 20 C and salinity of 34).<sup>19)</sup>

Semi-implicit finite difference method for the numerical solution of the three-dimensional equations 1 to 4 was used by Casulli, V. & Cheng, R.T.<sup>5)</sup>, Stansby, P.K.<sup>23)</sup>, and Chen, X.<sup>6)</sup> in the computation of shallow water flows. The equations 1 to 3 will be derived in which the gradient of surface elevation in the momentum equations and the velocity in the free surface equation 4 will be discretized implicitly. The convective, Coriolis and horizontal viscosity terms in the momentum equations will be discretized explicitly, but in order to eliminate a stability condition due to the vertical eddy viscosity, the vertical mixing terms will be discretized implicitly.

A general semi-implicit discretization of the momentum equations in 2 and 3 can be written into form as<sup>5)</sup>:

$$\begin{aligned} \bar{u}_{i+1/2,j,k}^{n+1} = & (F\bar{u})_{i+1/2,j,k}^n - g \frac{\Delta t}{\Delta x} (\eta_{i+1,j}^{n+1} - \eta_{i,j}^{n+1}) \\ & + \Delta t \frac{V_{k+1/2} \frac{\bar{u}_{i+1/2,j,k+1}^{n+1} - \bar{u}_{i+1/2,j,k}^{n+1}}{\Delta z_{i+1/2,j,k+1/2}} - V_{k-1/2} \frac{\bar{u}_{i+1/2,j,k}^{n+1} - \bar{u}_{i+1/2,j,k-1}^{n+1}}{\Delta z_{i+1/2,j,k-1/2}}}{\Delta z_{i+1/2,j,k}}, \end{aligned} \quad (7)$$

$$\begin{aligned} \bar{v}_{i,j+1/2,k}^{n+1} = & (F\bar{v})_{i,j+1/2,k}^n - g \frac{\Delta t}{\Delta y} (\eta_{i,j+1}^{n+1} - \eta_{i,j}^{n+1}) \\ & + \Delta t \frac{V_{k+1/2} \frac{\bar{v}_{i,j+1/2,k+1}^{n+1} - \bar{v}_{i,j+1/2,k}^{n+1}}{\Delta z_{i,j+1/2,k+1/2}} - V_{k-1/2} \frac{\bar{v}_{i,j+1/2,k}^{n+1} - \bar{v}_{i,j+1/2,k-1}^{n+1}}{\Delta z_{i,j+1/2,k-1/2}}}{\Delta z_{i,j+1/2,k}}, \end{aligned} \quad (8)$$

where  $\Delta z_{i+1/2,j,k}$  and  $\Delta z_{i,j+1/2,k}$  are in general the thickness of the  $k^{\text{th}}$  water layer more simply denoted by

$\Delta z_k$ .

Then, equations 7 and 8, we can be written in the compact matrix form as:

$$\mathbf{A}_{i+1/2,j}^n \mathbf{U}_{i+1/2,j}^{n+1} = \mathbf{G}_{i+1/2,j}^n - g \frac{\Delta t}{\Delta x} (\eta_{i+1,j}^{n+1} - \eta_{i,j}^{n+1}) \Delta \mathbf{Z}_{i+1/2,j}^n \quad (9)$$

$$\mathbf{A}_{i,j+1/2}^n \mathbf{V}_{i,j+1/2}^{n+1} = \mathbf{G}_{i,j+1/2}^n - g \frac{\Delta t}{\Delta y} (\eta_{i,j+1}^{n+1} - \eta_{i,j}^{n+1}) \Delta \mathbf{Z}_{i,j+1/2}^n \quad (10)$$

where  $\mathbf{U}$ ,  $\mathbf{V}$ ,  $\Delta \mathbf{Z}$ ,  $\mathbf{G}$  and  $\mathbf{A}$  are defined as:

$$\mathbf{U}_{i+1/2,j}^{n+1} = \begin{bmatrix} \bar{u}_{i+1/2,j,M}^{n+1} \\ \bar{u}_{i+1/2,j,M-1}^{n+1} \\ \bar{u}_{i+1/2,j,M-2}^{n+1} \\ \vdots \\ \bar{u}_{i+1/2,j,m}^{n+1} \end{bmatrix}, \quad \mathbf{V}_{i,j+1/2}^{n+1} = \begin{bmatrix} \bar{v}_{i,j+1/2,M}^{n+1} \\ \bar{v}_{i,j+1/2,M-1}^{n+1} \\ \bar{v}_{i,j+1/2,M-2}^{n+1} \\ \vdots \\ \bar{v}_{i,j+1/2,m}^{n+1} \end{bmatrix}, \quad \Delta \mathbf{Z} = \begin{bmatrix} \Delta z_M \\ \Delta z_{M-1} \\ \Delta z_{M-2} \\ \vdots \\ \Delta z_m \end{bmatrix},$$

$$\mathbf{G}_{i+1/2,j}^n = \begin{bmatrix} \Delta z_M (F\bar{u})_{i+1/2,j,M}^n + \Delta t \tau_x^w \\ \Delta z_{M-1} (F\bar{u})_{i+1/2,j,M-1}^n \\ \Delta z_{M-2} (F\bar{u})_{i+1/2,j,M-2}^n \\ \vdots \\ \Delta z_m (F\bar{u})_{i+1/2,j,m}^n \end{bmatrix}, \quad \mathbf{G}_{i,j+1/2}^n = \begin{bmatrix} \Delta z_M (F\bar{v})_{i,j+1/2,M}^n + \Delta t \tau_y^w \\ \Delta z_{M-1} (F\bar{v})_{i,j+1/2,M-1}^n \\ \Delta z_{M-2} (F\bar{v})_{i,j+1/2,M-2}^n \\ \vdots \\ \Delta z_m (F\bar{v})_{i,j+1/2,m}^n \end{bmatrix}$$

$$\mathbf{A} = \begin{bmatrix} \Delta z_M + \frac{(v_{eff})_{M-1/2} \Delta t}{\Delta z_{M-1/2}} & \frac{-(v_{eff})_{M-1/2} \Delta t}{\Delta z_{M-1/2}} & & & 0 \\ \frac{-(v_{eff})_{M-1/2} \Delta t}{\Delta z_{M-1/2}} & \Delta z_M + \frac{(v_{eff})_{M-1/2} \Delta t}{\Delta z_{M-1/2}} + \frac{(v_{eff})_{M-3/2} \Delta t}{\Delta z_{M-3/2}} & \frac{-(v_{eff})_{M-3/2} \Delta t}{\Delta z_{M-3/2}} & & \\ & \vdots & \vdots & \vdots & \\ 0 & & \frac{-(v_{eff})_{m-1/2} \Delta t}{\Delta z_{m-1/2}} & \Delta z_m + \frac{(v_{eff})_{m+1/2} \Delta t}{\Delta z_{m+1/2}} + \frac{g \Delta t \sqrt{(\bar{u}^2 + \bar{v}^2)}}{C_z^2} & \end{bmatrix}$$

Equations 9 and 10 are linear tridiagonal systems which are coupled to the seawater surface elevation  $\eta^{n+1}$  at time  $t_{n+1}$ .

For determine  $\eta_{i,j}^{n+1}$  and for numerical stability, the new velocity field has to satisfy for each  $i,j$  the finite difference analogue of the seawater surface elevation equation 4, we can be written in the compact matrix form:

$$\eta_{i,j}^{n+1} = \eta_{i,j}^n - \frac{\Delta t}{\Delta x} [(\Delta \mathbf{Z}_{i+1/2,j})^T \mathbf{U}_{i+1/2,j}^{n+1} - (\Delta \mathbf{Z}_{i-1/2,j})^T \mathbf{U}_{i-1/2,j}^{n+1}] - \frac{\Delta t}{\Delta y} [(\Delta \mathbf{Z}_{i,j+1/2})^T \mathbf{V}_{i,j+1/2}^{n+1} - (\Delta \mathbf{Z}_{i,j-1/2})^T \mathbf{V}_{i,j-1/2}^{n+1}] \quad (11)$$

Finally, the vertical component of the velocity  $\bar{w}$  at the new time level can be discretized from the continuity equation 1 becomes:

$$\bar{w}_{i,j,k+1/2}^{n+1} = \bar{w}_{i,j,k-1/2}^{n+1} - \frac{\Delta z_{i+1/2,j,k}^n \bar{u}_{i+1/2,j,k}^{n+1} - \Delta z_{i-1/2,j,k}^n \bar{u}_{i-1/2,j,k}^{n+1}}{\Delta x} - \frac{\Delta z_{i,j+1/2,k}^n \bar{v}_{i,j+1/2,k}^{n+1} - \Delta z_{i,j-1/2,k}^n \bar{v}_{i,j-1/2,k}^{n+1}}{\Delta y} \quad (12)$$





where  $k=m, m+1, \dots, M$ , and the no-flux condition across the bottom boundary is assumed by taking  $\bar{w}_{i,j,m-1/2}^{n+1} = 0$ .

The available energy that investigated in this study is the available power per  $m^2$  ( $\text{kW}/m^2$ ). The first, we will back at the equation of the available power which is equation of the marine current power in the Bangka strait can be discretized from equations 6 becomes:

$$P = \frac{1}{2} \rho (v_{i,j,k}^{n+1})^3 \cdot A \quad (13)$$

and the second, we will be little algebra from equation 13 and equation of the marine current power per  $m^2$  in the Bangka strait as follows:

$$P_A = \frac{P}{A} = \frac{1}{2} \rho (v_{i,j,k}^{n+1})^3 10^{-3} \quad (14)$$

where  $P_A$  is the marine current power in the Bangka strait in  $\text{kW}/m^2$  and  $v_{i,j,k}^{n+1} = \sqrt{\bar{u}^2 + \bar{v}^2 + \bar{w}^2}$  is velocity resultant with  $\bar{u} = \frac{1}{2}(\bar{u}_{i,j,k}^{n+1} + \bar{u}_{i+1,j,k}^{n+1})$ ,  $\bar{v} = \frac{1}{2}(\bar{v}_{i,j,k}^{n+1} + \bar{v}_{i,j+1,k}^{n+1})$  and  $\bar{w} = \frac{1}{2}(\bar{w}_{i,j,k}^{n+1} + \bar{w}_{i,j,k+1}^{n+1})$  are scalars, respectively.

## II. RESEARCH METHOD

The research place in the Bangka strait and Faculty of Engineering, Manado State University, Tondano, North Sulawesi since January 2016 until to date. The method used was initially literature study; survey in the research location; measurements of data such as tide (January and February), temperatures of sea water and the air above the surface, wind speed above sea level; bathymetry of the Bangka strait; finally are the analysis of data measurements and design of a numerical model in the form of numerical program. Figure 3 shows steps of a numerical model in calculating the velocities of  $\bar{u}$ ,  $\bar{v}$  and  $\bar{w}$  respectively and the power of marine current in the Bangka strait per cross-sectional area.

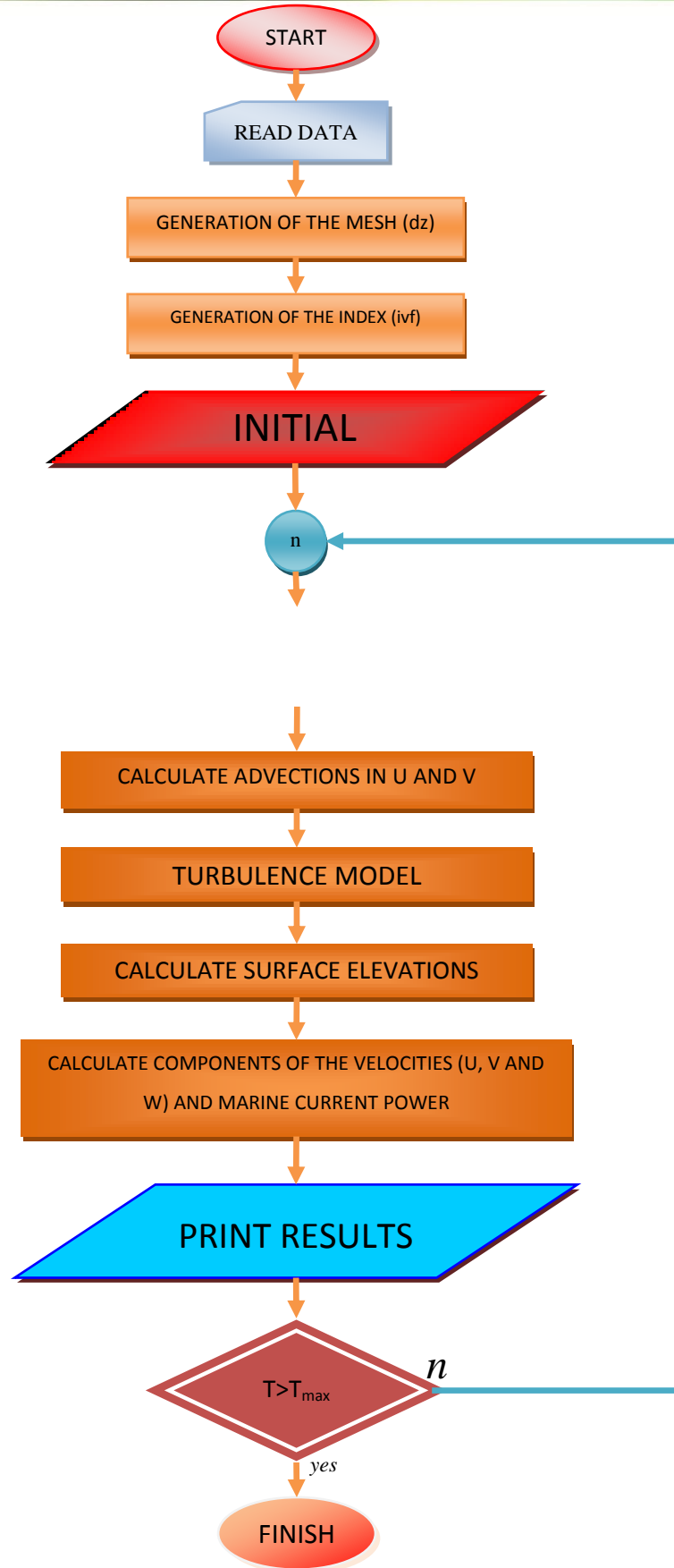


Figure 3. Flow chart of a numerical model

**Table 1.** Numerical Parameter for 3D-Simulations

Parameter	Value	Parameter	Value
$g$	$9.81 \text{ m s}^{-2}$	$\rho_{seawater}$	$1024 \text{ kg/m}^3$
$C_z$	48	$\Delta x$	60 m
$\tau_o$	2 days	$\Delta y$	60 m
$\tau_i$	1 day	$\Delta z$	20 m
Discharge	variable	$\Delta t$	1 sec
$T_{water}$	20 C	$T_{air}$	29 C

In the 3D-simulations, we also have made two types of simulations with four variation of discharge. The first type, we also have conducted when low tide current where each simulation has considerate with constant discharge inside. In second type, when high tide currents with same condition discharge as in first simulations. Parameter of entry discharge we also have made varies from 0.025 Sv to 0.5 Sv with classifications are 0.025 Sv, 0.1 Sv, 0.3 Sv and 0.5 Sv. For the other parameter, we can see in table 1. In calculation of numerical model, no variable of tide to entry because of that calculated by parameter of variable discharge.

Design of a numerical model in the form of numerical program we can see in Figure 2 that show flow chart for solution of a numerical model in calculating the velocities of  $\bar{u}$ ,  $\bar{v}$  and  $\bar{w}$  respectively and the power of marine current in the Bangka strait per cross-sectional area.

### III. RESULTS AND DISCUSSION

The distributions of the available power per  $\text{m}^2$  when low tide currents in the Bangka strait (3D-simulation) showed in figure 4. Discharge influence to the available power is very big where ever greater of discharge then ever greater also power availability like in 2D-simulation. At discharge of 0.025 Sv (a) shows that there are about  $1.5\text{-}5 \text{ W/m}^2$  available in around section A (see figure 2), whereas  $50\text{-}350 \text{ W/m}^2$  at 0.1 Sv (b),  $2\text{-}10 \text{ kW/m}^2$  at 0.3 Sv and at 0.5 Sv available of  $10\text{-}45 \text{ kW/m}^2$  which is maximum discharge.

Also, when high tide currents in figure 5, we found around section A where the power availabilities per  $\text{m}^2$  are maximal. Generally, there are about  $2\text{-}9 \text{ W/m}^2$  at 0.025 Sv (a),  $50\text{-}550 \text{ W/m}^2$  at 0.1 Sv (b),  $2\text{-}16 \text{ kW/m}^2$  at 0.3 Sv (c) and  $10\text{-}77 \text{ kW/m}^2$  at 0.5 Sv power availabilities per  $\text{m}^2$  in the Bangka strait which the values are bigger than in figure 4. We also can see that the two when low and high tide currents in figure 4 and 5 where can be concluded that biggest values are at section A.

The results showed that the numerical program will be a product in analyzing potential kinetic energy as the prime mover of turbines for marine current power plant in the Bangka strait. These analyzes could be used in developing entrepreneurship pedagogy in the business of electrical energy production on vocational education and partnerships between the state electricity company and educational institution of educators in technological and vocational education for the development of vocational education.

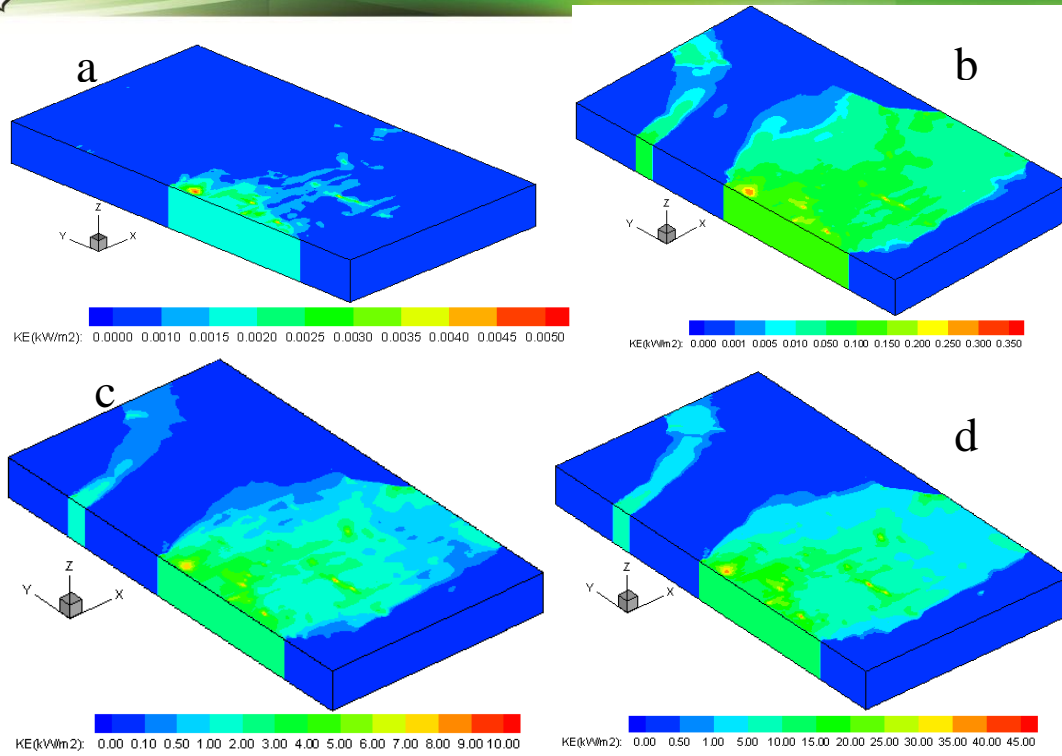


Figure 4. Simulated (3D) distributions of the available power per  $m^2$  at seawater column of 20 m when low tide currents at (a) discharge 0.025 Sv, (b) discharge 0.1 Sv, (c) discharge 0.3 Sv and (d) discharge 0.5 Sv.

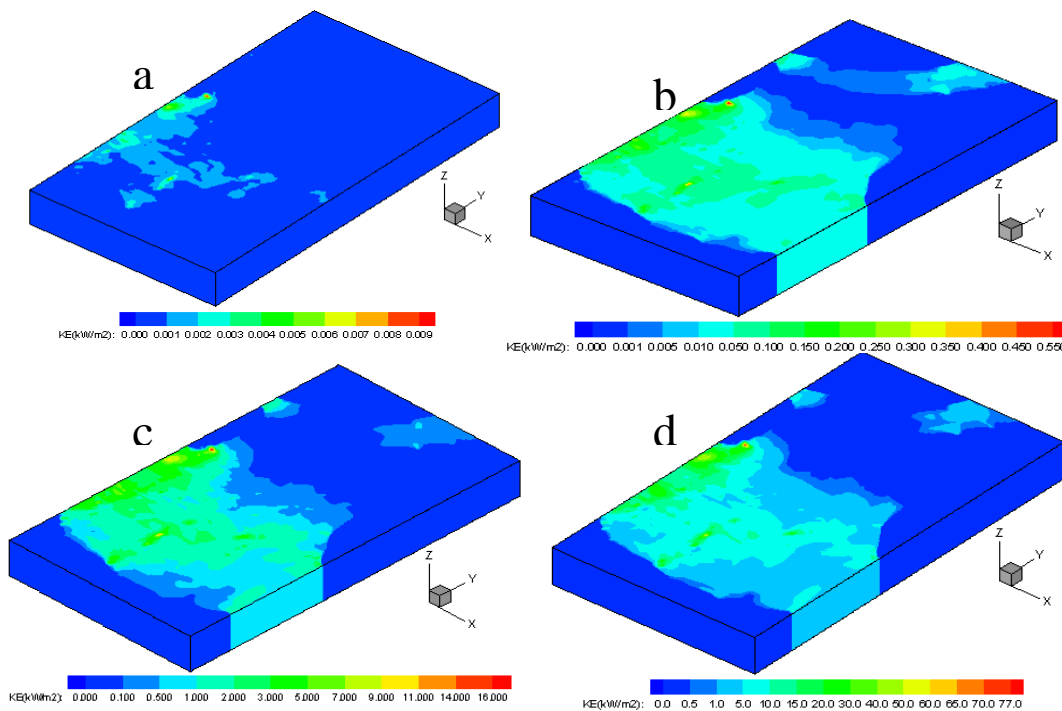


Figure 6.20. Simulated (3D) distributions of the available power per  $m^2$  at seawater column of 20 m when high tide currents at (a) discharge 0.025 Sv, (b) discharge 0.1 Sv, (c) discharge 0.3 Sv and (d) discharge 0.5 Sv.

#### IV. CONCLUSIONS

The numerical program will be a product in analyzing potential kinetic energy as the prime mover of turbines for marine current power plant in the Bangka strait. When low tide currents, the



available power per  $m^2$  about 50-350 W/  $m^2$  at 0.1 Sv, 2-10 kW/  $m^2$  at 0.3 Sv and at 0.5 Sv available of 10-45 kW/ $m^2$ . When high tide currents, there are about 2-9 W/ $m^2$  at 0.025 Sv, 50-550 W/ $m^2$  at 0.1 Sv, 2-16 kW/ $m^2$  at 0.3 Sv and 10-77 kW/ $m^2$  at 0.5 Sv. These analyzes could be used in developing entrepreneurship pedagogy in the business of electrical energy production on vocational education and partnerships between the state electricity company and educational institution of educators in technological and vocational education for the development of vocational education.

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E-04-009

## STUDY DESCRIPTIVE ABOUT STUDENT'S VOCATIONAL INTEREST AND THEIR PARENT'S OCCUPATION

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**ABSTRACT :** Past research and daily observation on unive interest were often similar with their parents occupation. The present research aimed to examine this phenomenon in high school students who were on their way to choose their vocational interest. The objective of this research was to describe parents' occupation.informTherefore,thestudenttoknow abouttheir inventoriedresult can vocational interest and also inform the parents and teachers about their role in their children/students' vocational interest developm recruited by simple random sampling method. A quantitative approach was used to make descriptive inferences about vocational interest which was measured by Rothwell Miller Interest Blank (RMIB) Test, parents' occupation questio measured. The result showed that most of the students chose scientific and medical categories as their vocational interest. On the other hand outdoor, practical and mechanical categories were the least preferable vocational interest. Furthermore, most of the father's occupations were tradesman, while most of the mothers were housewife and employee. There were only a few students who have similarity between their vocational interests with their parents' Finally, we concluded that parents' occupation mewereinformatio notforstudents theto pri develop their own vocational interest.

**Key words:** Vocational Interest, Rothwell Miller Interest Blank Test, Occupation.

### I. INTRODUCTION

Teens are a period of transition from childhood into adulthood. This period known as a time of emotional upheaval that accompanied the rapid physical growth and psychological growth. Erikson (1968, in Santrock, 2010) describe that teenagers are in the identity vs. identity confusion phase which is they start to decide who they are and what kind of life that they will have. This means that teenagers will start to make a decision in their own life. As an individual, teenager is following by several development tasks. According to Duvall (1977), some of their tasks are become an independent individual and start to think like an adult, try to face their problem and solve it based on the principle and experienced that they already had, and preparing their self to choose their career by deciding the major that they will take in university based on their interest, ability and opportunity.

Along with their development tasks, career choice used to be a common topic in the family of teenagers. This process start from finding the thing that they like or we can call it their vocational interest. The development of interest was begun since they were young. Basic drive that influences the Vocational interest was curiosity. This curiosity will fulfill by doing exploration, which was an important activity that happen in career development (Super, 1990, 1994; Savickas, 2002; in Sharf, 2006).

Dariyo (2004) states that deciding vocational interest is a result from individual and environment interaction, so he also said that external factor also have an important role in



development of vocational interest. The most important factor is their parents. Parents can encourage their teenager by showing and sharing that they really like their job (Hargrove, Creagh, & Burgess 2003 in Santrock, 2010). Parents are the social group th personality. Every type parental styles are very influencing an interest of an individual (Sadolikar, 2012).

Beside that, occupations that their parents have also take some role in teenagers' decisio According to Harris & Robert (1987), children because of that children have something in common with their parents, such as in their ability, talent, and also personal characteristic, so that the similar occupation will suit their children. Super (1976 in Herr and Cramer, 1992) states that occupation is a valuable activity by one self, directed and consecutive. It requires the expenditure of efforts and it may be compensated (paid work) or uncompensated (volunteer). The objective may be intrinsic enjoyment of work itself, the structure given to live by the work role, the economic support which work make possible or the type of leisure which it facilities.

Young (in Santrock, 2010) states that parents who love their occupation will encourage their children to do the same occupation with them. Its happen when teenagers learn the value that including cupationin parent'sandtheteenagerswillocalso like that occupation unconsciously. This phenomenon recorded in the daily life and interview with some college students that have chosen their vocational interest by deciding the major in college. It showed that there are similarity between the vocational interestch of s will try to prove that this theory also happen to the students who still deciding their interest. So the research takes place in SMA N 3 Padang, while the students still deciding their own interest. There are 238 students that participated in filling the questionnaire. The questionnaire consists of their expressed interest and the occupation that their parents have. And the result is only 77 (32 per Cent) students who have the same or similar interest with their parents. The differences between the past research and the actual things that happen today make the researcher want to know more about the description of vocational interest of student and their parents' occupation by measured the student inven

## **II. RESEARCH METHODS**

A quantitative approach was used to make descriptive inferences about vocational interest, which in this research will be carried out analysis of collected data as it is without intending to make conclusions or generalizations apply to the public (Sugiyono, 2006). So, from this research will be known the description about vocational interest

### **1. Participant**

The participants in this research were third grade student of SMA N 3 Padang with range of age between 16-17 years old. 154 participants were recruited by simple random sampling method,

### **2. Measurement**

Vocational interest was measured by using an interest tool which was Rothwell Miller Interest Blank (RMIB) test, and for the type of parents occupation by using a questionnaire that consist of their





demographic data, last education occupation. Besides that, the interview method also uses to measure the stereotype that students have about occupation's category.

### III. RESULT

Based on the analysis of data, this research discovered that:

1. The majorities of vocational interests that students have are Scientific and medical, while the least favorite were outdoor, practical and mechanical categories.
2. The majorities of father's occupation were housewives and employee.
3. Only a few students have a similarity between vocational interest and the types of occupations that are owned by the parent.
4. It is different from the past research; the type of parent's occupation was source that students have to consider their vocational interest. This research found that the other factors such as school environment an important role and in considering their vocational interest.

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A-04-010

## DEVELOPING INTERNSHIP PROGRAM

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**ABSTRAK :** *This paper is discusses about internship for vocational student in civil engineering department. Internship program was done on 7<sup>th</sup> semester, with 2 credit semester unit. Tim of student contain 2 till 4 persons took the internship for 420 hours at contractors which is hired for constructing work. After finishing the report, each student present the paper in small seminar as final examination. The results of participant observation internship program in odd semester of 2015/2016 showed a number of students that the completion of the internship program as long as 1 semester by 16% of the total number of students, 2 semester is done by 43% of the total number of students, three semesters is done by 37% of the total number of students, 4 semester is done by 4 % of the total number of student. The internship program were: material building in 2nd semester; element structure in 4th semester, and management in 6th semester. The student program may take internship at contractor, material building factory, asphalt batching plant, concrete batching plant, or depend on the supervisor.*

**Key words:** Internship

### I. INTRODUCED

Surabaya State University as one of the universities contribute prepare human resources to excel in the field of science and technology. Law of the Republic of Indonesia number 12 of 2012 on Higher Education states that higher education as part of the national education system has a strategic role in the intellectual life of the nation and advance science and technology by observing and applying the value of the humanities as well as the cultivation and empowerment of Indonesia sustainable. Furthermore, an article of 5 paragraph (a) by Law explained that the purpose of higher education to develop students' potential to become a man of faith and piety to God Almighty and noble, healthy, knowledgeable, skilled, creative, independent, skilled, competent and cultured for interests of the nation.

Surabaya State University graduates were expected to implement, develop, create science and technology and art. The educational program at the State University of Surabaya aims to produce graduates who have the characteristics, among others (Anonymous, 2010): (1) The master of science, technology, and art in the field of education or non-educational at levels which are relatively high and can apply it in a professional manner in everyday life in accordance with the needs of the community and national development, (2) master of science, technology, and art in the field of education or non-educational at levels which are relatively high and academically developing and creating science, technology, and new art according to the field expertise for the benefit of everyday people and the needs of national development, (3) have the independence and positive attitude to the work in the field of entrepreneurship and be able to apply in everyday life, so that the graduates can create new jobs and competitive in the market free, (4) have the ability to evolve and adapt actively with various problems and to solve problems of educational and non-educational field. (5) being critical, innovative, dynamic, independent, open, dedicated high morals, and able to work together to develop themselves.

State University of Surabaya effort at education with internship included as a compulsory subject of travel for students of Civil Engineering, study programs in Vocational in Civil Engineering, Diploma courses in Civil Engineering, and Diploma courses Transport. Industrial Practice / Work Practice (PKL) or internship carried out with the cooperation of the business and industrial world. Industrial Practice / Field Work Practice (internship)



aims to make students: 1) improve the skills and ability to apply theory acquired in the course to the practice field, so after graduating better understand the field of employment, 2) identifying the industrial activity, 3) appreciate the management process industry, 4) gain work experience in the industry / company. Empirical experience is expected to bring a positive influence on the process of education and teaching as students, and work after graduation, whether in industry, other institutions or may be in entrepreneurship (Wrahatnolo, Tri et al., 2014).

Subject Field Work Practice weighted second semester credit units (credits) and performed for 400 hours, or 50 working days, with an average working time of 8 hours each weekday (Anonymous, 2015). Subject PI / PKL can be done at the time of the lecture activities on or the holidays end of the semester on the condition that the student has taken the course prerequisites specified in the curriculum of each program of study, namely: (a) Students of the D3 have to take a course over 4 semesters and have achieved 80 credits with Index Point Average (GPA) of at least 2 (b) Students of the SI has been taking courses for 6 semesters and have achieved 120 credits with a GPA of at least 2. (c) Students program the subjects PI / PKL semester ongoing, (d) Students following the debriefing PI / PKL accordance with the schedule organized departments / study programs. (E) Students provide accommodation and transportation costs as appropriate. Internship scheduled at odd semester 4th year study program S1 Technical Education Building and the odd semester 3rd year study program Diploma in Civil Engineering, with a long completion of one semester (Anonymous, 2014).

Internship conducted in various companies in the field of civil engineering or related to civil works, such as contractors, consultants, construction, building materials industry, or government agencies. Ping Zhu and Zhang Lei (2012) states that the company as the application of the latest technology, the collaboration of universities and companies that can yield gains in both parties. Furthermore the University can develop by inviting expert execution of development as an outstanding lecturer, or take advantage of management thinking, can proceed to learning materials, and the company as a place to work.

## II. METHOD

Data were obtained by means of documentation, namely diaries that have been compiled by the internship coordinator in 2013, 2014 and 2015. Data are arranged on behalf of the participants, the old settlement, and information from participants of the internship program. The research data presented in narrative form sentences and pictures.

**Table 1.** Sum of participants internship program

Program studi	Tahun	2013/2014		2014/2015		2015/2016	
		1	2	1	2	1	2
S1	2007		9	0	0	0	
S1	2008		9	8	8	0	
S1	2009		26	15	16	11	
S1	2010		90	39	22	9	8
S1	2011		0	83	78	35	27
S1PPGT	2011		0	26	0	0	
S1	2012		0	0	0	62	34
S1PPGT	2012		0	0	0	32	
S1	2013						56
S1	2014						
<b>Jumlah</b>		<b>0</b>	<b>134</b>	<b>171</b>	<b>124</b>	<b>149</b>	<b>125</b>
D3	2009		2	0	0	0	
D3	2010		18	13	10	0	
D3	2011		15	14	9	7	
D3	2012		0	21	21	21	13
D3	2013		0	0	0	24	20
D3	2014						22
D3	2015						
<b>Jumlah</b>		<b>0</b>	<b>35</b>	<b>48</b>	<b>40</b>	<b>52</b>	<b>55</b>

Some of the questions submitted to the participants of the internship program are: 1) how to get the company where the program ? 2) type of work place practices ?, 3) how long completed job training program in the field?, 4) the role of supervising the field? 5) how the role of supervising the university? 6) How long to complete the report job training program up to a seminar at the university? 7) if the completion time exceeds 1 semester, what obstacles were encountered ?, 8) how the opinion of program participants to eliminate barriers? Data were analyzed by describing the document based on the theory, and references. Additionally interview data for reviews based on the opinions of experts and civil engineering majors development program forward. ,

### III. RESULT AND DISCUSSION

Observations showed that the number of participants of the internship (S1 degree) program as in Figure 1, the number of participants internship even semester of 2013/2014 were 134 participants, 171 participants in odd semester of 2014/2015, even semester 2014/2015 were 124 participants, 149 participants in odd semester of 2015/2016, even semester of 2015 / 2016 were 166 participants. And participants of the internship of diploma (D3 degree) of even semester of 2013/2014 were 35 participants, 48 participants in odd semester of 2014/2015, even semester 2014/2015 were 40 participants, 52 participants in odd semester of 2015/2016, even semester of 2015 / 2016 were 55 participants.

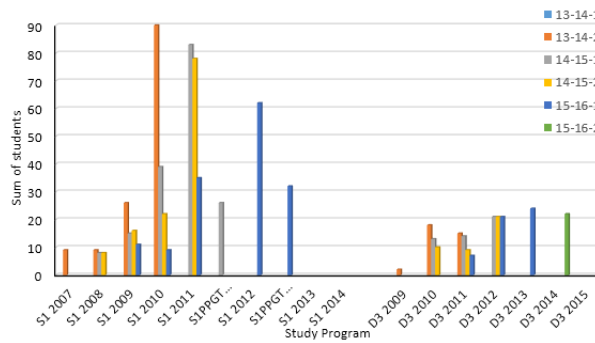


Figure 1. Histogram of Participant

The results of participant observation internship program in odd semester of 2015/2016 showed a number of students that the completion of the internship program as long as 1 semester by 16% of the total number of students, 2 semester is done by 43% of the total number of students, three semesters is done by 37% of the total number of students, 4 semester is done by 4 % of the total number of students, as shown in the following figure.

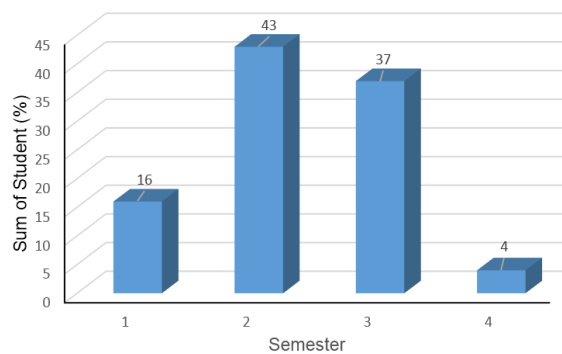
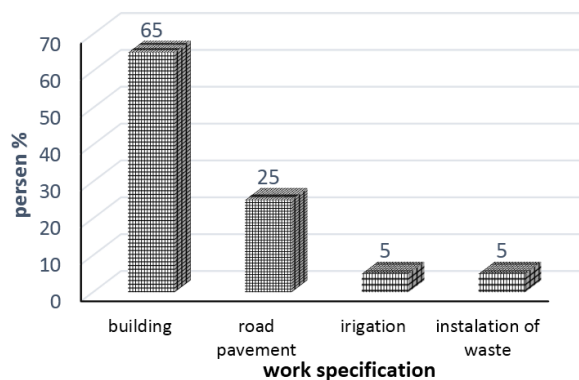


Figure 2. Internship duration in 2015

Data interview participants who completed the internship program during 1 semester by 16% of students showed that the chances of a internship program (contractors) are available and open. Information

obtained student opportunities through former program participants, so the company has received students participating in the program several times. Some construction services company turned out to have been a place of activity internship, because having a job as an example: PT. Wijaya Karya, PT. Duta Rama, and some other contractor companies. Information internship participants stated that the street vendors are managed by PT. Adhi Karya, and PT. Pembangunan Perumahan, etc. the project construction had to wait several weeks for quota participants of the internship program at a job site were still met.

Participants internship program apprentice in the contracting company; Most of the approximately 65% of companies building contractors carrying out the work, 25% in the contracting company carrying out road works, and 5% in irrigation contractors, and the remaining 5% in the contractor performing work sewage treatment plants and others.



**Figure 3.** Work Specification of internship

In general, the internship program in the field completed within 420 hours. Six participants of the internship program flawed finish (400 + 200) hours, because the problems of administration (program participant late to start field activities to the lecturers. Two participants must complete internship in different companies, because of the development work on the first company terminated by the directors of the field.

Writing a report is expected for 2-month internship as internship guidelines. One of 28 students of diploma program in Civil Engineering in 2013 completed a report for two months, followed by a seminar; and 8 of 56 students of study program S1 2012 completed a report two months. Participants completed a report internship program exceeds 2 months, for work on other tasks, such as the plan of concrete, steel structure plan, and thesis. Internship programmed in the 5 semester by students enrolled in civil engineering diploma, and in the 7th semester study program of study program S1. Some students of civil engineering diploma at the time of the internship program was not entirely passed a concrete plan courses, as well as the students of study program. They completed the task internship reports and some other tasks that seem to correspond equally weighted.

Data internship interviews showed that participants communicate with field supervisor once a week, even some of the students admitted to almost daily discussions with field supervisor. Site Manager every day at the job site contractors appointed as supervisor field. High frequencies have a positive impact on the completion of the internship program in the field, in addition to the desire of each participant internship program to complete the task as quickly as possible. Supervising internship at the university declared that is ready to serve the participants once a week. Data interview showed the consultation of participants with the internship supervisor regularly once a week, or once a month, Successful implementation of the internship seems to be resting on the participants. Participants internship are able to strive completed all stages, including: 1) active consultation with



the supervising court and supervising the university, 2) provide time according to the schedule, 3) completing the correction report from counselors, 4) complete the administrative process, and 5) keep in health

Supervising on the field, and at the very role directing a university internship participants. Initial consultations between participants internship with the university supervisor will determine the next steps in the completion of activities. One of the most important is the determination of the topic of the report, as it relates to data collection from the field; For example: on the topic: work concrete columns on the 4th floor, in need of data: work schedules, pictures implementation plan, field preparation, preparation for employment, and the provision of working tools. Supervising the universities play a more active, since the completion of the internship program is conducted entirely by student teams or individuals. The team's success is determined by the individual student or herself and the direction of the supervisor. The success of the internship program is fully achieved if students do referrals supervisor.

Internship program aimed at giving the participants gain experience implementing civil buildings, following the administration process and construction in the field for 400 hours. Internship program implemented during the construction, which is a progress of 25% to 85%. Preparation of implementation of development began in progress 0% to 25%, then the process of completion and fireplace building on the progress roughly 85% to 100%. Data showed that participants carry out the internship program during the execution of construction.

Completion of the internship program implemented in a timely 1 semester can affect the length of study in civil engineering study program. Figure 1 shows that the completion of the internship program for two semesters is done by 43% of participants and 37% of participants accomplishing for 3 semesters. The idea to change the implementation of the internship program emerged as one way to complete the program on time 1 semester internship. Internship program for students of study program S1 was proposed to do on holidays at the last of even semester of the 2nd level, holidays at the last of odd semester the 3rd level, and holidays at the last of even semester of 3rd level; the duration each of three section of internship program were 25 days @ 8 hours or equivalent of 200 hours. The participant was given a certificate that pass the internship program. Participant internship program may take internship at contractor, material building factory, asphalt batching plant, concrete batching plant, or depend on the supervisor.

Internship activities on the first, second, and third is expected to be sustainable, so that the experience of the participants can be reconstructed into a whole series of such objectives internship. Supervision is always needed to determine the condition of participants of internship in the field. Supervision is expected to 2 times in every activity, i.e. early in the field and 2 weeks or 3 weeks in the field, or at the end of the internship in the field.

Reporting any activities conducted in internship activities. Reporting approved by the supervisor in the field and supervisor at the university. Seminar internship results in the form of a report carried out at the beginning of the lecture. Supervising the field is expected to follow the seminar at the university, as well as a university supervisor. Material report containing all activities that have been performed and recorded every day during the internship, including solving problems in the field that are sometimes not taught in the classroom.



#### IV. CONCLUSION

The internship program aims to provide sufficient knowledge of civil engineering. Knowledge given to the participants of internship through real experience in the field participated in the construction of buildings or bridges or other civil buildings. Sixteen percent of the participants in the internship can be completed during the first semester. Internship activities carried out in the field for an average of 420 hours. Eighty-four percent of the participants completed the internship 2 to 4 semesters. Completion internship exceed one half of an effect on a long study at university.

Internship program proposed in holiday of the last even semester of 2nd level, holidays of odd semester of 3rd level, and holidays of even semester of 3rd level. The new internship program which divide by three section was one of solution to finishing study program at the university on time.

The Companies as a place of internship able to work together so that the university can improve mutual learning materials necessary industry or company. Similarly, the company may recruit new employees as desired, so that the sustainability of the company can develop.

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**EI-05-001**

**PERANCANGAN APLIKASI *EXPERT SYSTEM* PADA PENENTUAN JURUSAN CALON MAHASISWA BARU MENGGUNAKAN PENDEKATAN *BAYESIAN NETWORK* DI UNIVERSITAS MUHAMMADIYAH RIAU**

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**ABSTRACT :** *The objective of this application is to design an application expert system as a medium of information and provide an overview for prospective students on the right majors according to academic ability, interests and personality he has. The method used is literature study, questionnaires, interviews with education experts and psychologists, and system design approach Bayessian Network. The reason the use of methods Bayessian Network is because this method can be used for inconsistent data and data bias by calculating the conditional probability as the basis for the decision makers. The results of this application is expected to help prospective students choose majors appropriate to their interests and abilities. The conclusions obtained are designing an expert system is an effective method of Bayesian Network for prospective students as a medium that can give an overview and recommendations regarding the right direction through a series of tests that measure the ability of its base. Outcomes or final results that will be produced is in the form of an expert system that helps applications intelligently prospective new students in the selection of majors.*

*Key words: Expert System, Bayesian Network, Determination Of Majors, Information System, Interests*

## **I. PRELIMINARY**

### **Background**

Education is an important aspect of human life. Definition of education according to the Education Law No. 20 2003 is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual power of religion, self-control, personality, intelligence, character, and skills needed him and society. Once the importance of education so that education is necessary in accordance with the changing times require individuals to be able to develop his or her potential in accordance with its domain expertise that will be needed both to private students themselves and the community.

The problem that often occurs is a student disebuah higher education can sometimes be difficult to determine majors and programs of study they would choose, one contributing factor dalam because of their lack of knowledge about the subject that they will take and also adjust to the ability of intelligence and competence that exists in students the. This resulted in many students after the passage of the lecture felt their inability in the majors and courses they have chosen, as a result many students who drop out half way, or if they are trying to survive their learning is very low and when making the final project of their choosing to hire to others because most students are not able to make their own due to their inability to make a study according to their area of expertise either a system or product.

Another case happened incoming students choose courses that require a fairly high academic potential but the test results is recommended for a more suitable study program with academic potential. This case is also common in college.



So to solve this problem is necessary to develop a system that can give a recommendation to the students in determining the direction and course of study that they will take. Later, students are expected to develop the potential of the students' personality in accordance with the intelligence and ability as a personality so that once they finish education, it could be a solid foundation would look like for students in developing their career later on in the world of work and to meet the needs of stakeholders according to the background of the courses they select. One technique that can be used to overcome this problem is an expert system or expert system that is part of a system that mimics the computer science aspect of certain aspects of the expertise of a man who made so that the computer can do the job and as good as humans do. Therefore, the authors feel this topic is very important to be appointed as a research to reduce the number of students who go to school do not correspond with the majors, interests and personality they have. So this title Application Design Expert System On Determination of New Student Programs Prospective Approach Using Bayesian Network at the University of Muhammadiyah Riau is important to apply in the college later.

**The formulation of problem in this research are:**

How to designation of an expert system application to the determination of majors for the new prospective students by using Bayesian network inThe University of Muhammadiyah Riau

**Research purposes**

The designation of an expert system application to the determination of the new majors for prospective students by using Bayesian network in TheUuniversity of Muhammadiyah Riau

**Bayes method**

Bayes method provides a fundamental way to incorporate external information into the data analysis process. This process begins with an existing probability distribution for a given data set analyzed. Because the distribution is given before any data is taken into consideration, so called a priori distribution. The set of new data makes this a priori distribution into the posterior distribution. Changes that occur from posterior priori to refer to the Bayes Theorem. Bayes' theorem is a theoretical background to the statistical approach to the problem of making inductive inferences. The author will first explain the basic concepts that is defined in the Bayes theorem and then use this theorem in the explanation of Process Classi fi cation Classi fi kator Bayes or Simple Bayes.

Suppose  $x$  is a sample of the data that the class label is unknown. Suppose  $H$  is a hypothesis: such that the data sample  $x$  included in a special class  $c$ . The author wanted to determine  $P(H / x)$ , the probability that the hypothesis  $H$  is true with samples given the observed data  $x$ .  $P(H / x)$  is the posterior probability that illustrates our confidence in the hypothesis after  $x$  is given. Conversely,  $P(H)$  is the prior probability of  $H$  for something a sample, regardless of how the data in the form of samples. The posterior probability  $P(H / x)$  is based on more information than priori probability  $P(H)$ . Bayes theorem provides a way calculate the posterior probability  $P(H / x)$  using the probability  $P(H)$ ,  $P(x)$  and  $P(x / H)$ . The basic relationship is:

$$P(H / x) = [P(x / H) (P(H))] / P(x)$$

## II. RESEARCH METHODS

### Research methods

In designing applications Expert System in the determination of new students majoring using Bayesian Network approach, we use the method of **research and development** consists of three main stages, namely:

1. Literature review

Library Studies conducted to study the theory that will be used related to the subject and research problems.

2. Field Study

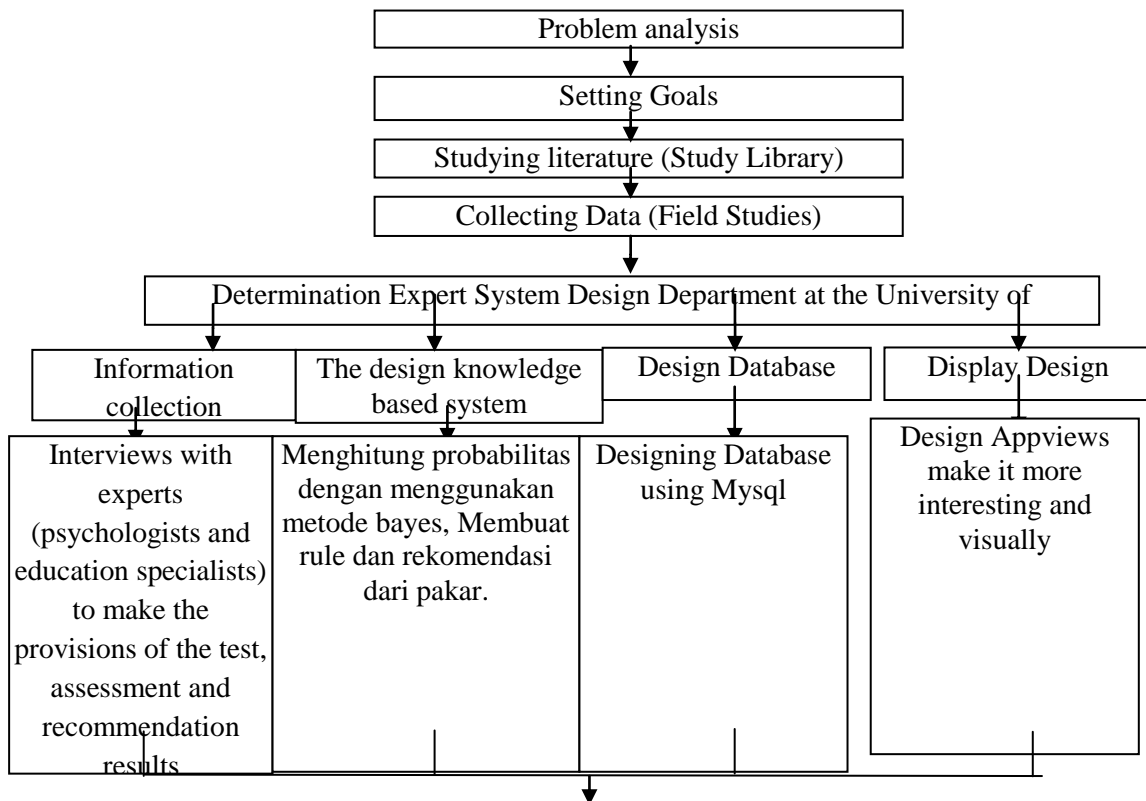
Field studies conducted by the method of observation, interviews and questionnaires. Methods Interviews were conducted to remove the ability of experts into the system while the method of questionnaire to get interest or interest

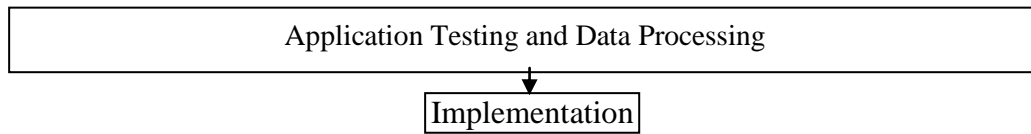
3. Design method

The design method carried out in several stages, namely:

- a. Information Collection System
- b. The design knowledge based system
- c. Design Database
- d. Display Design

All of these methods can be seen in the following process





**Figure 1.** Methods Designers Expert System Applications On Determination of New Student Programs Prospective Approach Using Bayesian Network

### **Description Procedure Development**

Based on the framework above, each step can be described as follows:

#### 1. Definition Scope of Problem

The scope of the problem to be careful to be determined beforehand, because without being able to determine and define the boundary problem to be studied, then there will never come a best solution of the problem. So the first step is the most important first step in this writing.

#### 2. Problem Analysis

Step analysis of the problem is a step to be able to understand the problems that have determined the scope or boundaries. By analyzing the problems that have been determined, it is expected the problem can be well understood.

#### 3. Setting Goals

Based on the understanding of the problem, then the specified objectives to be achieved from this writing. At this destination is determined targets are achieved, particularly to overcome the problems that exist.

#### 4. Studying Literature

To achieve the goal, then studied some of the literature that is expected to be used. Then studied literature were selected for the literature can be determined which will be used in research.

#### 5. Collect data

In the data collection was conducted observation of direct observation in the study so that the existing problems can be seen clearly. Interviews were aimed at obtaining information or data is needed. It also conducted a literature study by reading books that support the conduct of analyzing the data and information obtained.

#### 6. Design Expert Systems Applications Using Bayes Method.

This section aims to make the determination applications department at the University of Muhammadiyah Riau as for the steps being taken are as follows:

##### a. Collection of Information from Experts

In collecting this information we require expertise experts such as psychologists who will judge the personality and IQ of children and together education experts to design a matter of right to an IQ test, TPA and personality that will be used for the determination of the majors in Umri.

##### b. The design knowledge based system

After the data collection process from experts, then the knowledge based design process, where the process is made the rule and the alternative options based on the terms and conditions



subject obtained from experts and recommendations majors right choice according to the results of an IQ test, TPA and Personality tests.

c. Database Design

Database design intended to accommodate the data of prospective students.

d. Display Design

The design of this display aims to make an application visually and easy to use by the user.

7. testing Systems

Testing of the system is very important because it aims to test the feasibility of the system before it applied at the University of Muhammadiyah Riau. This experiment is the accuracy of the data and recommendations from experts who poured into the system.

8. Implementation

Applying Systems designed at the University of Muhammadiyah Riau

### III. RESULTS AND DISCUSSION

#### Mechanism System Will Be Designed

The system is built will adapt the knowledge of experts in the field of psychology and education, which refers to the theory of personality types by using pedekatan Bayesian Network. Here a representation of the knowledge base obtained:

**Table 1** Priority Selection Programs

Priority	Department
Priority I	1. Technical Information
	2. Information System
	3. Finance and banking
	4. Mechanical Engineering
	5. Automotive Engineering
	6. Nursing
	7. Physics
	8. Chemistry
	9. Informatics Education
Priority II	1. Industrial Engineering
	2. Legal studies
	3. Accounting
	4. Economic development
	5. Biology
Priority III	1. Communication Studies
	2. Film and Broadcasting
	3. Journalism
	4. Public Relation

If the test IQ = "Above average"; Tests TPA = "Very High" and Personality Test = "estj", "ENTP"



**Then Programs 1 = "Technical Information" and Department 2 = "Finance Banking"**  
**If the test IQ = "average"; Tests TPA = "High" and Personality Test = "ENFJ"**  
**Then Programs 1 = "Informatics Education" and Department 2 = "Communication Studies"**  
**If the test IQ = "average"; Tests TPA = "Low" and Personality Test = "ENTP"**  
**Then Programs 1 = "Journalism" and Department 2 = "Public Relations"**

**Figure 2** Rules to be designed

### **Research Instruments**

The research instruments were developed to collect data in this study as follows:

1. Sheets validation of the model development of electronic systems majors which is filled by the validator. This instrument consists of three pieces of assessment consisting of the value of the test consists of IQ test questions, test the landfill and personality test

2. Questionnaire sheet practicality electronic model system of majors by course and students  
Sugiyono (2007: 172) defines a questionnaire as a list of questions or statements that must be filled by the respondents to be evaluated.

On this sheet grating researchers designed a questionnaire to the practicalities of indicators covering students' perceptions about the model of the system electronics majors, student motivation to learn the system on the determination of the majors, with regard to competencies they want so it will enhance the spirit of learning and the quality of their own

Gazette relating to the need for further validation of electronic model of the system by the study program, so that the course can improve the quality of competence of its graduates.

3. The results of the electronic system Model majors

The results of the model's electronic system used to determine the majors majors and courses in accordance with intelligence and competency of the student and it is also at the same time improving the quality of college graduates themselves.

### **Data analysis technique**

Data analysis technique used is the technique of data analysis results of tests of academic potential, psychological and personality tests., Which is made in the scale and range that has been determined and the validity, practicality and quality of graduates' competence by using an electronic model of the system of majors students at the University of Muhammadiyah Riau.

1. Analysis of the validity of an electronic model development

Analysis of content and construct validity using a Likert scale based validation sheet, the steps of:

- a. Scoring for each use a scale of 1-5 with the following provisions:

Value 5 = very valid

Value 4 = Invalid

Value 3 = fairly valid

Value 2 = less valid

Value 1 = Invalid



- b. Summing scores of each validator for all indicators
- c. Scoring validity is given by the formula:

$$\text{The validity} = \frac{\text{score obtained}}{\text{The maximum score}} \times 100\%$$

(Suharsimi, 2008)

To determine the validity of the model electronic system penjurusanl developed, the criteria used can be seen in the following table:

Table 2 Category level of validity of electronic model system to define majors

No.	level of achievement	Category
1	90-100	very valid
2	80-89	valid
3	65-79	enough valid
4	55-64	less valid
5	0-54	Invalid

(Nana Sudjana and Ahmad Rivai, 2001)

2. Practicality questionnaire analysis system of electronic models majors

Questionnaire practicalities of electronic model system of majors. described the technique of frequency analysis of data by the formula:

$$\text{Scores ideal value} = \frac{\text{score average}}{\text{The maximum score}} \times 100\%$$

With the achievement of the respondents used the value category classification according to Nana Sudjana and Ahmad Rivai (2001) in the table below:

Table 3 Category Practicality Model Electronic systems majors

No.	The level of attainment (%)	Category
1	90-100	very practical
2	80-89	Practical
3	65-79	quite practical
4	55-64	Less practical
5	0-54	not practical

(Nana Sudjana and Ahmad Rivai, 2001)

3. Analysis of observation sheet

To analyze the observation sheet used descriptive analysis. The measures undertaken in the analysis of these observations are:

1. Giving value to each aspect in the observation with the provisions of the following assessment:
  - Value 5 = excellent 4 = good value
  - Value 3 = fairly good value 2 = poor
  - A value of 1 = not good
2. Summing values in all aspects of observation
3. scoring



Conversion affective value (NA) =  $\frac{\text{scores on the observation}}{\text{The maximum score}} \times 100\%$

The maximum score

(M. Ngalim, 1990)

**Table 4** Category results using the model system electronics majors

No.	level of achievement	Category
1	90-100	Very good
2	80-89	Good
3	65-79	Pretty good
4	55-64	Not good
5	0-54	not good

(M. Ngalim, 1990)

#### 4. Model Analysis of Results of electronic systems majors

The results of the ranking of study programs and determining the range of scoring IQ tests, personality tests and will generate rules which will serve as a model system electronics majors. This can give a recommendation to determine the appropriate departments with intelligence and competence so that students will have an impact on the competence of graduates at the University of Muhammadiyah Riau.

#### IV. CONCLUSION

Expert system application results in the determination of majors. This will give a recommendation to determine the appropriate departments with intelligence and competence of the students because the input that has been adjusted so that it will have an impact on output competencies of graduates at the University of Muhammadiyah Riau and outcomes that can provide a strong foundation for the future career development of students in entering the world of work and the needs of stakeholders.





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## EFFECTIVENESS OF CD INTERACTIVE LEARNING GRAPHIC DESIGN BASED MULTIMEDIA FOR VOCATIONAL SCHOOL STUDENT IN DHARMASRAYA

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**ABSTRACT :** *Graphic Design is a duty subject for vocation school students skill package in Multimedia Department Dharmasraya which still has not optimal. Graphic Design learning more directed at practical activities based on competency in providing strong skills provision is accompanied by a realistic theoretical basis to students. This research design by Needs Analysis Graphic Design Learning, continued designing interactive CD- multimedia based graphic design learning, and then followed up with a test that includes validity, efficiency, and effectiveness. Graphic Design learning materials based multimedia includes the concept introduction graphic design in video form tutorials, lab-based competency test in objective form. This type of research is classified as Research and Development (R & D), with a four-D models approach (4D) and testing the CD Interactive Graphic Design. The results showed that CD Interactive learning Graphic Design has validity criteria (Content, Instructional Design, Display Visual Communication, and Exploiting Software), Practicality (effective, creative, efficient, interactive, and interesting) and effectiveness to support the learning process Graphic Design vocational student courses Multimedia department in Dharmasraya. Graphic Design Interactive CD's learning can also be used more widely if the requirements are met.*

*Keywords: Research and Development, Graphic Design, Multimedia.*

### I. BACKGROUND

One indication of the low quality education in Indonesia can be seen from the learning result average is low (Sudrajat, 2009) so that need a efforts to improve learning result. One way to improve learning outcomes is used learning media.

Learning media is one of learning component has an important role in the Teaching and Learning Activities. Use media should be priority attention by teacher in each learning activity. Therefore, the teachers needs learn how to establish media learning in order to effective of achievement the learning objectives in learning process.

In fact, the learning media is often ignored by many reasons, such as: the limited time to make teach preparations, hard to find appropriate media, unavailability costs, and others. It is unnecessary if each teacher / facilitator have knowledge and skills about learning media.

One of the learning media is to use interactive multimedia CD in interactive multimedia. Multimedia by Arsyad (2008: 170) is "a combinate various media in which there is a text, animation, sound and information, message, or lesson content". The combination provides a interesting multimedia display. Multimedia purpose to present the information in a form that is fun, exciting, easy to understand and clear.

The media learning used should be perceived well by the students. someone perception to somethings is influenced by needs relevance, which someone would give a positive reaction, if it is a necessity for them. In the process of learning graphic design product-oriented entrepreneur will got a



positive response from students when the learning a given relevant to their lives, such as debriefing skills that they can apply even can become a bussines as income.

Many occupations that are influenced by computer technology development. One of field influenced by computer technology development is graphic design field. Graphic design is very important because it used by various groups such as: government, social organizations, military, banks, medical, education, transportation, trade, crime, industrial, and almost all life aspects.

Based on the explanations described previously, so that with information technology development is increasingly rapidly and influence people lives, designed a learning media Graphic Design and product oriented entrepreneurial seen its influence toward student learning result. It is stated in a study entitled: "THE EFFECTIVENESS OF CD INTERACTIVE LEARNING GRAPHIC DESIGN BASED MULTIMEDIA FOR VOCATIONAL SCHOOL STUDENT IN DHAMASRAYA".

## **II. FORMULATION OF THE PROBLEM**

Based on t the description of the background above , the problems can be formulated as follows:

- a. Determine the Validity CD Graphic Design Interactive toward entrepreneurs product oriented.
- b. Determine the practicalities CD Graphic Design Interactive toward entrepreneurs product oriented.
- c. Determine the Effectiveness CD Graphic Design Interactive toward entrepreneurs product oriented.

## **III. PURPOSE OF THE RESEARCH**

In connection with the formulation of the problem mentioned above, the purpose of the research is as follows:

- a. To determine the validity of CD Interactive Graphic Design toward entrepreneurs product oriented.
- b. To determine the practicalities CD Graphic Design Interactive toward entrepreneurs product oriented.
- c. To determine the effectiveness CD Graphic Design Interactive toward entrepreneurs product oriented.

## **IV. REVIEW OF RELATED LITERATURE**

Rohani (2008: 25) quotes Reigeluth that; "Instructional management is concerned with understanding, improving, and applying of managing the use of an implemented Intructional program". It is means that learning management is accordant with the understanding, improvement and implementation from implemented management learning programs. Learning management narrower than just a education administration, because these activities are handeled a learning programs in educational institutions. Rohani (2008: 25) explains that learning management is the process of helping learners to achieve the knowledge, skills, abilities, and understanding them around world. Majid (2006: 111) argues that learning management is a organizing process interaction the



learners with the teacher and learning resources in a learning environment. While Suryosubroto (2004) states that the learning management can be defined cooperation to achieve the learning process through planning, directing, monitoring and assessment. In learning a teacher must have an ability to plan, implement, and evaluate learning. Learning management means learning strategies and teaching style teacher will determine a success in achieving learning goals. Benefits of learning management is a professional activity in using and maintaining the unit of programs implemented learning. Learning management is the utilization of all process that interacting each other (learning resources) to achieve the goal of learning program (Majid, 2006). According to Slamet RJ (2006) Graphic Design: is a form of painting (picture) applied that gives freedom to the designer (designer) to select, create, or arrange elements such as illustrations, photographs, text, and lines on a surface with a purpose to produce and communicated as a message. Pictures and signs that used to be a typographical or other media such as drawing or photography. Graphic design is generally applied in the advertising world, packaging, film, and others. According to Suyanto (2005) graphic design is defined as "an application of art and communication skills for business and industry needs". These applications include advertising and products sales, creating a visual identity for institution, products and companies, and environmental graphics, information design, and visually completly the message in publication. According Daryanto (2011: 49) Multimedia divided into two categories, namely linear multimedia and interactive multimedia. Linear Multimedia is a multimedia that is uncomplitte with a controled device that can be operated by the user. Multimedia is running sequential (sequential), for example, TV and Film. Interactive multimedia is a multimedia equipped with a controller that can be operated by the user so that the user can choosen what will the next process. Examples of interactive multimedia is the interactive learning and gaming applications. The advantages of learning media when used as a learning media that video is a appropriate media in may learning media, such as classes, small groups, even one student. The use of instructional video tutorial models are very suitable for teaching a wide variety of learning especially in practice. The Research Institute of Computer Technology Research (CTR), states that man is able remember 20% what they hear, 30% the visual, 50% which is heard and seen, 80% which is seen, heard and done at once. Therefore, this media very suitable to applied in learning material that contains graphic design materials and practical activities, so that help students to independently study and understand the steps in design and produce the result of graphic design learning.

## **V. RESEARCH METHOD**

Methods of research and development (research and development / R & D) are included in category of research "need to do", the research results will be used to assist in work, so that if the work is helped by the products resulting from R & D it will be more productive, effective and efficient. Therefore, research methods and development (R & D) is used for solve this research. Research methods and development (R & D) are included in research methods combined sequential model / sequence. Based on the preblem and purpose of the research the population of the research



was all vocational school student of multimedia departmen in Dhamasraya. Limited test subjects in this study involved 30 vocational school students of MultimediaDepartmen in Dharmasraya

## VI. RESULT AND DISCUSSION

The purpose of the assessment to more in-depth assessment to the revised. Assessment conducted is summative evaluation, which is to apply the validity test , practicalities test and effectiveness test. The treatment in this stage focused on examining CD Interactive Learning-Based Graphic Design Multimedia developed are valid, practical and effective.

After the product had been developed, the next step is to validate the product. The validation purposed to determine the suitability of products made with the learning purpose. Test validation is performed by the validator /experts according to their respective fields.

### a. Validity Graphic Design Learning Module Books

Results of assessment (validation) graphic design learning module books is shown in Table 1. graphic design learning module books have three (3) assesment aspects. Validity test results graphic design learning module books, are explained in detailed as follows:

Table 1. The results of validation graphic design learning module books

No	The aspect assesment	Result of assesment		
		Average	TCR	Category
1	Feasibility Content Aspects	4.13	82.50	Good
2	Presentation aspect	4.18	83.59	Good
3	Linguistic aspect	4.33	86.67	Good
	average	4.21	84.25	Good

Source: Primer Data Processed

Based on table above the validity of the test results graphic design learning module books are categorized good. The average of final assest is 4.21 with the achievement level 84.25%. These results were obtained after rated by 3 (three) validator. Based on table found all aspect in categories When viewed under aspects of evaluation are found all aspects of the assessment in both categories, namely Feasibility Content aspects, Presentation Aspect and Linguistic Aspects.

Based on assessment data validator using SPSS ,so the result of data in table 2 below:

Table 2. Reliability Coefficient and Interclass Correlation about Assessment of graphic design learning module books

Reliability Statistics	
Cronbach's Alpha	N of Items
.824	3

Intraclass Correlation Coefficient							
	Intraclass Correlation <sup>b</sup>	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.610 <sup>a</sup>	.445	.749	5.684	41	82	.000
Average Measures	.824 <sup>c</sup>	.706	.900	5.684	41	82	.000

Source: Primer Data Processed

Based on the calculation of SPSS for reliability Cronbach's Alpha is 0.824 in accordance with the provisions of value greater than 0.6 means the graphic design learning module books is reliable. Results of correlation assesment the scale ICC in graphic design learning module books are assessed by validator, the analysis shows the average inter-rater agreement of 0.824 mean while for one rater consistency rater was 0.610.

**b. Media Validity CD of Graphic Design Interactive**

Results of assessment (validation) media validity CD of graphic design interactive are shown in Table 3. graphic design learning module books have three (3) evaluation aspect. Validity test results graphic design learning module books, are explained in detailed as follows:

Table 3  
Results Validation Media CD of Graphic Design Interactive

No	Assesment Aspect	Result of assesment		
		Average	TCR	Category
1	Material Substance	4.08	81.67	good
2	Learning design	4.07	81.33	good
3	Visual communication display	4.00	80.00	good
4	Software usage	4.89	97.78	Very good
	Average	4.26	85.19	good

Source: Primer Data Processed

Based on table above the validity of the test results Media Interactive CD Graphic Design categorized good. The average final assest obtained 4.26 with the achievement level 85.19%. These



results were obtained after rated by 3 (three) validator. When viewed based assest aspect found one (1) aspects of the assessment are in the very good category is Exploiting Software. For the aspects of material substance, learning design and visual communication display are in good category. Based on assessment data validator assesment using SPSS and the result in Table 4 below:

**Table 4.** Reliability and Interclass Correlation Coefficient Assessment of the CD Interactive Media Graphic Design

Reliability Statistics							
Cronbach's Alpha	N of Items						
.822	3						
Intraclass Correlation Coefficient							
	Intraclass Correlation <sup>b</sup>	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df 1	df 2	Sig
Single Measures	.606 <sup>a</sup>	.342	.811	5.620	17	34	.000
Average Measures	.822 <sup>c</sup>	.609	.928	5.620	17	34	.000

Source: Primer Data Processed

Based on the calculation SPSS for reliability Cronbach's Alpha is 0.822 in accordance the provisions value greater than 0.6 means Media CD Graphic Design Interactive is reliable.

Results of assesment intra-class correlation with measure the scale of the ICC in Media CD of Graphic Design Interactive assessed by validator, the analysis shows the average inter-rater agreement 0.8224, while for one rater consistency was 0.606.

**c. Assesment of the partically graphic design learning module books.**

The results practicalities test of questionnaire filled out by students collage about practicality graphic design learning module books showed in 5 below:

**Table 5.** Assessment practicalities graphic design learning module books

No	Assesment Aspect	Result of assesment		
		average	TCR	Category
1	I am happy followed the learning process with the module provided	4.30	86.00	Good
2	I read an interesting module	4.50	90.00	very good
3	Wrote the material that I read easily to understood	4.25	85.00	good
4	These materials help me understand the learning material	4.45	89.00	Good
5	These materials help me in learning process	4.55	91.00	Very good
6	Media and methods used interesting and fun	4.20	84.00	Good
7	Provided enough time to understand the learning process	4.05	81.00	Good
8	I am interested in following study like this on the other learning activities	4.40	88.00	Good
	Average	4.34	86.75	Good

Source: Primer Data Processed

Based on the table above conclude that average partially assesment of ) graphic design learning module books is 4.34 with the achieve score level at 86.75 and are in good criteria (practical). It is means that the practicalities ) graphic design learning module books can be applied.

**d. Assessment of practicality Media CD of Graphic Design Interactive**

The results the practicalities test of charging questionnaire filled out by students collegeabout media CD the practicality of Graphic Design Interactive showed Table 6 below:

**Table 6.** Result of Assessment practicalities Media CD of Graphic Design Interactive

No	Assesment aspect	Result of assesment		
		Average	TCR	Category
1	Efektive	4.13	82.68	Good
2	Creative	4.21	84.20	Good
3	Eficient	4.13	82.55	Good
4	Interactive	4.21	84.29	Good
5	Interesting	4.53	90.62	Very good
	Average	4.24	84.87	Good

Source: Primer Data Processed





Based on Table 6 above it can be concluded that the average assessment of practicalities Media CD of Graphic Design Interactive is 4.24 with achievement level of 84.87% and are in good criteria (practical). It means that the practicalities Media CD of Graphic Design Interactive workable.

**e. Test Effectiveness (limited test)**

The purpose of this stage is to apply assessment deeply toward to prototype which is valid and practical. The assessment conducted is effectiveness test. Effectiveness is discussed in this section seen from a comparison of student learning result before and after implementation of the learning model based Multimedia Graphic Design. This test is for seen the difference in the effectiveness of learning model development Graphic Design Based Multimedia has been applied 5 meeting.

In describing the data, researchers will look out each one supporting data and solve problems research that proposed in this research. In this section data processing from information obtained from the field / respondents, which will be applied with used descriptive statistical analysis in order to see the preference of spread of data.

1) Pretest Graphic Design Learning

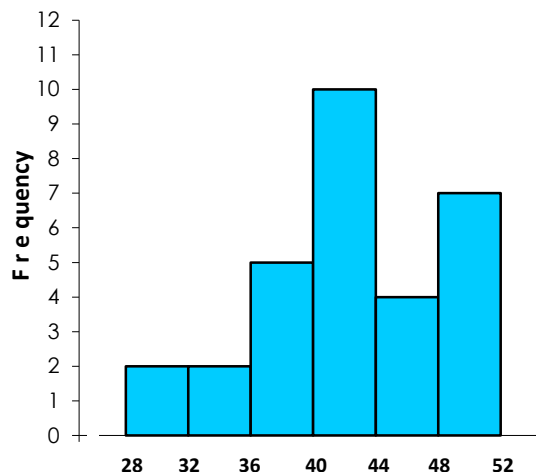
Based on data research of pretest Learning-Based Multimedia Graphic Design students of Information Engineering Education achieved by students after given a test with a sample 30 respondents obtained the minimum score range 0 until 100. The results show that the empirical value  $n = 30$ , minimum score = 28, maximum score = 52, range = 24, multiple classes = 6, interval = 4, mean = 41.40, standard deviation = 6.173, modus = 40, and median = 41.00. The frequency distribution of the data presented in Table 7 below:

**Table 7.** Frequency pretest Distribution Multimedia–Based of Graphic Design Learning

No.	Interval Class	Absolut Frekuensi	Relative Frekuensi (%)
1.	28 - 31	2	6.67
2.	32 - 35	2	6.67
3.	36 - 39	5	16.67
4.	40 - 43	10	33.33
5.	44 - 47	4	13.33
6.	48 - 52	7	23.33
<b>Total</b>		<b>30</b>	<b>100,00</b>

Source: Primer Data Processed

Based on the calculations shown in Table 7, 33.33% of respondents obtained an average score from learning result Graphic Design (pretest), 30.01% of respondents obtained a score below the average price, and 36, 66% of respondents obtained a score above average price. The histogram showing the group score of Graphic Design Learning (pretest) showed in Figure 1 below:



**Figure 1.** Histogram pretest Multimedia –Based of Graphic Design Learning.

2) Rated posttest learning Graphic Design

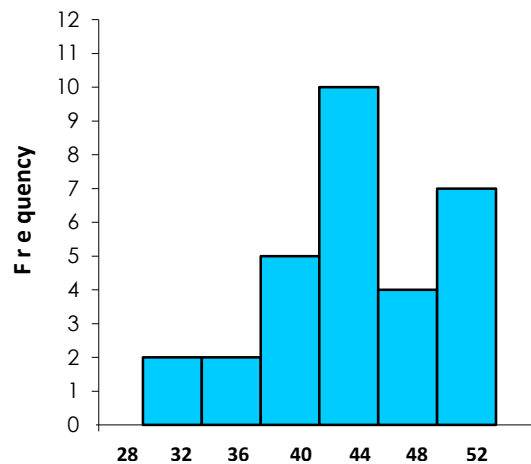
Based on data research posttest Learning-Based Multimedia Graphic Design students of Information Engineering Education achieved by students after given a test with a sample 30 respondents obtained the minimum score range 0 until 100. The results showed that the empirical value  $n = 30$ , minimum score = 52 , maximum score = 76, range = 24, multiple classes = 6, interval = 4, mean = 60.60, standard deviation = 6.350, modus = 56, and median = 60.00. The frequency distribution of data presented in Table 8 below:

**Table 8.** Frequency Distribution posttest Multimedia–Based of Learning Graphic Design

No.	Interval Class	Absolut Frekuensi	Relative Frekuensi (%)
1.	52 - 55	6	20.00
2.	56 - 59	7	23.33
3.	60 - 63	8	26.67
4.	64 - 67	4	13.33
5.	68 - 71	2	6.67
6.	72 - 76	3	10.00
<b>Total</b>		<b>30</b>	<b>100,00</b>

Source: Primer Data Processed

Based on the calculations shown in Table 8, 26.67% of respondents obtained an average score of learning result Graphic Design (posttest), 43.33% respondents obtained a score below the average price, and 30,00% of respondents obtained a score above average price. Histogram showing the group score Graphic Design Learning (posttest) showed Figure 2 below:



**Figure 2.** Histogram pretest Multimedia –Based of Graphic Design Learning.

f. Hypothesis Testing

Hypothesis Testing in this study was conducted used t test. Presented the data processing differences in student learning result before given CD Interactive (pretest) with student learning result after given CD Interactive (posttest). For more details presented in Table 9 below:

Table 9. Distribution of average learning result student before given CD Interactive (pretest) with learning result student after given CD Interactive (posttest)

Variable	Mean	SD	SE	Sig.	N
Learning result student					
- Pretest	41,40	6,173	1,127	0,000	30
- Posttest	60,60	6,350	1,159		

Source: Primer Data Processed

According table 9 above average learning result student (pretest) is 41.40 with standard deviation 6.173. The average posttest learning result student is 60.60 with standard deviation of 6.350. Mean values (Table 4.24) differences between the learning result students before given CD Interactive (pretest) with learning result student after given CD Interactive (posttest) is 19.20 with a standard deviation 9.197. Statistical test result p value = 0,000, it can concluded there is a difference in learning result student before being given CD Interactive (pretest) with learning result student after given CD Interactive (posttest). For more details explained in Table 10 below t test:

Table 10. T Test learning results students before given CD Interactive (pretest) with student learning result after given CD Interactive (posttest)

Variabel	Mean	SD	SE	t	Sig.
Hasil Belajar Siswa Posttest - Pretest	19,200	9,197	1,679	11,435	0,000

Source: Primer Data Processed



From the calculation t test above showed value  $t = 11.435 > t_{table} = 1.70$  at significance level  $\alpha = 0,000$  it means that  $H_0$  is rejected and  $H_1$  accepted, thus the hypothesis that there are differences in learning result students before given CD Interactive (pretest) with learning result student after given CD Interactive (posttest) is acceptable. It showed in significant level of  $0.000 < 0.05$ , which there is significant differences between learning result students before given CD Interactive (pretest) with learning result student after given CD Interactive (posttest).

## VII. CONCLUSION

Based on the effectiveness results CD of study Graphic Design Interactive Learning-based multimedia can concluded as follows:

1. Produced an interactive CD of graphic design that have orientation toward valid business product, as obtained an average value 4.21 with good categories
2. Produced an interactive CD of graphic design that have orientation toward practical business product, as obtained an average value 4.24 with good categories.
3. Produced an interactive CD of graphic design that have orientation toward effectively business product.

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EI-05-003

## ENTERPRISE ARCHITECTURE PLANNING TO DEVELOPMENT FACULTY OF INFORMATION SYSTEMS USING ZACHMAN FRAMEWORK METHOD

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**ABSTRACT :** At this time, already used several applications in data management processes at the Faculty, such as the use of Information Systems Academic Campus, Data Reporting System Feeder, Library Information System, E-Journal System and several other applications ever built. But not all these applications work within a system. Most of these applications still stands alone. One cause of this, because at the time of system development and the creation of applications, not built an application framework that is whole and complete. The purpose of this study was to produce a draft of Enterprise Architecture in the Faculty of Computer Science University of Lancang Kuning. To design information systems used Zachman Framework, which is one of Enterprise Architecture Framework that can demonstrate or define a enterprise structurally presenting at the intersection of two-dimensional classification 6x6 matrix.

**Keyword:** Enterprise Architecture, Zachman Framework, Information System, Development

### I. INTRODUCTION

#### 1.1. Background

Enterprise Architecture (EA) is defined by Gartner (2016), “as a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analysing the execution of change towards desired business vision and outcomes”.

EA is an evolving discipline, including and evolving Theory, Framework, Standards, Methodologies, Tools and Models. First and foremost the EA community needs to continuously improve and enrich the theory of EA, for it to remain relevant and useful (Bernus Peter, 2014).

The enterprise architecture for patterns business process support analysis enable (1) efficient qualitative analysis of the baseline enterprise architecture from the point of view of business process support, (2) establishment main of the directions for improvement of the existing enterprise architecture, and (3) comparison of potential target architectures. (Sasa, A., Rozanec, 2011).

At this time, the Faculty of Computer Science University of Lancang Kuning already use several applications at the service and administrative processes. Most of these applications are still stand alone, because at the time of system development and the creation of applications, not built an application framework that is whole and complete. In order for the business process at the Faculty of Computer Science, there needs to be rearrangement of Information Systems.

Enterprise information systems are a key component of an enterprise’s architecture. Implementing and changing an enterprise information system entails changes in its architecture. Conversely, any change to an enterprise’s architecture will have repercussions on its information systems. Consequently, next generation enterprise information systems should be seen in the context of these new realities. The



reflections of this paper are guided by the Zachman Framework for Enterprise Architecture (ZFEA), a well-recognized EA model that offers an ontology for enterprises.(Zachman, 2011).

## 1.2. Formulation of the problem

Based on the existing problems in the background, can be formulated the problem is how to design an Enterprise Architecture Planning for the development of information systems at the Faculty of Computer Science University of Lancang Kuning

## 1.3. Research purposes

The purpose of this study was to map the relationship between the database and information systems at the Faculty of Computer Science University of Lancang Kuning and to produce a draft of Enterprise Architecture in the Faculty of Computer Science University of Lancang Kuning.

## 1.4. Zachman framework overview

Zachman calls the Zachman Framework for Enterprise Architecture or the Zachman Framework™ (ZFEA) “The Enterprise Ontology” or the theory of existence of components of an enterprise. Zachman also describes the ZFEA as a schema because it represents the intersection between two historical classifications that have been in use for thousands of years. The ZFEA depicted in Fig. 1 is a 6x6 bounded matrix where the columns depict the fundamentals of communication or primitive interrogatives, namely what, how, when, who, where and why. The rows represent the notion of reification the transformation of an abstract concept into an instantiation through different design perspectives. One common misconception of the rows is that lower rows are refinements of upper rows, or that lower rows provide a more detailed description of upper rows. This is not true since each row represents all the models of the enterprise from a specific perspective, and there may be different level of detail within a particular row

The intersection between the interrogatives and the transformations in the ZFEA are the framework classifications and primitive elements. Each cell in the ZFEA is a normalized fact (or a primitive) so that no one fact can show up in more than one cell. According to Zachman, the complete matrix would necessarily constitute the total set of descriptive representations that are relevant for describing an enterprise. To construct meaningful models of any enterprise, it is necessary to combine primitives. In general, EA models are combinations or composites of the basic primitives and logic in the ZFEA and from the primitive cells all composite models that describe the enterprise could be constructed by combining model primitives in rows. The architecture of an enterprise is the total set of intersections between the abstractions and the perspectives and the enterprise itself is the implementation, depicted in the framework as row six.

### 1.4.1 Zachman interrogatives

Zachman specifies that the columns in the ZFEA are the fundamentals of communication, namely what, how, when, who, where and why and the answers to these interrogatives will allow an engineer to describe all aspects of any engineering object. For the ZFEA, Zachman



specifically defines what the interrogatives would imply within the context of enterprises, namely that the what interrogative translates into inventory sets, the how into process flows, the where into distribution networks, the who into responsibility assignments, the when into timing cycles, and the why into motivation intentions.

#### 1.4.2. Zachman perspectives

The rows in the ZFEA represent different perspectives on the enterprise from the viewpoint of different stakeholders. The executive perspective row represents the perspective of an executive, possibly the board of directors or the executive management concerned with the position of the identified enterprise within its operating domain. The business management row represents the perspective of business management, typically the managing director or the CEO of the enterprise. This perspective is concerned with the business itself, and would typically transform/translate/reify the perspective of the executive into the business model. The architecture row represents the perspective of the business architect. This perspective is interested in the logical building blocks necessary for the enterprise to operate and would take the perspective of the business owners or the business model and translate/transform (or reify) these into the enterprise building blocks. Technology that supports the business model would feature in this perspective, where components such as a customer database or a workflow system are building blocks. In this perspective, business-IT alignment would be a concern, specifically if IT is a technology of choice. The engineer row represents the perspective of the enterprise engineers interested in “building” or designing the building blocks identified by the architecture. This perspective would transform (or reify) the enterprise building blocks into system constructional requirements and specifications for building the systems. The technician row represents the perspective of the business technicians such as the database implementers and the workflow system implementers. The enterprise row represents the perspective of the running enterprise, i.e. the physical enterprise offices with a physical address that a customer would enter, a server room and a backup system for the customer database system.

#### 1.5. Foresight with Zachman

The way we used the ZFEA to guide our reflection is as follows: each row and each column were used independently as a means for generating ideas and reflecting about how enterprises could change in the future and what challenges they will face based on our current knowledge.

##### 1.5.1 What interrogative

The what interrogative is about the set of “things” (inventories) that enterprises must track and manage and that may have multiple uses: input/output of transformation processes, input/output of decision-making processes, means for execution transformation or decision-making processes.



#### 1.5.2 How interrogative

The how interrogative is concerned with how work and processes are designed and executed within the enterprise. As mentioned, future enterprises will have to be capable of coping with increased complexity and, we would venture, high levels of uncertainty due to rapidly changing operating environments.

#### 1.5.3. Who interrogative

The who interrogative is about organizational stakeholders as well as their respective roles and responsibilities.

#### 1.5.4. Where and when interrogatives

The where and when interrogatives are about changes with regards to space (i.e. location and distance) and time. Modern ICT technologies create the possibility of enterprises being purely virtual, existing only electronically, or potentially existing everywhere and never being closed.

#### 1.5.5. Why interrogative

The why interrogative is about intentions and values, the motivations that drive organizational behaviours, decision-making and concerns.

#### 1.5.6. Executive perspective

The executive perspective is mostly externally focused. The executive of the future will be faced with the challenges of guiding their enterprises through a world full of complexity and uncertainty. In such conditions, current ways of doing would probably lead to failure [35].

#### 1.5.7. Business management perspective

The business management perspective is primarily internally focused. The managers of the future, similar to executive, will be faced with the challenges of guiding their work forces. As already stated, the complexity and uncertainty within organizations will reflect the complexity and uncertainty of their environment. Asbhy's Law of Requisite Variety states that "variety can destroy variety" [37]. Consequently, the managers of the future will have to strive to foster organizations with immense variety. However, such levels of variety will necessary bring into question current organizational structures and management practices that are focused on achieving stability, conformance and standardization.

#### 1.5.8. Architecture perspective

The architecture perspective is primarily concerned with understanding the components of the enterprise and the relationships between them.

#### 1.5.9. Engineer perspective

The engineer perspective is concerned with designing all aspects of the enterprise. Traditional approaches to designing are based on the assumptions that problems can be clearly formulated and that appropriate methods can be identified to solve these problems (G. Satell, 2014). The designs also assumed control over resources. Moreover, in the past, it was often



possible to design organization in ways that were very structured in order to achieve predictable efficiency.

#### 1.5.10. Technician perspective

The technician perspective is concerned with execution. The key challenge with execution in the context of future organizations will be with regards to coping with “rules of engagement” that are always changing. Key concerns such as skill sets, performance expectations, organizational structures and enterprise knowledge will be constantly changing in order to adapt to complexity and uncertainty within and outside organizations.



Gambar 1. Zachman Framework

## II. RESEARCH METHODS

The method used in this study are:

### 2.1. Needs Identification and Data Collection

At this stage of data collection on the issues to be studied. The data collection was done by the observations related activities at the Faculty of Computer Science. Additionally conducted a question and answer to the parties associated with the use of the system. At this stage, we will get the needs of the individual components of the system. These needs, will be the planning of the architecture to be built.

### 2.2. Condition analysis

Analysis was conducted to determine the condition of the circumstances existing system. Analysis performed includes: business processes, systems and teknologi used today, business modeling, the relationship between business functions with organizational units.

### 2.3. Design Model using Zachman Enterprise Architecture Planning

At this stage, we will design an EAP models using the Zachman Framework for School of Computer Science. The design is in accordance with the form of a 6x6 matrix which is owned by the method of the Zachman framework

### 2.4. Feasibility Model

Once the information system design completed, the next phase of testing of the design results. So that will be obtained conclusions from the study.

## III. RESULTS AND DISCUSSION

### 3.1. Zachman Information System Modeling Framework In Fasilkom

#### 3.1.1 What

What column to discuss the existing data in the Faculty of Computer Science. The parts that will be described is the scope, enterprise modeling, and system models.

### 3.1.2 How

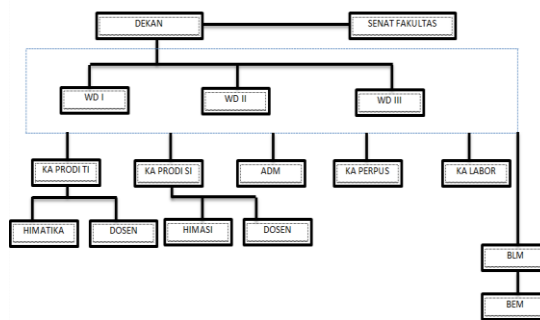
Column How discuss the processes that take place in the Faculty of Computer Science. The parts that will be described is the scope, system models and technology models.

### 3.1.3 Where

In the Where column will discuss the principal place of business is the location where the Faculty of Computer Science carrying out the process of academic activities. The part that will be described is the scope, enterprise models, system models and technology models.

### 3.1.4 Who

In the Who column will discuss the human resources play an important role in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. The parts that will be described is the scope, enterprise models, system models, components, and functional system.



Gambar 2 Organizational structure

### 3.1.5 When

When the column, part of which will be described is the scope, enterprise models, system models, and functioning system.

### 3.1.6 Why

Why in the column, part of which will be described is the scope and enterprise models.

## 3.2. System implementation

Here is an application of the Zachman Framework in the Faculty of Computer Science University of Lancang Kuning Pekanbaru.

### 3.2.1 What Column

Here is an explanation of these parts.

#### 3.2.1.1 Column What Section Scope

This section lists important entities that play a role in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. The relationship among these important entities can be described very well, so it can be illustrated in the diagram relational as well as on the column What part of Enterprise Model.

#### 3.2.1.2 Column What Part of Enterprise Model



This section is a relational diagram image created by a list of important entities contained in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. List of important entities that have been written in the column What section Scope.

### 3.2.1.3 Kolom What Bagian System Model

Berdasarkan data yang terdapat dalam kolom What, daftar hubungan antar entitas tersebut dapat digunakan sebagai acuan ketika menguraikan proses bisnis yang terdapat pada kolom How.

### 3.2.2 How

In the column How, have discussed about the process - a process that occurs in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. The parts described are Scope, Enterprise Model, System Model, and Model Technology. Here is an explanation of these parts.

#### 3.2.2.1 Column How Section Scope

In the column How section Scope, described the main processes that take place in the Faculty ranging from the manufacture of the curriculum and the establishment of lecturers by Structural Officials, Students guardianship process, the lecture, the exam period until the end of the study period. Datas regarding such processes can be obtained properly.

#### 3.2.2.2 Column How Section Enterprise Model

In the column section How Enterprise Model contains depictions flow process / model activity. The portrayal is made based on the description that has been written in the column How section Scope.

#### 3.2.2.3 Column How Part System Model

In the column How System Model section lists a set of actions by the Head of Department, Secretary of the Department, Administration and Students. The depiction of a set of actions is illustrated by using the Use Case Diagram and be detailed in the activity diagram for each actor. For further data contained in this column is used as a reference for the discussion about the user interface of the Integrated Academic System (SAT) is the column How Technology Model section.

#### 3.2.2.4 Column How Technology Section Model

When conducting an analysis of the column How Technology Model section found that there are deficiencies in the Integrated Academic System (SAT). Where there is no unity of data from an existing study programs.

### 3.2.3 Where In the Where Column

Has been discussed about the location of the main business of the Faculty of Computer Science University of Lancang Kuning Pekanbaru in due process of academic activities. The part that will be described is Scope, Enterprise Model, System Model, and Model Technology. Here is an explanation part - the part.

#### 3.2.3.1 Where column Section Scope

Where the column Scope section outlines the business location of the Faculty of Computer Science University of Lancang Kuning Pekanbaru, lecture rooms and laboratories of the Faculty of



Computer Science University of Lancang Kuning Pekanbaru along with hardware specifications contained in any laboratory space.

#### 3.2.3.2 Where part Column Enterprise Model

Based on the data that has been obtained in section Scope Where column, the data is illustrated in columns Where parts Enterprise Model as a map of the location. The data required can be obtained by properly so that it can complement it with a good column.

#### 3.2.3.3 Where part Column System Model

Where the column System Model section outlines the site link topology is a network scheme associated with the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Data obtained on the column described in more detail in the next column is the column Where Technology Model section.

#### 3.2.3.4 Where part Column Technology Model

In the column Where Technology section be detailed model of the network scheme contained in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Data contained in this column can be used as a reference when the Faculty will perform additional computer resources or upgrading the faculty computer or computers contained in the laboratory. Existing data in the column Where they can help upper management to conform to the specifications of existing computer and also can see the scheme of the existing network in the faculty room so that the computer of new lecturers can be connected to the network used for the lecturer at the Faculty of Computer Science University of Lancang Kuning ( [fasilkom.unilak.ac.id](http://fasilkom.unilak.ac.id) domain).

#### 3.2.4 In the column Who Who

Has been discussed about the human resources play an important role in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Part - the part that will be described is the scope, enterprise models, system models, technology models, components, and functional system. Here is an explanation part - the part.

##### 3.2.4.1 Who column Section Scope

In the Who column, the entire column can be implemented properly for the good cooperation with the parties at the Faculty of Computer Science University of Lancang Kuning Pekanbaru.

##### 3.2.4.2 Who column Section Enterprise Model

Who column Scope section outlines the list of organizational units, which are crucial in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Based on the data listed in this column, the data is described as the framework of the organizational structure in the column Who section Enterprise Model.

##### 3.2.4.3 Who column section System Model

Decomposition of each role contained in the organizational structure of the column Who Enterprise Model section described in section System Model Who column. Then the job description described in section Technology Model Who column.



#### 3.2.4.4 Who Column Technology Section Model

Data contained in the column Who can be used as a reference for knowing who the party which was instrumental in the Faculty of Computer Science University of Lancang Kuning Pekanbaru and what competencies possessed by each of the human resources that exist within the organization. So when will perform additional human resources for the Faculty of Computer Science University of Lancang Kuning Pekanbaru can be considered correct qualifications - actually needed by the Faculty of Computer Science University of Lancang Kuning.

#### 3.2.4.5 Who column Section Components

For details on the data of each of the human resources can be found in the column Who Components section. These columns can be used to determine the personal data of an individual human resources in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. These columns can be used to assess the competencies possessed by each of the parties that play a role in the Faculty.

#### 3.2.4.6 Who column Part Functioning System

In the column section Enterprise Model Who portrayed on its terms of organizational structure. Then, in the column Who Functional System frame section is filled by those who have positions in the organizational structure. The organizational structure is a structure organisasi Faculty of Computer Science at Odd Semester, Academic Year 2015/2016.

#### 3.2.5 When On When Column

Has been discussed on a list of the main activities that take place in the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Data can be acquired and describe events that occur globally. Based on the available data it can be seen how active the Faculty of Computer Science University of Lancang Kuning Pekanbaru in developing ourselves example of scheduling time to do promotions. How effective the campaign is done Faculty of Computer Science University of Lancang Kuning Pekanbaru and how much value to that obtained by the Faculty of Computer Science University of Lancang Kuning Pekanbaru based promotion that has dilakukan. Berikut this is the explanation part - the part.

##### 3.2.5.1 Column When Section Scope

When part Scope column is a list of the main activities that take place in the Faculty of Computer Science University of Lancang Kuning. For the next column (column When parts Enterprise Model) is a detail of major events that have been registered in the column When section Scope.

##### 3.2.5.2 When the column section Enterprise Model

When a column based Enterprise Model section be detailed in section System Model When a column that is a detail the activities and measures undertaken in these activities globally as well as defining the time for such activities.

##### 3.2.5.3 When the column section System Model



After defining time textually described in the column When System Model section. The data is structured as an academic calendar that is written in the column When part functioning System. Each half of this column can be updated based on the actual date of each academic activities that take place in the Faculty of Computer Science University of Lancang Kuning.

### 3.2.6 Why On Why Column

Most of the columns can be implemented on the cooperation of the top level management of the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Data contained in Rev column is the description of the long-term plan which is owned by the Faculty of Computer Science University of Lancang Kuning Pekanbaru. Here is an explanation part - the part.

#### 3.2.6.1 Column why Section Scope

Column why Scope section contains the vision, mission, objectives and business strategy of the Faculty of Computer Science. In the why part of the Enterprise Model described by using the Balance Score Card (BSC) used by Fakultas Information Technology Lancang Kuning University as a depiction of long-term planning as well as the measurement of equilibrium that is based on the objective to be achieved, the measure of success, the target achievement, and initiatives to achieve the target.

## IV. CONCLUSION

Document Enterprise Architecture can be used by the Faculty of Computer Science University of Lancang Kuning Pekanbaru to develop information systems that already exist. From this study, it was shown that existing information systems architecture. Documents that are built using the Zachman framework, can be used as a reference by researchers who will develop information systems in a faculty.

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## THE DEVELOPMENT OF INSTRUCTIONAL MEDIA BASE ON E-LEARNING TO INCREASE THE CLASS EFFECTIVENESS IN VOCATIONAL HIGH SCHOOL

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**ABSTRACT:** Education is one of the most important requirements on thuman life. Education itself is one aspect of dynamics human culture, as well as the use of information and communication technology (ICT) can not be separated from cultural changes of human life in everyday life. In achieving a balance of education and technology collaboration, necessarythe transformation of an aspect of learning in education today, as well aswith the development of media-based instructional and communication technologyinformation. By implementing a media-based on e-learning to students, it is expected that e-learning is directly accessible by students anywhere in the form of learning media applications on a PC and notebooks. In addition, e-learning will be built with responsive web deasign. It will be mobile and can be accessed by mobile devices (and ultimately to enhance students' understanding on Physics Subjects. This media is mobile learning with the adoption of responsive web design techniques developed by the modern web markup language HTML5 and style formatting pages with CSS3 by utilizing supporting features pages in both languages. The instructional media validated by media experts, media based on e-learning developed have good quality, very decent and very effective for use as instructional media to learn physics onVocational School. student response to this instructional mediashowed a positive response. Based on this it can be concluded that the e-learning media is best used asphysics learning media in Vocational School in Surabaya.

Keywords : Instructional Media, E-Learning, responsive web design, student response

### I. INTRODUCTION

According Smaldino<sup>8)</sup> learning is to develop new knowledge, skills, and behaviors which is the interaction of individuals with the information and the environment. Environment in this case is not only soft skills, but also be hard skills, such as highways, televisions, computers, and so forth. According to the definition. Learning can not be separated from an interaction between the individual and the environment. Information will achieved completely by the help of Instructional media. Even though e-learning is relatively new, its concept has been around for decades. E-learning was the training method applied in the internet or a company's intranet system. It began in the early 1980s with the use of CD-ROMs to teach technical skills. Nowadays e-learning is used widely in the education and corporate world. The application of e-learning through Information and Communication Technology (ICT) is also vital in the planning of a nation's economy in the k-economy perspective. K-economy emphasizes in the application of knowledge and aptitude and not by looking at physical product such as agricultural and industrial goods per say. In other words, keconomy is based on highly knowledgeable workforce, which includes adaptation of new values and efficiency in place of traditional ones. Services are directly brought to consumers thus cheaper, more flexible and convenient<sup>3)</sup>. Apart from using Local Area Networking (LAN) and Wide Area Networking (WAN) in



transmitting content and interaction, e-learning also utilizes electronic media such as the interactive internet, intranet, audio and video tapes, the television and CD-ROM. Teaching could be done synchronously and asynchronously by utilizing texts, animation, simulation and audio-visual material. But an important part is that elearning must also provide adequate channel for discussions and professional support on-line. Learnframe<sup>6)</sup>. According to Rosserberg<sup>7)</sup>, defines e-learning as "the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance". Rosenberg also states that different organizations define elearning in various ways and this is usually a reflection of the organization's e-learning direction. However, Rosenberg emphasizes that e-learning is much more than online training or computer based training. It also encompasses knowledge management and electronic performance support.

The focus of e-learning is the learners. They are given the freedom to learn independently, according to their pace and time, therefore giving more autonomy and responsibility to the learners. This could bring to a more interactive and active learner. Learners will have to plan and prepare thoroughly by searching materials and information regarding a topic with their own initiative. It allows self-learning to happen, revisiting difficult topics repeatedly and most of all allowing learning to happen without embarrassing oneself in front of their colleagues. Questions could be posted on-line<sup>5)</sup> Based on preliminary studies on students in vocational high school in Surabaya, facility to support the provision of e-learning has indeed been developed, but the implementation is still not optimal. Knowledge is delivered still tend to use conventional learning media such as notes from the blackboard and media presentation software such as PowerPoint. The utilization of information technology is still less effective and interactive because there are no moving images. By implementing instructional media based on e-learning, it can be easily accessed by students anywhere in the form of instructional media applications on a PC or notebook. In addition, e-learning built using responsive web techniques that can also be accessed by mobile devices (such as smartphones) and ultimately to improve the understanding of students in the Physics lessons about magnetism

## **II. METHOD**

This research employed a research and development approach, and it was intended to develop the e-learning media for Vocational Competency Basics learning in vocational high schools. The method to be used is the type of research and development methods (research and development (R & D)). The development model employed in this research was the result of the integration of multimedia development modeled by Alessi & Trollip<sup>1)</sup>. This research and development had produced: (1) e-learning media using responsive web design as its base for Vocational Competency Basics learning, (2) tutorial book on how to use e-learning media for the teacher and the student, (3) Vocational Competency Basics learning instrument set.

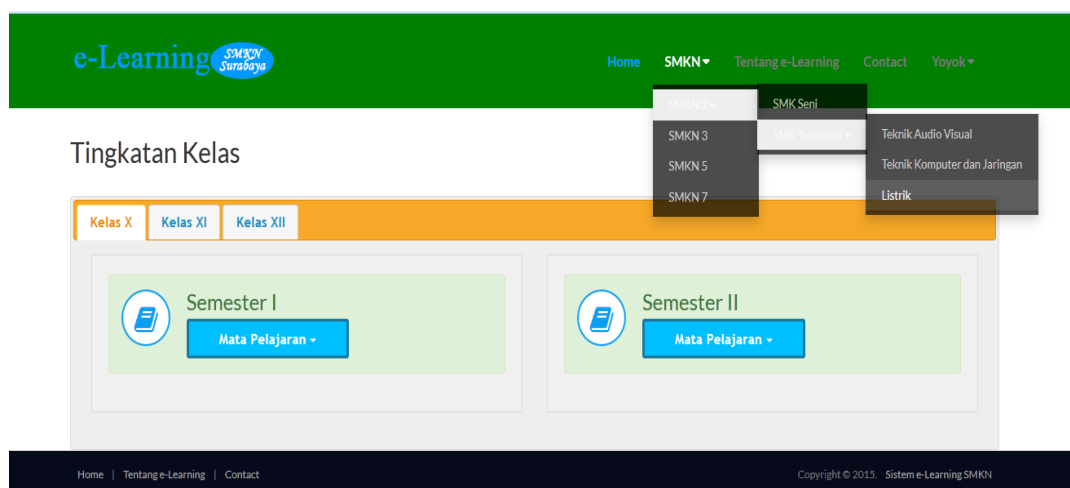
The subjects of the experimentation were the students in Grade X, majoring in Civil Engineering, Building Drawings Program. The subjects of group experimentation were students in State Vocational



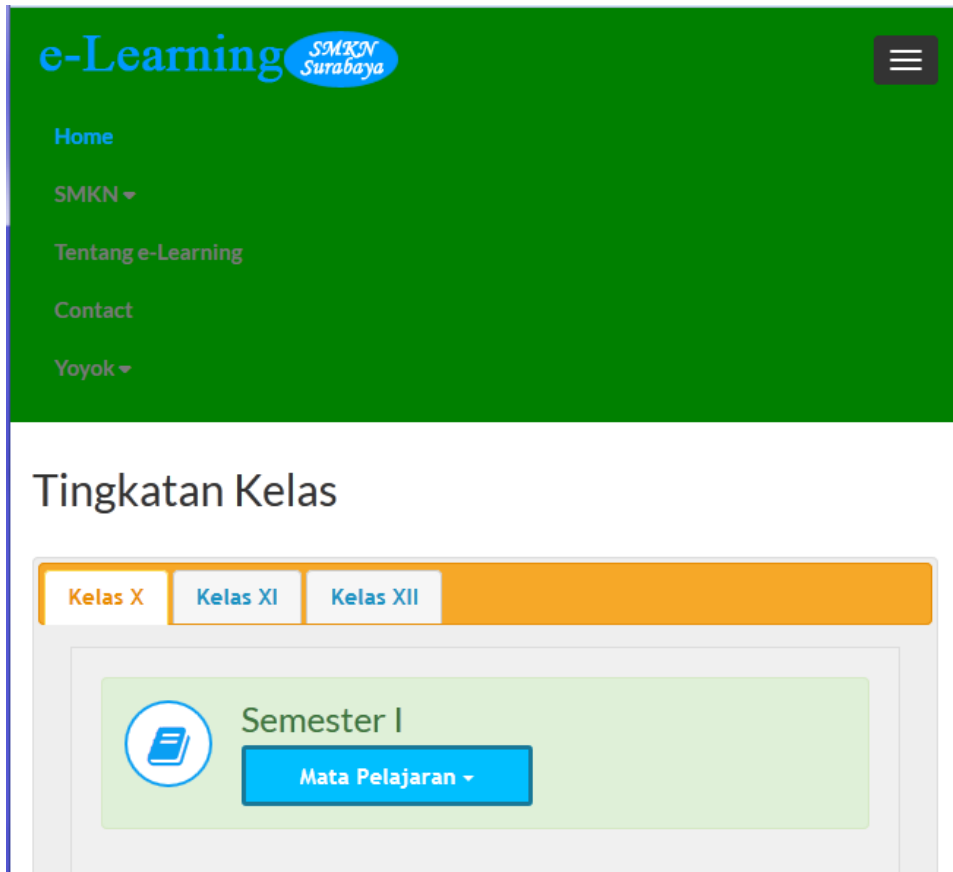
High School Number 5 of Surabaya. The data of the research were gathered through primary and supporting instruments. The former was the assessment sheet (questionnaire) for the hybrid-learning product. The questionnaires used were: (1) the questionnaire for the media experts encompassing three aspects namely the aspects of display design, interaction design, and information design; (2) the questionnaire for the material experts including two aspects, namely pedagogical and content correctness; (3) the questionnaire for students and teacher as a product users, in order to get the formative evaluation of the product that had been developed. Their validity and reliability on this research and the development of the e-learning media development were reached in two ways: logical theoretical validity and reliability, obtained by asking for the expert supervisors', material experts', and media experts' justification (criticism, suggestion, and revision) on the hints and instrument items that had been composed by the researchers. Those instruments were questionnaire, note sheet, observation guide, and interview guide; The data gathered in this research were: (1) the data of the need analysis of vocational competency basics material and the criteria of hybrid e-learning media; (2) the validation of the material experts' appraisal; (3) the validation of the media experts' appraisal; (4) the data of student responses upon applying the e-learning product; The types of the compiled data were the quantitative data using scoring scale as the main data.

### III. RESULT

The result of this research is e-learning media web design using responsive web design. The technique that used for responsive wb design was flexible grid layout, flexible images, and media queries. E-learning media built with responsive web design supported using modern web markup language and CSS3 page style format. The result of e-learning media using responsive web design showed bellow

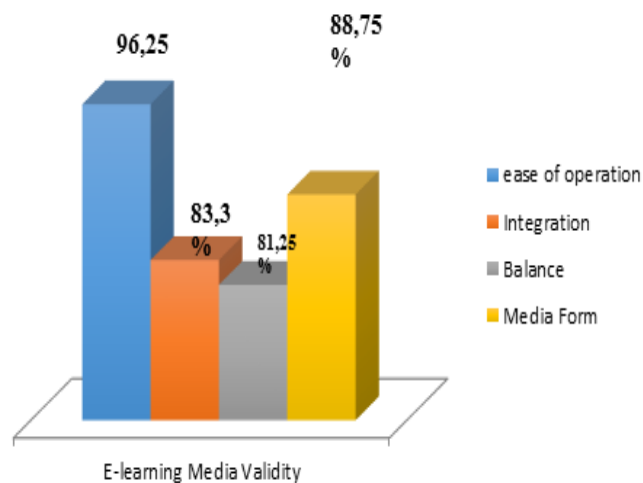


**Fig 1.** E-learning media on Personal computer



**Fig 2.** E-learning media on Smart Phone using responsive web design technique.

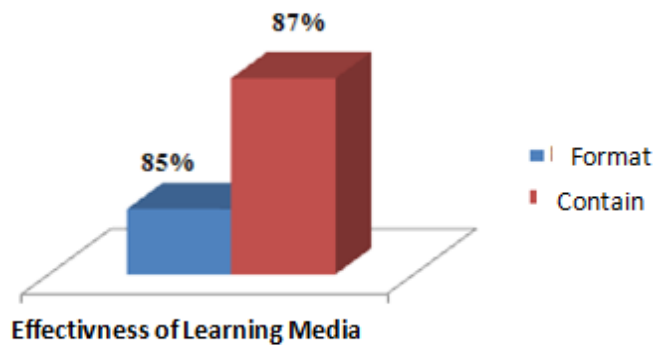
This study aims to produce instructional media e-learning in the subjects of Physics at SMK Negeri Surabaya. Prior tested by a student of SMK Negeri 5 Surabaya, media validated by media experts and matterial experts. Three aspect developed through media validation; (1) ease of operation, (2) integration of media, (3) balance of media, (4) form of media. The result 96,25% show that interpretation of media experts is “very valid” for the first aspect. The table that describe validity aspect show bellow



**Fig3. E - Learning media Validity Diagram**

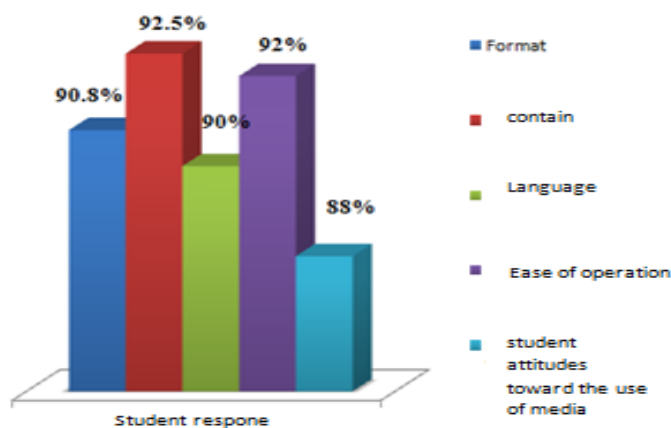
The quality e-learning media consists of the aspects of ease of operation, integration aspects, aspects of balance, and aspects of media form. Form validation in general to the variable quality of e-learning media, it can be seen the average percentage is 89.5% of media quality. It was mean that e-learning media had a very feasible quality according to expert judgment. Furthermore, the description of the quality of media can also be shown in the graph in Figure 3

Effectiveness of e-learning media consists of the format and content of the media that was in compliance with the purpose of learning materials on physics I. From the results of the validation assessment in general to the variable effectiveness of e-learning media, it can be seen the average percentage of media effectiveness was 86%. This shows that e-learning media had very effective interpretation rating scale according to expert assessment . Furthermore, the description of the effectiveness of e-learning media can also be shown in the graph in Figure4.



**Fig4..Effectiveness of Instructional Media**

As for the results of the percentage of student responses to the media e-learning, an average largest student response assessment of some aspects of media, such as media format, media content, media language used, the ease of operation of the media, and student attitudes toward the use of instructional media e-learning. The average percentage of each aspect got response rate of 90.6%. This means that e-learning media are in very good criteria for student response. Furthermore, the description of the results of student responses to the e-learning media can also be shown in the graph in Figure 6



**Fig5. Student Responses Against Instructional Media**



#### IV. CONCLUSION

Based on the research problem formulation, there are three conclusions, namely: (1) based on the study conducted by media specialists, instructional media developed by researchers gain medium quality overall percentage of 89.5%, which means that the media has a very good quality and worth to used as a medium of learning Physics on Surabaya State Vocational School ; (2) the results of the validation are performed by experts materials, instructional media developed by researchers obtained a percentage of 86% effectiveness of the media, which means that e-learning media very effectively used in teaching Physics ; (3) Student response to the e-learning medium showed a very good response. This can be shown by the results obtained from the percentage of student responses at 90.6%.

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EI-05-005

## AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY

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**ABSTRACT :** Knowledge management system becomes a useful tool to manage knowledge in organizations. The goal of applying knowledge management system is to effectively utilize the existing knowledge to create new knowledge and to take some advantages to achieve organizational goal. Nowadays, knowledge management system is deeply applied in enterprises or companies yet limited in vocational education. This paper proposed a knowledge management system model for vocational education in terms of academic perspective to enhance learning capacity. Knowledge management system in this research is developed based on Balanced Scorecard. We first defined components of Balanced scorecard and build knowledge management system model is according to these components. The automated knowledge management system is generated by exploring weighted ontology. The proposed model has been validated by some experts and results revealed KMS model is recommended to be applied in vocational education to enhance learning capacity.

**Key Words:** Balanced Scorecard, Knowledge Management System, Learning capacity, Vocational education, Weighted Ontology.

### I. INTRODUCTION

Knowledge is a valuable asset for an organization or institution. It comprises individuals' experiences, values, insights, and contextual information which is required to be managed. The benefits of knowledge management (KM) are to increase profits, to improve quality of decision-making, to prevent knowledge loss, and to effectively reuse existing knowledge. Contrarily, KM have several limitations to be implemented, such as technical complexity, top management ambiguity (i.e. the management commitment to KM strategies is uncertain and unclear), and money/time consuming. Knowledge management system (KMS) therefore becomes a useful tool to manage knowledge in organizations. Many enterprises, such as Adobe, Microsoft, and IBM, have applied KMS to share knowledge resources, perform decision-making, etc.

On the other hand, Balanced Scorecards (BSC) is a well-known framework for organizational managerial. BSC is developed by David Kaplan and Robert Norton in 1992 to evaluate the organization's performance in financial, customer, internal business process, and learning and growth. Knowledge management and Balanced Scorecards (BSC) proposals, projects, and systems are happening to appear in organizations. The relation between knowledge management and BSC has been widely applied in many enterprises recently. Enterprises such as AT&T, BMW, Dupont, Mellon, and UPS have revealed an excellent performance based on BSC which leads them to exploit resources effectively. The benefits of BSC are to implement strategic implementation, to drive the process of change, and to aware the university staffs of the meaning of their work. However, there are limited vocational educations have applied KMS for academic domain.



Therefore, in this work we propose an automated knowledge management system model according to BSC in vocational education for enhancing learning capacity. The objective of this work is to develop a conceptual integrated view of knowledge management using BSC. The rest of this paper are as follows. Section 2 describes some related work about knowledge management system in education. Section 3 explains our proposed model. Finally, section 4 provides conclusions of this paper.

## **II. RELATED WORK**

A design and implementation of KMS, namely KMS-THU, has been proposed in Tsinghua University to support course-based learning system (Peng, Jiang, & Zhang, 2013). KMS-THU comprises three modules which are individual knowledge management (KM), group knowledge management, and public management. Individual KM is deployed for teacher and student to store and manage their learning documents or record their notes. Group KM and Public KM provide file management and open knowledge resource management, respectively. KMS-THU has been tested by several teachers and students. They agree that it benefits for storing, accessing, and sharing knowledge.

The predictive relationship between knowledge management and school capacity has been examined by (Cheng, 2013). A cross-sectional predictive quantitative survey has been conducted to aggregate data from secondary school teachers in Hong Kong. Knowledge management was evaluated as knowledge processes of accessibility, sharing, and application. The questionnaire investigated teacher perceptions of their learning capacity and the knowledge process and school learning capacity. A Structural Equation Model (SEM) was exploited to evaluate the questionnaire results. The results indicated that knowledge processes of sharing and application were identified as the predictive factors of teacher learning capacity while accessibility and sharing were identified as the predictive factors of school learning capacity.

KMS framework has been proposed by (Yeh, 2011) to enhance quality and performance of higher education. KM framework comprises a strategy for academic and organizational knowledge management. The academic knowledge consists of individual, institutional, and network knowledge while organizational knowledge consists of culture, leadership, technology, and measurement knowledge. The study claims that the proposed framework benefits to support educational administration which further supports teaching and learning process.

KMS is utilized as a flexible and adaptable tools for knowledge society and global market demand as proposed by (Trivella & Dimitrios, 2015). The study was conducted to consider knowledge management in public universities. A number of dynamic simulation models have been proposed to investigate the impact of the organizational culture, information systems, business strategy, and structure. The dynamic simulation models revealed that the academic staff, students, and university staff satisfied to adopt a strategy to harness the bulk of knowledge and to manage it.

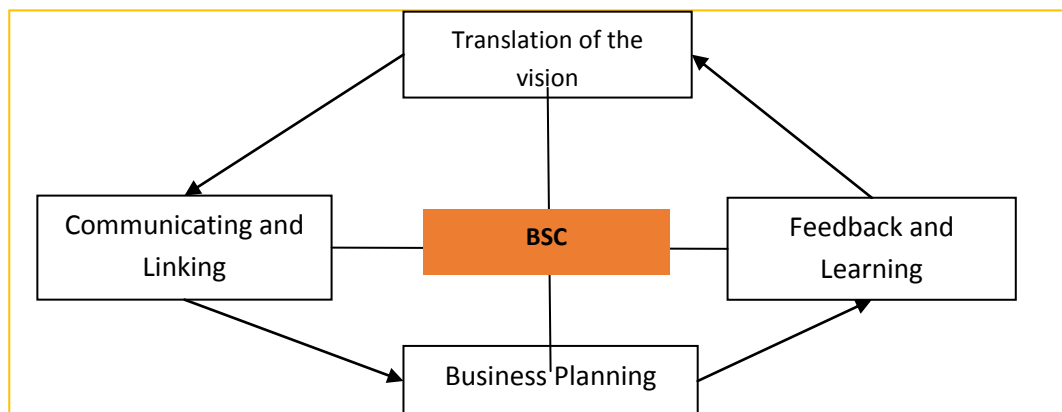


**Figure 1.** The basic concept of Balanced Scorecards

The aforementioned studies have not deeply explored Balanced Scorecards (BSC) for developing KMS in higher education. The basic concept of BSC is depicted in Figure 1. In our work, the basic concept is then adapted to the need of vocational education to build KMS model. KMS implementing BSC enables vocational education to recognize the most currently important and future knowledge priorities, goals and objectives, and the critical knowledge domains to develop strategic knowledge systems. Furthermore, integrated KMS and BSC supports vocational education to be more competitive by creating new knowledge according to the existing knowledge to reduce cost, to increase speed, and to meet vocational education requirements.

The steps for implementing BSC in vocational education are depicted in Figure 2 and listed as follows.

- Clarifying and translating vocational education vision and strategy;
- Communicating and linking strategic objectives and measurements;
- Planning, setting targets, and aligning strategic plans;
- Enhancing strategic feedback and learning.



**Figure 2.** Strategic Management System

### III. Knowledge Management System Model

In building KMS, we first translate the basic concept of BSC to the need of vocational education as adopted from (Aljardali, Kaderi, & Levy-Tadjine, 2012) and (Sordo, Orelli, Padovani, & Gardini, 2012). A brief description of four perspectives of BSC is described as follows.

- Financial Perspective – *how do we look to stakeholders?*

The aim of this perspective is monitoring the relationship between the organization and shareholders. The criteria for this perspective are such as shareholder value, profitability capability, income growth, and unit cost.

b. Customer Perspective – *how do customers see us?*

In this perspective, values for customers are targeted. The customers for this work are defined as students/parents, faculty/staff, industry, government, alumni, and society.

c. Internal Process Perspective – *what must we excellent at?*

This perspective determines the processes performance of identified strategy.

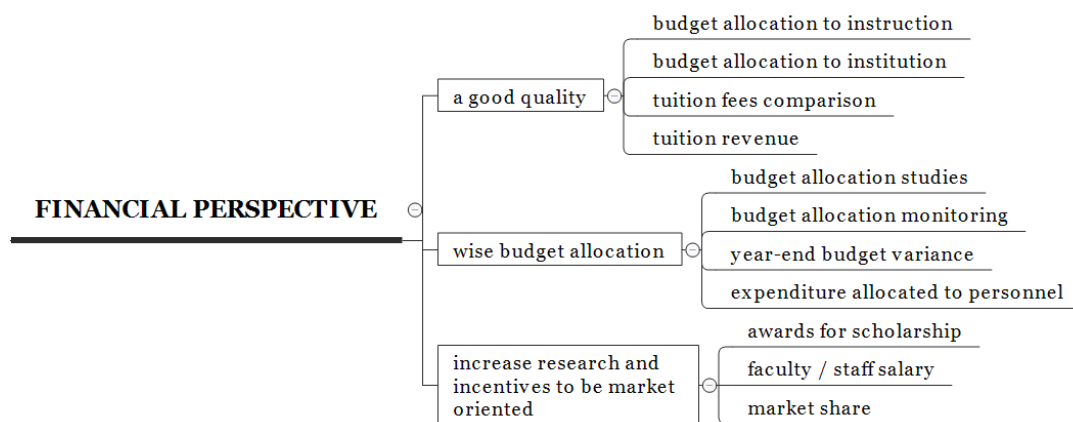
d. Learning and Growth Perspective – *can we continue to improve and create value?*

Strategic goals for this perspective are selected considering human capitals, staff abilities, knowledge, technology and organizational culture. The agreement about those elements is required to limit ambiguity.

In this work, the measurement for key performance indicator (KPI) of BSC is adapted from (Aljardali et al., 2012) with some improvement to meet the need of vocational education.

a. Financial Perspective

Let's assume that rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 3.



**Figure 3.** KPI measurement of Financial perspective

b. Customer Perspective

Let's assume that oval is stakeholder, rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 4.



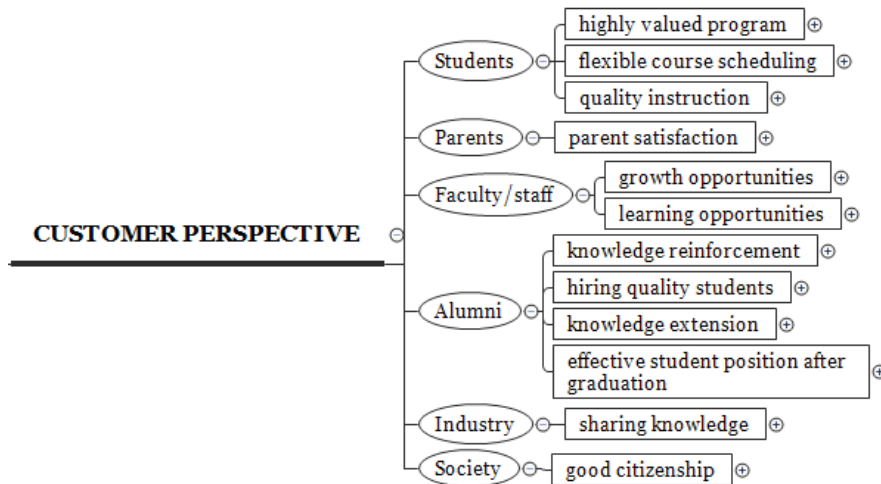


Figure 4. KPI measurement of customer perspective

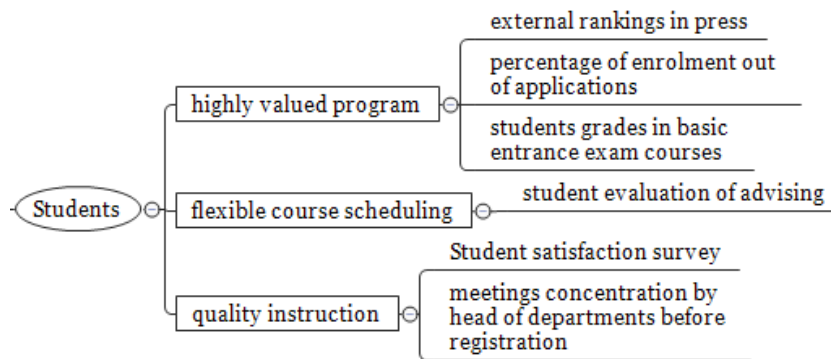


Figure 4 a. KPI measurement of customer perspective for students

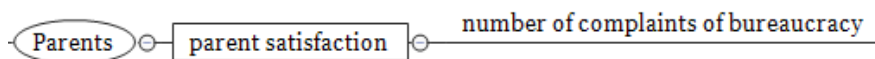


Figure 4 b. KPI measurement of customer perspective for parents

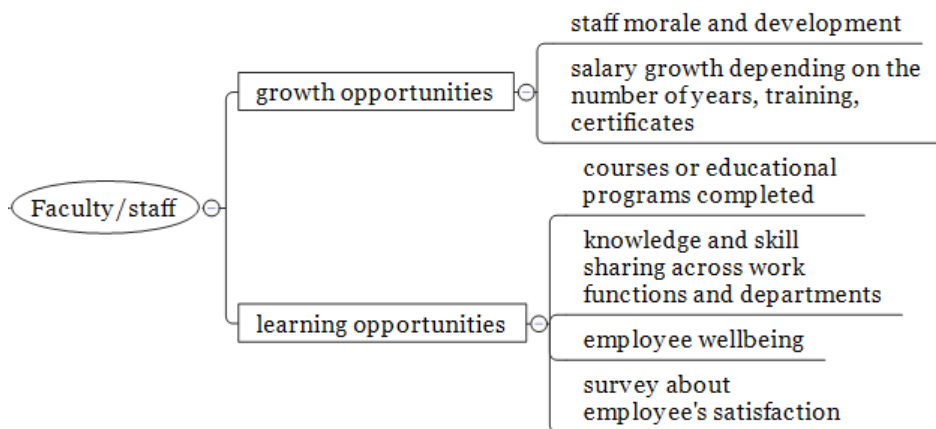


Figure 4 c. KPI measurement of customer perspective for faculty/staff

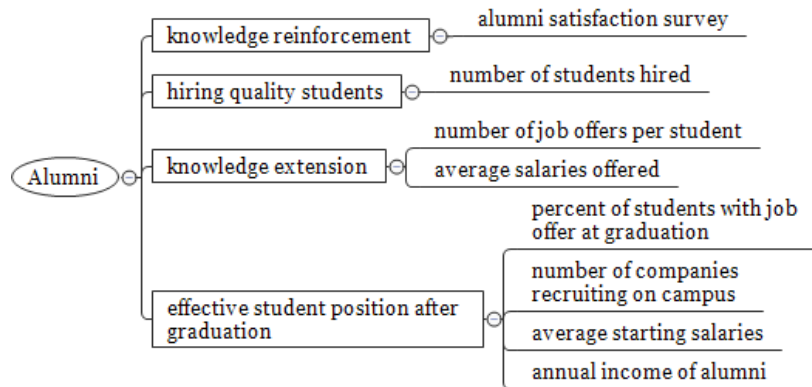


Figure 4 d. KPI measurement of customer perspective for alumni

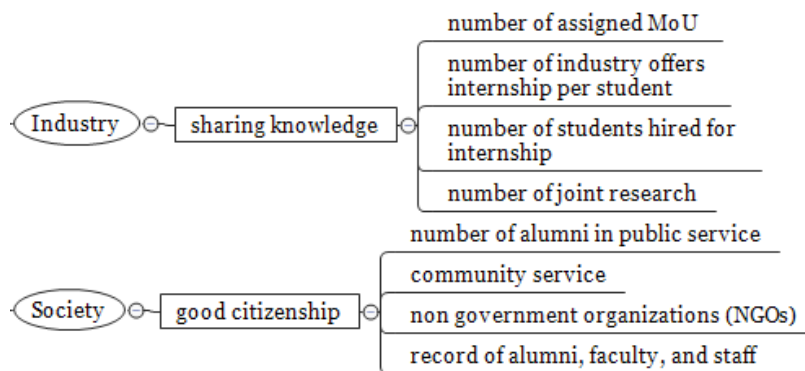


Figure 4 d. KPI measurement of customer perspective for industry and society

c. Internal Process Perspective

Let's assume that rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 5.

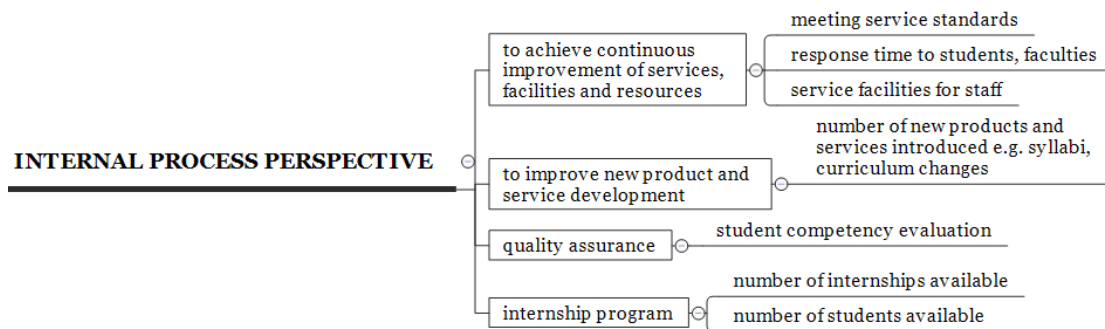
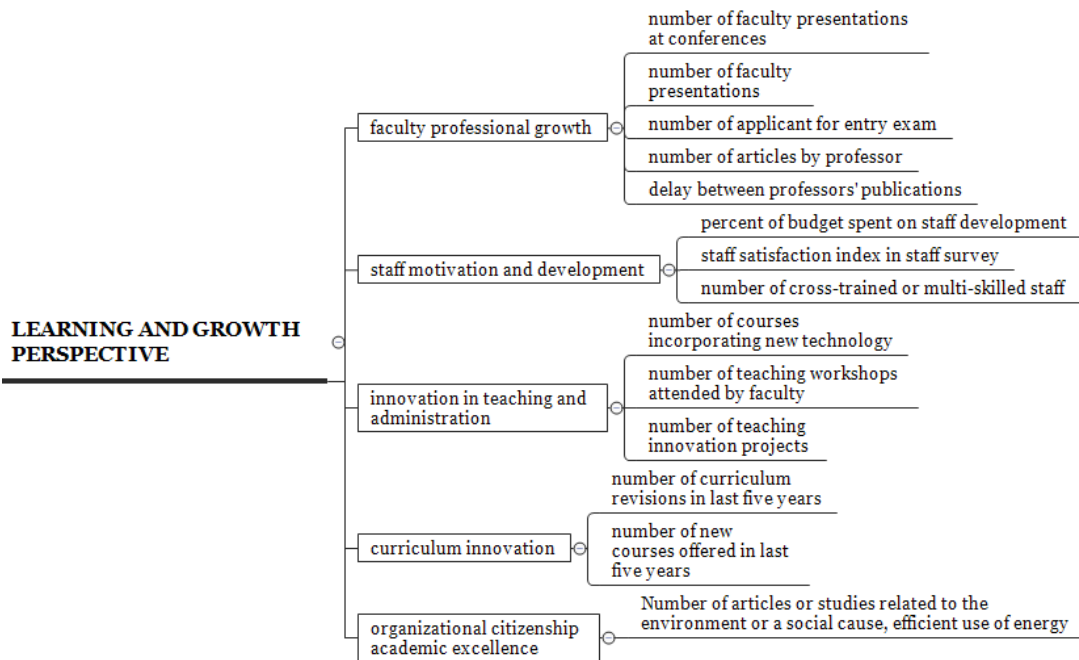


Figure 5. KPI measurement of internal process perspective

d. Learning and Growth Perspective



**Figure 6.** KPI measurement of internal process perspective

The next step after building the model of KPI of BSC is generating knowledge management system model. In this work, KMS model is built according to KPI measurement of BSC. The document is processed and classified into four classes, which are financial, customer, internal process, and learning and growth class. The objectives of KPI measurement are assigned to be subclasses of those four classes.

Each document which supports BSC perspective is processed automatically by utilizing weighted ontology model adapted from (Anistyasari & Sarno, 2011) which is an improvement of ontology model by adding some weight for each word according to its relation to other words. Words which have semantic similarity (i.e. estimated by dice similarity) are then grouped to further being measurement object of KPI of BSC.

The proposed KMS model has been validated by five experts. The validation results show that KMS model is recommended to be applied in vocational education to enhance learning capacity.

#### **IV. Conclusion**

This work proposes an automated-knowledge management system based on Balanced Scorecard. Four perspectives of Balanced Scorecard which are financial, customer, internal process, and learning and growth perspectives are first translated to the need of vocational education. Knowledge management system model is then built according to those four perspectives. Weighted ontology is explored to build an automated-knowledge management system model.

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**EI-05-006**

**EVALUATION OF PRACTICE LEARNING COMPUTER SKILL  
COURSE DRAWING PROGRAM MODE CLOTHING  
EDUCATIONAL SYSTEM STATE UNIVERSITY MEDAN (UNIMED)**

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**ABSTRACT:** The approach used in this study is a quantitative research. This study aims to reveal how the evaluation of learning ability in the subject of computer practice mode drawing education courses dressmaking State University of Medan. Analysis of the data showed that the evaluation of the ability of practical learning computer drawing mode to expect the labor market based on the ability berorganisasi high category (82%), Effective Communication high category (84%), mastery and enthusiasm Class high category (85%), Positive Attitude Students high category (85%), administration of exams and Rated Justly high category (83%), Dexterity Teaching categorized as moderate (75%), confidence in the students of high category (88%), creativity in learning high category (86%), motivation student high category (86%), and the Student Learning Outcomes Good high category (82%).

**Keywords:** Evaluation, Ability, Student

## **I. INTRODUCTION**

Learning is an activity undertaken in integrating the sequence of events starting from organizing the lecture material, students, equipment, materials, and time spent in the learning process. So that teaching and learning activities carried out by students and lecturers can be run in accordance with a systematic and optimal. And targets achieved in the mastery of science can be mastered by students to produce a value of learning outcomes that are theoretical or practical.

Practical learning the teaching and learning activities in the classroom, especially in the media laboratory space with good ingredients that electronic media, visual media, print media, audio media, or media projections silent. Learning practices commonly use tools and equipment in the form of a simple (manual) shaped machines and equipment. Thus, in practice learning are expected to master control of media and equipment that have been determined at each learning materials with the goal of students have special skills in the field that they do during the lectures.

Practical Lessons in the lecture computer drawing model is a model of the development of practice learning by using electronic computers. During this time generally in the world of fashion Unimed education, especially in the course drawing mode always creates some fashion with conventional media simple manual. In which students create some fashion by using a simple media antarlain; 2B pencil, colored pencil, and watercolor (color poster), and so forth. As the development of technology in the present, then pengembangan lectures drawing mode is to be developed by using computer media in creating a fashion that works in accordance with the development of the industrial world. In addition the student is able to design fashions manually as well students are able to have the skills to design fashions with computer media on photoshop program.



Design is a design pattern that became the basis of making an object such as clothing. Design produced through thought, consideration, computation, joy, taste, art and hobby crowds poured on paper tangible image. This design is easy to read or understand the intent and understanding by others so easily transformed to the form of real objects.

Drawing model is a basic knowledge for an aspiring designer. In the design of this dress will be explained about the understanding of fashion design, the types of design, design elements, design principles, tools and materials needed to design, design of anatomy, engineering drawing parts clothes and coloring techniques and settlement design.

From the description above can be concluded that the design is a form of formulation of a process of thought, consideration and calculation of designers poured in the form of images. The image represents the transfer of ideas or mindset of concrete from the designer to others. Each dress is a result of the disclosure of a design process.

## **II. THEORITICAL REVIEW**

Adobe Photoshop, commonly called Photoshop, image editor software is made by Adobe Systems which is devoted to editing photos / images and effects creation. The software is widely used by digital photographers and advertising company that is regarded as the market leader (market leader) to the image processing software, and, together with Adobe Acrobat, is considered as the best product ever produced by Adobe Systems.

Design mode is a picture fashion model in which there are elements of line, shape, silhouette, size, texture, thus forming an image that can be read or understood by others especially those who will make the dress according to the model. So a design mode to be able to illustrate clearly what is in the mind of a designer so that he has in mind can be read by others. (Arifah A.Riyanto, 2003)

Drawing is a form of two-dimensional models were drawn manually by hand in the form of a basic form of the model's body (Croquis). The point is to draw a realistic picture of the body, but a blank canvas for illustrations of dresses, skirts, blouses, accessories and the entire creation creator. Add color and texture details such as fabric, style / motif, lining and buttons to help illustrate the ideas in the mind of the mind.

Learning model drawing mode so that the user originally used the stairs image developed into computer media to create designs that fashion is a trend in the fashion world. Along with the technological advances of our times and the demands of the world garment and textile industry, indispensable skills (skills) computer to create fashion models to accelerate production in the industrialized world. So in the world of education, the students demanded to prepare visual computer skills using Adobe Photoshop program in accordance with the needs of employment in the industrial area.

This course examines how to draw some media of fashions using Photoshop there are two techniques. Two techniques are designed in the drawing models: burberry plaid draw and draw ciffon. Rate on practice learning model computer drawing mode dressmaking Education Students on



University of Medan use the ratings of ten indicators, namely; 1) Organizing, 2) Effective Communication, 3) Mastery & Enthusiasm Class, 4) Positive Attitude Students, 5) Provision of Examination and Value Fair, 6) Dexterity Teaching, 7) Self-esteem in students, 8) creativity in learning , 9) Motivation of students, and 10) Student Learning Outcomes Good.

### III. RESEARCH METHODS

This research uses descriptive quantitative approach to analyze how the ability to analyze how the ability of students to develop practical learning on the subjects of computer drawing mode Students dressmaking courses at Unimed in the academic year 2014-2015.

Population and sample are students of Department of dressmaking Unimed academic year 2014-2015 amounted to 120 people, with the consideration that the students studied are students who attend lectures drawing mode.

Based on purposive sampling techniques and techniques of sampling Slovin it is known that the number is 30 people. To collect research data conducted by using a questionnaire instrument (questionnaire). Questionnaire was conceived and developed in accordance with the indicator variable capabilities required 10 working market, then the indicator is based on the study of the theory suggested by experts that later developed into the questions. By using a Likert Scale modified in accordance with the measurement indicators with a positive attitude measurement scale up negative.

Data analysis was performed using percentage and categorization by the formula:

$$\frac{\text{Total acquisition score}}{\text{The highest total score ideal}} \times 100\%$$

$$\frac{\text{Acquisition Total Score}}{\text{The highest answer x number of respondents x Number of questions}} \times 100\%$$

The results of the analysis based on the above formula and then do the categorization of the results based on the scale of the achievement level Responsen. Sudjana (1996) according to the following table 1:

**Table 1:** Scale

Percentage of Achievement	Criteria
90 – 100 %	Very high
80 – 89 %	High
65 – 79 %	moderate
55– 64 %	Low
0 – 54 %	Very low

### IV. RESULTS AND DISCUSSION

The results of the study are described based on the average (mean), the mean (median), the lowest value (minimum), the highest value (maximum), the total score (sum), the percentage of respondents attainment levels and categories. Here are the results of data analysis computer evaluation of the Learning Practice

**Table 2: Results of Data Analysis**

No	Learning Evaluation Results	Mean	Mdi	Mode	Min	Max	Sum	%	Category
1	organizing	32.93	32.00	32	28	40	988	82%	High
2	Effective communication	41.97	41.00	40	36	50	1259	84%	High
3	Mastery and enthusiasm Class	12.80	12.00	12	10	15	384	85%	High
4	Positive Attitude Students	21.20	20.50	20	18	25	636	85%	High
5	Exam Award and Fair Value	16.60	16.00	16	14	20	498	83%	High
6	Dexterity Teaching	29.97	30.00	29	24	40	899	75%	moderate
7	Confidence in students	22.03	22.00	22	20	25	661	88%	High
8	Creativity in learning	17.27	17.00	17	14	20	518	86%	High
9	Student Motivation	12.97	13.00	13	10	15	389	86%	High
10	Good Student Learning Outcomes	32.97	32.00	32	23	40	989	82%	High

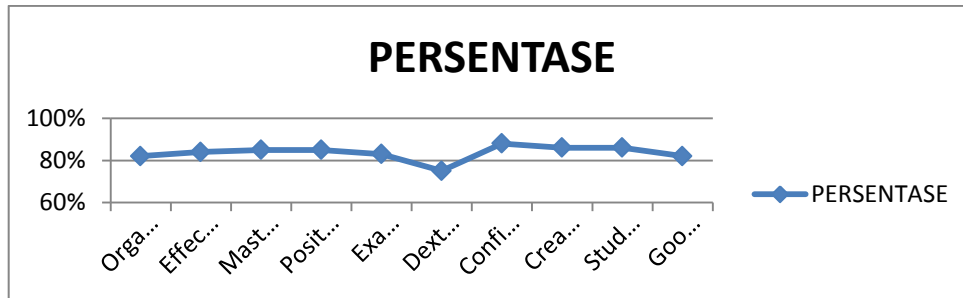
Students on the mode of drawing dressmaking Education State University of Medan.

Based on Table 2 above shows the results of the evaluation of the ability of computer practical learning in lecture mode drawing perngorganisasian enter the category with a high percentage of 82%. The results of the evaluation of effective communication in the course drawing modes include high category with a percentage of 84%. Evaluation of student learning towards mastery and enthusiasm pekuliahan computer drawing entry mode in the high category with a percentage of 85%. Evaluation of student learning positive behavior including high category with a percentage of 85%. The results of the evaluation of student learning to the administration of the exam and a fair value entered in the high category with a percentage of 83%. Evaluation of student learning to the flexibility in the teaching practice of computer drawing modes include medium category with a percentage of 75%. The results of the evaluation of learning self-confidence of students enter high category with a percentage of 88%.

Evaluation study on creativity in drawing machine learning modes include high category with a percentage of 86%. The results of the evaluation of student learning on motivation in the high category with a percentage of 86%. And the results of the evaluation of machine learning in lecture mode to draw on learning outcomes of students, including high category with a percentage of 82%.

Analysis of the data presented, is more clearly expressed in the form of research results histogram Figure 1 below:





Based on the data analysis described above it can be concluded that the evaluation results on the computer practical learning courses have an indicator drawing mode of organization, effective communication, mastery Mastery and Class enthusiasm, creativity in learning and student motivation plays in the high category. It shows the students have been able to create new prodak field of fashion required by the public and industry. For students already have the skills (skills) to design mode using the medium of the computer program with a creative photoshop. So expect future skills possessed by the student indispensable in the craft industry, the garment, or the textile industry.

While the results of the evaluation of a computer learning course on drawing mode to the indicator positive attitude of students, self-confidence in students, giving exams and fair value, and indicators of student learning outcomes is an indicator of support of the core indicators are above but the indicators are interrelated and relate to among the variables with other variables. An indicator of the positive attitude of students, self-confidence in students, giving exams and fair value, and indicators of student learning results in the category of good and satisfactory. So that all the indicators above demonstrate the preparation of students on employment prepared and mature as optimal as possible as a potential fashion designers. With hope after completing his studies at the College, students are ready to enter the world of work and students are ready to create new jobs in the fashion business appropriate clothing with the fashion trends and needs of the community.

## V. CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of learning ability on the computer practice mode drawing courses at Unimed students showed an increase of excellent quality with good learning outcomes for students of fashion. Evaluation of the ability of computer practical learning in the course drawing mode using a qualitative description research using Likert Scale.

The results of this evaluation consists of ten indicators, namely; 1) Category perngorganisasian with a high percentage of 82%. 2) The results of the evaluation of effective communication in the course drawing modes include high category with a percentage of 84%. 3) evaluation of student learning towards mastery and enthusiasm pekuliahan computer drawing entry mode in the high category with a percentage of 85%. 4) Evaluation of learning positive behavior of students, including high category with a percentage of 85%. 5) The results of the evaluation of student learning to the administration of the exam and a fair value entered in the high category with a percentage of 83%. 6) Evaluation of student learning to the flexibility in the teaching practice of computer drawing modes include medium category with a percentage of 75%. 7) The results of the evaluation of learning on the



confidence of students enter high category with a percentage of 88%. 8) Evaluation of learning on creativity in drawing machine learning modes include high category with a percentage of 86%. 9) The results of the evaluation of the students' learning motivation in the high category with a percentage of 86%. 10) And the results of the evaluation of machine learning in lecture mode to draw on learning outcomes of students, including high category with a percentage of 82%. The development of practical learning to draw mode by using computer media is needed to prepare students for a reliable workforce in industries such as the garment industry, boutiques, and textile industries.

## **VI. SUGGESTION**

It is expected of students who have followed the course of practice drawing mode, would be to develop creativity in creating fashion designs required by the community in accordance with the trend mode. So students proficient in designing fashion using manual techniques and computer media. So that the students acquired skills that may be required in the world of industrial work.

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EI-05-007

## LEARNING SYSTEM IMPROVEMENT ON HYDRAULICS COURSES OF CIVIL ENGINEERING STUDENTS

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**ABSTRACT:** High and low quality of student learning outcomes are determined by many factors, both internal and external. Internal factors depend on the individual characteristics of the students either intelligence, attitude, motivation and other supporting factors. While external factors are environmental factors that can be designed to support the effectiveness of implemented learning. For that reason various learning support facilities must be provided, the professionalism of the academic staff need to be developed, administrative services, the academic atmosphere and other relevant factors should lead to support an effective learning process in order to more optimal achievement. This research aims to obtain an understanding of how students that today is passive learning and making it to the process of active learning through field programs, evaluation of the application of the lecture. Results of analysis enhance students competencies by field implementation method, field observations obtained the discharge water drainage on the Perjuangan street not far from around UNIMED is 1,3641 m<sup>3</sup>/sec. drainage around UNIMED is still quite good.

Keywords: Field-based learning, Students competence. Hydraulics courses

### I. INTRODUCTION

In the course of hydraulics will be presented the principles of the flow in open channels, both the flow laminar, turbulent, flow of permanent (steady flow), the flow is not permanent (unsteady flow), uniform flow and the flow is not uniform and the flow channel is covered as pipe. The core of the process of learning is an attempt to teach learners or in other words how learners are willing to learn, with respect to mentioned hence most important role of the lecturer how to most effectively and efficiently so that learning occurs in self-learners. Therefore according to the task of lecturer as managers expect the learning activities in creating a climate conducive learning and able to bring learners into teaching and learning activities-creative. At the university consists of the faculty, students and effort administrator. In other words, the physical presence of lecturer is a symptom of a phenomenon which would not exist without the presence of lecturer academic activities in the real sense. The fundamental problem faced by the students is the lack of motivation to learn because during the input process to Universities do not do competitions mean, besides, lack of response to the material presented theoretically for students is difficult to imagine the real situation on the ground, so the need to create demonstration in the form of demonstrations in the classroom, on the field and the laboratory and the help of computer software.

The purpose Teaching Grant is to be obtained: An understanding of how learning students who today are passive learning and making the process of active learning, then to obtain teaching methods



appropriate for different types of learning in accordance with the conditions that exist in universities today and finding ways evaluation of the application of the research process. Arikunto, S., (2010).

## **II. METHODOLOGY**

This research is a classroom action research methods. The approach used is qualitative and quantitative approaches as fasilitator. A qualitative approach aimed to reveal the difficulties experienced by the students in understanding the concepts in the subjects Hydraulics and how to cope in an attempt to overcome the difficulties experienced by students. While quantitative approaches aimed to describe student mastery of concepts and problem solving skills.

## **III. RESULTS AND DISCUSSION**

### **3.1 Problems and Solutions in Hydraulics**

The problem is the situation (can be either questions or issues) and requires an act of solution, and is not available or a way to deal with the situation. The characteristics of a situation that can be summarized as a problem is the situation itself, there is a will and feel the need to take action to address them, and could not immediately be found how to resolve them. Hydraulics within a matter or question will be a problem if there is no rule/law immediately certain that can be used to answer or resolve the problem. Hudoyo, (2001) This means that a hydraulics problem will be a hydraulics problem in this paper defined as a problem that is completely new for solving the problem, and on the matter. But the problem is still in the range of cognitive students.

### **3.2 Learning Objectives**

To be key in order to determine the learning objectives are the needs of students, the courses and the lecturer itself, based on the needs of students can be determined what to be achieved, developed and appreciated. Based on existing courses in the curriculum clue can be determined educational outcomes desired. Lecturer itself is the main source objectives for the students, and he should be able to write and select educational goals significant, and measurable. The purpose is the comprehensive formulation of the results desired education. It includes objectives targeted by learning and provide a pillar to provide learning experiences. Teaching and learning process have components as in the curriculum, the components in question include the objectives, resource materials and assessment methods and tools (evaluation). According to Hamalik, Oemar (2010). Learning is more focused on the efforts lecturer in conducting lectures so as to make student learning activities. Thus the targets to be achieved are oriented to the achievement of student learning outcomes.

### **3.3 Framework of Thinking**

From the nature of assignment has been known that giving assignments to students is a ploy to membelajarkan students to be more active. By giving students the task of learning geared itself efforts out their duties. In general, students realize when not doing his job then he will obtain the sanction of the lecturers. It is realized that everyone did not want in the law and always trying to complete the task

given to him lecturer. The students in their job is forced to learn, was forced to search for the necessary reference material, perhaps he would attempting ask others if he does not understand the problem. With these efforts, however students were already focused on the hydraulics subject. In studying subjects hydraulics requires practice to hone the analytical ability and motivation to learn. The lecturer should be able to apply: (1) keeping the mahasiswa always carry out their duties. (2) Adjust the work plan in classroom activities. (3) Planning material (4) Discuss the work with colleagues. (5) Provide counseling to students. (6) To provide a response to questions from the students.

### **3.4 The stages of Research**

Amri, S. dan Ahmadi, K.I. (2010). describes the action research is research that is a series of steps, where each step consists of four stages: digestion, action, observation and reflection. Kemmis dan Mc Taggart (in the Kasihani Kasbolah 1998, 1999:14) also illustrates that action research is a spiral cycle of digestion, action, observation (observation) and that further reflection may be followed by the next spiral cycle.

#### **a. Action Planning (Alternative Solution I)**

The planning stage of the action carried out after preliminary tests and interviews to students outside class research subjects. Initial tests were used aims to look at the difficulties experienced by students in completing the test mastery of concepts and test problem-solving skills in the subjects Hydraulics with conventional teaching. Interviews are being conducted after the initial test is obtained. The questions given at the interview directed to explore the reasons given in the work on the problems. Results of tests and interviews is then used for the early identification of the actions to be implemented. Azwar (2001).

#### **b. Implementation of Actions I**

Once the action plan drafted then be giving action. The provision of this action is the development and implementation of a planning program that has been compiled. Activities undertaken at this stage include:

*Step I:* Students were divided into 6 groups. Each group consists of 4 people with opposite groups facing each other and researchers as observers attempted to move freely to any group to monitor.

*Step II:* Researchers presenting the material Hydraulics learning model based on the problems that have been prepared.

*Step III:* Every student is given a worksheet that contains a problem to be solved. Each student must provide input and ideas to the group and input and ideas will be summarized based on the best as a result of the discussion. Researchers observed the action closely and can provide scaffolding to students to direct the course of problem solving and discussion. At the end of giving the material the students were given a worksheet that contains a problem to be solved.

*Step IV:* Once all the material taught hydraulics, the research provides mastery tests mastery of concepts and problem-solving skills in students to find out how the results were achieved.



This research was conducted in Building Engineering Education program UNIMED namely the 24 students who took the course with a competency-based curriculum Hydraulics Force Year 2010/1011. The object of this research is student mastery of concepts and problem solving skills. To obtain the actual data in the study used a data collection tool as follows:

a. Concept Mastery Test

The tests used form of description. Before the test is used to first see the characteristics of a test based on expert opinion.

b. Interview

The interviews were conducted after the test is given to students both in class research subjects. Interviews were conducted to find out the difficulties experienced by students based on test error work done by the students.

### 3.5 Research Instruments

In this research instrument used was a test sheet. Gazette tests used in the form of a count who first described the material with students. To measure the ability of the homogeneity of the initial experimental group and the control class used early tests (Pre Test). While the final test (post test) was used to determine the ability of the end. The number of questions used in the final test as many as five questions.

### 3.6 Material Research.

a. Flow classification

Flow in the channel can be classified into different types based on different criteria. Laminar and turbulent Flow. Laminar flow can only occur in a special Hydraulic conditions as was done in the experiment by Reynold. (1842 - 1912). Turbulent flow occurs when the forces of relative depth is very large compared to the style of viscosity so that the flow is controlled by inertia in this type of flow of fluid particles move on trajectories irregular or on any track. Critical Flow, Sub Critical and Super Critical. Triatmodjo (1993).

Comparison of inertial forces to the forces of gravity known as numbers Froude yaitu :

$$F = \frac{v}{\sqrt{g.l}}$$

b. Dimensions and Units

Dimensions are measured quantities, which shows the characteristics of an object, such as: mass, length, time, temperature, and so on. In Indonesia is still widely used system of units MKS, where the basic measure for length, mass and time are the meter (meter, M); kilogram (kg, K) and the second (second, S). In addition Mks unit system, also used international language single unit called United Systeme International (SI). Raju K.G.Ranga (1981),

c. Characteristics Of Fluid

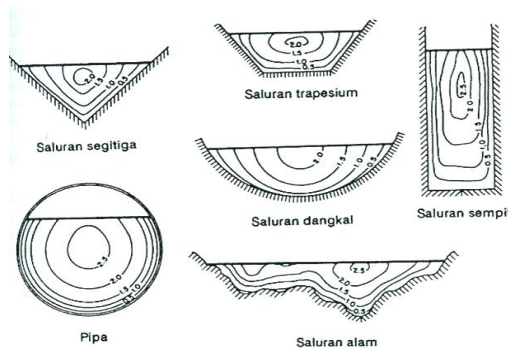
Fluid is a substance that can flow, which has particles that easily move and change shape without mass separation. Prisoners fluid is very small, so can easily follow the shape of the room /

place that limit. Some of the fluid properties are important, such as: Meetings mass, density, fluid congestion, viscosity, surface tension and Capillarity.

### 1. OpenChannel

An open Channel is a channel that flows with free water level. At all points along the channels, pressure on the water surface is the same which is typically the atmospheric pressure. Flow through the open channels must have beas water level, the flow is usually associated with liquid and generally is water.

Analysis of the flow through open channels is more difficult than the flow through the pipe (channel is closed), the open channel such as rivers, drainage, variable flow is very irregular both the space and time. The variable is the cross section of the channel, roughness, bottom slope, curves, flow and so on. The resulting lack terarutan flow analysis is very difficult to be solved analytically. In flow through open channels, the velocity distribution depends on many factors such as the shape of the channel, wall roughness and flow. Uneven velocity distribution at each point in the cross-sectional. Chow, Ven Te (1997).



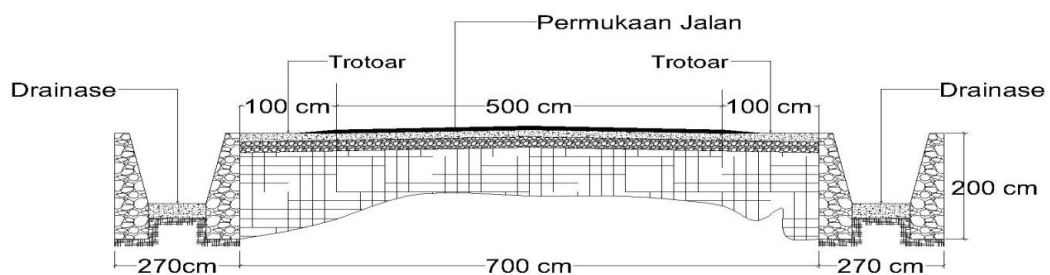
**Figure 1:** Distribution of velocity in open channel

The vertical velocity distribution can be determined by performing measurements at various depths. The more measurement points will give better results. Usually the velocity field measurements performed using the Current Meter. This tool is a propeller blades will rotate because of the flow which would then give the relationship between the angular velocity of the rotor blades at a flow rate.

### 2. Data Retrieval

After getting the data necessary data in the field, then the student authors, perform calculations to find flow in the drainage we review.

Data such data include:



**Figure 2.** Forms the channel and the road



**Figure 3.** Students measure the dimensions of Drainage

**Calculation:**

**Cross-sectional Area**

$$\begin{aligned}
 A &= Y ( B + my ) \\
 &= 0,37 ( 1 + 2 ( 0,37 ) ) \\
 &= 0,644 \text{ m}^2
 \end{aligned}$$

**Circumference of Damp**

$$\begin{aligned}
 &= B + 2y \sqrt{ 1 + m^2 } \\
 &= 1 + 2 ( 0,37 ) \sqrt{ 1 + 22 } \\
 &= 2,655 \text{ m}
 \end{aligned}$$

**Hydraulic radius**

$$\begin{aligned}
 &= \frac{ Y ( B + my ) }{ B + 2y \sqrt{ 1 + m^2 } } \\
 &= \frac{ 0,37 ( 1 + 2 ( 0,37 ) ) }{ 1 + 2 ( 0,37 ) \sqrt{ 1 + 22 } } \\
 &= 0,243 \text{ m}
 \end{aligned}$$

**Discharge Channel**

$$\begin{aligned}
 ( Q ) &= A \cdot V = A \times \frac{ 1 }{ n } \times R^{ 2/3 } \times I^{ 1/2 } \\
 &= 1,3641 \text{ m}^3/\text{dt}
 \end{aligned}$$

**IV. CONCLUSION**

From the results of theory and observation in the field is obtained on drainage water discharge on Perjuangan street not far from the location is 1.3641m<sup>3</sup>/ sec.The drainage 0.5 km from UNIMED is still quite good and infrequent flooded.Understanding of the way of students learn today is passive learning and making the process of active learning has increased.Students understand the purpose and objective of learning through field programs by adjusting theory given granted to students methods and evaluation processes in the implementation of lectures with group discussions. Ways of evaluating implementation of the lecture by giving the material, discussions and field examination later test questions to make students ready for use in the business world if the students graduated.





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## **INVESTIGATING EMOTIONAL HONESTY THAT EFFECT LEADER BEHAVIOR: A CASE STUDY ON VOCATIONAL HIGH SCHOOL HEADMASTER**

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**ABSTRACT:** *The objective of the research was to investigate the effects of emotional honesty, interpersonal skills and task structure on directive leader behavior. This research was conducted at Vocational High Schools (SMK) in Medan, using the survey method with 136 principals as population and the sample of 60 principals as respondents who were selected by applying proportional random sampling. The hypotheses were tested by path analysis. This research findings were as follows (1) There was a significantly direct positive effect of emotional honesty on interpersonal skills; (2) There was a significantly direct positive effect of emotional honesty on task structure; (3) There was a significantly direct positive effect of emotional honesty on leader behavior; (4) There was a significantly direct positive effect of interpersonal skills on leader behavior; (5) There was a significantly direct positive of task structure on leader behavior.*

**Key Words:** *leader behavior, emotional honesty, interpersonal skills, and task structure.*

### **I. PREFACE**

Vocational High School (SMK) has the expansion chance and distribution access nowadays, started with any government policy in 2008. Bambang Indriyanto 2008, p.10) explains that the government policy in vocational school are: (1) Expanding access about education in vocational school (SMK). Appropriate with necessary and local superiority, through adding program vocational education which more flexible agree with labor market demand; (2) Changing the vocational students ratio toward senior high school student; (3) Vocational school efficacy can increasing graduation competencies so that vocational school can decreasing unemployment and make available standard manpower which competitive advantage.

Vocational education not only has a role to prepare standard manpower which compatible but also as education institution which can decrease the unemployment. The vocational school role decrease unemployment can make by labor market way, but also have to able to provide opportunities for employment. The opportunities for employment that meant to be can conduct through Unit Produksi Sekolah (UPS) management in every majority which is professionally implementing the management functions well.

The reshuffle role which is significant gave fundamental effect toward the headmaster leadership. The headmaster have to able implementing management functions when leading their school. The main challenge to scars the changing that happened is needed the effective leadership, so the vocational school goal as the school organization can achieved well. But in fact, headmaster



leadership generally stills in problem. Wahyosumidjo (2008, p.460) explains that headmaster leadership still in problem in meaning, achievement, contribution which can be given by headmaster to achieve the school goal, not always like expected. Moreover Wahjosumidjo explains that the main caused problem headmaster leadership happened are organizational, headmaster personality and maturity level teacher subordinate, report, librarian, administration worker and students.

Leader behavior can define as leader behave in case to effecting another people, so that can achieved the goal well. The leader can behave directive, supportive, or participative. Leader behavior that meant to be is directive behavior. Leader behavior can affected by some factors, there are emotional honesty, interpersonal skill, and task structure.

### **LEADER BEHAVIOR**

Leader behavior taht analyzed in this study is directive behavior. Directive behavior is one of the leader behavior which be based on contingency theory. According to path-goal theory by House in Robbins and Coulter (2007, p. 529), there are four leader behavior, that are: 1) directive behavior (directive) is giving chance to the subordinate know what is expected from themselves, scheduling the task which must to do, and giving the specific guidance about how to finishing the work; 2) supporting behavior (supportive) is have a friendly attitude and care about subordinate needs.; 3) participating behavior (participative) is consulting with the subordinate and using their opinion before make a decision.; and 4) orienting achievement behavior (achievement oriented) is determining the goal which challenging and expecting the subordinate works in highest level. Based on path-goal theory, directing behavior will be more effective to the official employee who has ambiguity task compared with the employee who has the structured work, because producing the employee satisfaction which is higher. Directing behavior will producing a higher employee satisfaction, when in the team work has conflict.

Yukl (2007, p.259) explains that any three ways that could conduct by the leader in order to the directing behavior can increasing the subordinate efforts, there are: decreasing role ambiguity, increasing incentive scale, and empowering award dependence.

### **EMOTIONAL HONESTY**

Cooper and Sawaf (1998, pp. 1-28) explains that emotion is the source energy, effect, and information which is internal in character. Emotion, even its good or bad, has been exist since born. Which distinguish the result is what had done with using information and energy from there. Cooper and Sawaf explain moreover, in reality, feeling to give important information and potentially give profit every time. This feed back (from heart, not from head) which set fire to creativity, make people honest into themselves, make relationship which trusting each other, give lustrous guidance for live and career, guide people to the unexpected possibility, and even can save themselves or organization from destroyed. According to Goleman (2003, pp. 56-76) emotion can be intellectual, if the "emotion" put into "intellectual" area becoming personality intellectual. This personality intellectual is emotional intellectual basic, there are: identifying self emotion and managing emotion. Identifying self emotion it



means identify the feeling when the feeling is happen, this thing called emotional self awareness. Managing emotion is handle the feeling in order to the feeling can expressed rightly, and this skill depend on emotional self awareness. Because of people who have emotional self awareness is the people who can listen their conscience and understand their unconscious think. Listen the conscience is the important role of feeling as guide to going through current personal decisions whis is continually did in life. Martin (2008, pp, 49-160) explains that authentic self is individual who understand the existentce structure of themself. People life basicly have three layer, there are: 1) the first layer is self image, what is showed by someone socially and related to people rating; 2) second layer is self concept, self evaluation into ownself; and 3) third layer is layer which deeper is true self, is people self who real. Authentic personal is personal who really based on the deepest layer that is true self. True self is individual self which truth.

### **INTERPERSONAL SKILLS**

One thing that important but often did not concerned from leadership in field of education is leader skill to fill a position. According to Mumford in Hoy and Miskel (2008, p. 425), the most up to date model positioning that skills to solving the problem, skill to deciding one thing in social life, and knowledge make an effectiveness leadership became reality. Be in accordance with Mumford, Yukl and Northouse in Hoy and Miskel explains that any three important category from skill that are associated with effectiveness leadership, that are: 1) Technical skills, 2) Interpersonal skills, and 3) Conceptual or cognitive skills. From the third manager level (top managers, middle managers, first-line managers) apparently interpersonal skills (social) was very important that possessed by all manager level, that is 50%. Therefore, it could be concluded that interpersonal skills get the biggest portion for each leader in every leadership level.

### **TASK STRUCTURE**

According to Fiedler in Robbins and Coulter (2007, p. 524) that the pleasing situation for leader is when the relationship between the leader with the members are in good level, the task structure is in the highest level, and the power position is in strongest level.

Be in accordance with Fiedler, /Wexley and Yukl (2005, p.207) explains that the supporting of leadership position is determined by: 1) the level of leader work structure, 2) the power of leader position, and 3) the relationship between the leader with the members. When the leader work very structural, so it possible to specify the details appropriately about subordinate behavior and what necessary to implementing the work effectively, and easily to monitoring and evaluating the work implementation of subordinate. If leader has the strong position, so leader can handling the reward and punishment that can used to vouching the subordinate loyalty about the commands. And if the relationship between the leader with the subordinate good, then the leader will has reference power to completing the position power. Based on Wexley and Yukl, leader situation which very supporting when the work is structured, the position power which is strong, and the relationship between the



leader with the subordinate good. Meanwhile, the unsupporting situation when the work unstructured, the leader position is weak, and the relationship with the subordinate is not good.

## **THEORETICAL FRAMEWORK**

### **1. The effect of emotional honesty on interpersonal skills.**

Interpersonal skills is skills of a leader in order to can work with individu and have a good work relationship which cooperative. If this things connected with emotional honesty, so the headmaster will always loved by teacher and staffs because the headmaster who very care to the teacher and staffs and have empathy attitude, so the relation between the headmaster with teacher and staff will good. This opinion based on thought that emotional honesty from a headmaster will make possibility the headmaster have effective interpersonal relation with teacher and staff., but when emotional dishonesty which is often appear from a headmaster, so it will become latent problem in school organization which causing interpersonal relation between the headmaster with teacher and staff become wide apart. Based on this opinion can assumed that there was significantly direct effect of emotional honesty on interpersonal skills.

### **2. The effect of emotional honesty on task structure.**

Task structure is the high-low level task work formalization a leader to do their work. Task formalization of headmaster is the way to manage the teacher and staff behavior. In organization with high formalization, there is an analysis position which is clear, many organization rules, and procedure which defined clearly that including various work process. Meanwhile, when the formalization low, the work behavior relatively unstructured and the employee have many freedom in case how the way of them to do a task. Task structure consist of dimation: goal clearness, various path goal, can approved the truth of decision and specifying of decision. More higher the task structure level of headmaster that will be conduct it surely will be more satisfying the leadership situation. On the contrary, more lower the task structure level of headmaster so more disatisfying the leadership situation. If this thing connected with emotional honesty, so that the headmaster who has high emotional honesty will be more able to orienting themself to scars that task structured, because the headmaster had been able to have more obvious and authentic attitude to implementing the task. In task structure which high categorized, so the leadership situation will be more satisfying. Just the opposite, if the task structure of headmaster is in low categorized so the leadership situation will not disatisfying. So that, for headmaster who emotional honesty in high categorized and the task structure in high categorized also, the leadership of headmaster will be more effective.

### **3. The effect of emotional honesty on leader behavior**

Headmaster who honest to theirsself, care to another people, empathy attitude, doing something based on conscience, and has emotion energy, so the headmaster will be more grateful to the teacher and staff, so that the teacher and staff will following the headmaster sincerely and direction which accepted by the teacher and staff can implementing well. On the contrary, if a headmaster not grateful to teacher and staff, so the teacher and staff will not following the headmaster sincerely, rather



following just for compulsion. That condition made the headmaster will be difficult to manage and direct the teacher and staff, so that will provide ineffective leadership. Headmaster who can empathic to another people will can felt the feeling which is experienced. With the empathy skill to another people, so the headmaster will can directing the teacher and staff like what expected. This condition showing that emotional honesty has strong effect on leader behavior.

#### **4. The effect of interpersonal skills on leader behavior**

Leader behavior is the behavior way of a leader to effecting the subordinate, by giving leading and guidance to the subordinate . if this thing related with interpersonal skills, so the interpersonal skills will be able to the headmaster have good relationship with teacher and staff. If the relationship between headmaster and the teacher also staff was good, so the communication path headmaster with teacher and staff will be fluent, so will be more easily to effecting the teacher and staff. The importance to keep interpersonal relation by the headmaster is an exact strategy to can effecting the teacher and staff to do direction.

#### **5. The effect of task structure on leader behavior.**

Task structure is the high-low level task work formalization a leader to do their work. Task formalization of headmaster is the way to manage the teacher and staff behavior. In organization with high formalization, there is an analysis position which is clear, many organization rules, and procedure which defined clearly that including various work process. Meanwhile, when the formalization low, the work behavior relatively unstructured and the employee have many freedom in case how the way of them to do a task. If this thing is related to the directing behavior, so the headmaster success in directing the implementation of subordinate works is depending to high-low task structure level that will be doing. More and more higher level the headmaster task structure that will be doing, certainly will be more pleasing the leadership situation. Because of that, the high-low task structure level of headmaster will could influencing directing behavior, because the direction that given by headmaster will be more effective if supported by satisfying leadership situation.

### **HYPOTHESES**

Based on the theoretical framework which had been analyzed above, so can proposed some hypotheses as such: *First*, there was a significantly direct positive effect of emotional honesty on interpersonal skills. *Second*, there was a significantly direct positive effect of emotional honesty on task structure. *Third*, there was a significantly direct positive effect of emotional honesty on leader behavior. *Fourth*, there was a significantly direct positive effect of interpersonal skills on leader behavior. *Fifth*, there was a significantly direct positive effect of task structure on leader behavior.

### **II. METHOD**

This research was conducted in sixty government and private vocational school. This research was done by survey method. Instrument which was developed to collecting data was questioner. The total number of correspondent was 60 headmasters and 180 teachers that was taken random

proportionally from sample framework as much 132 vocational high school. The analysis regulation including: (1) appraisal error normality testing, (2) regression linearity testing, (3) regulation about assumption residue, causal plot, and interval scale. Normality testing conducted with Lilliefors test and Linearity test used regression model. For testing model which was developed in this research used analysis path with helped by AMOS computer program.

### III. RESEARCH RESULT

#### 1. **There was a significantly direct positive effect of emotional honesty ( $X_1$ ) on interpersonal skills ( $X_2$ )**

First hypothesis shows that there was a significantly direct positive effect of emotional honesty ( $X_1$ ) on interpersonal skills ( $X_2$ ). Based on the calculation obtained  $t_{test} = 3,794 > t_{table} = 2,002$ , it means  $H_1$  accepted. Testing result of research hypotheses shows that  $\rho_{21} > 0$  and path coefficient from  $X_1$  to  $X_2$  as much 0,446 is significant with value ( $\alpha < 0,05$ ). Concluded that there was a significantly direct positive effect of emotional honesty on interpersonal skills.

#### 2. **There was a significantly direct positive effect of emotional honesty ( $X_1$ ) on task structure ( $X_3$ )**

Second hypotheses shows that there was a significantly direct positive effect of emotional honesty ( $X_1$ ) on task structure ( $X_3$ ). Based on the calculation obtained that  $t_{test} = 4,005 > t_{table} = 2,002$ , so  $H_1$  accepted. Testing result of research hypotheses shows that  $\rho_{31} > 0$  and path coefficient from  $X_1$  to  $X_3$  as much 0,465 is significant with value ( $\alpha < 0,05$ ). Concluded that there was a significantly direct positive effect of emotional honesty on task structure.

#### 3. **There was a significantly direct positive effect of emotional honesty ( $X_1$ ) on leader behavior ( $X_4$ )**

Third hypotheses shows that there was a significantly direct positive effect of emotional honesty ( $X_1$ ) on leader behavior ( $X_4$ ). Based on the calculation obtained that  $t_{test} = 2,174$  and  $t_{table} = 2,003$  so  $H_1$  accepted. Testing result of research hypotheses shows that  $\rho_{41} > 0$  and path coefficient from  $X_1$  to  $X_4$  as much 0,206 is significant with value ( $\alpha \leq 0,05$ ). Concluded that there was a significantly direct positive effect of emotional honesty on leader behavior.

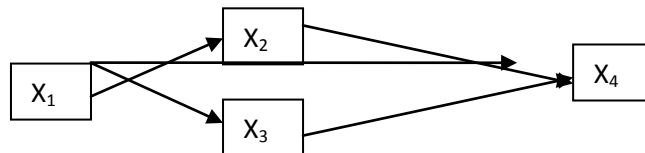
#### 4. **There was a significantly direct positive effect of interpersonal skills ( $X_2$ ) on leader behavior ( $X_4$ )**

Fourth hypotheses shows that there was a significantly direct positive effect of interpersonal skills ( $X_2$ ) on leader behavior ( $X_4$ ). Based on the calculation obtained that  $t_{test} = 5,010$  and  $t_{table} = 2,003$  so  $H_1$  accepted. Testing result of research hypotheses shows that  $\rho_{42} > 0$  and path coefficient from  $X_2$  to  $X_4$  as much 0,477 is significant with value ( $\alpha < 0,05$ ) Concluded that there was a significantly direct positive effect of interpersonal skills on leader behavior.

#### 5. **There was a significantly direct positive effect of task structure ( $X_3$ ) on leader behavior ( $X_4$ )**

Fifth hypotheses shows that there was a significantly direct positive effect of task structure ( $X_3$ ) on leader behavior ( $X_4$ ). Based on the calculation obtained that  $t_{test} = 2,350$  and  $t_{table} = 2,003$  so  $H_1$  accepted. Testing result of research hypotheses shows that  $\rho_{43} > 0$  and path coefficient from  $X_3$  to  $X_4$  as much 2,223 is significant with value ( $\alpha < 0,05$ ). Concluded that there was a significantly direct positive effect of task structure on leader behavior.

Situational leadership model on vocational education which is found can see in image 1.



**Image 1.** Leadership Model of Vocational Education

Explanation:  $X_1$  (emotional honesty);  $X_2$  (interpersonal skills);  $X_3$  (task structure);  $X_4$  (leader behavior)

#### IV. CONCLUSION, IMPLICATION, AND SUGGESTION

Leader behavior was direct effected by emotional honesty, interpersonal skills, and task structure. Meanwhile, interpersonal skills and task structure was direct effected by emotional honesty.

##### 1. The Effort to Increase Directive Behavior in Vocational High School

Emotional honesty of vocational high school headmaster still belong to sufficient categorized. Meanwhile, interpersonal skills of headmaster also still belong to sufficient categorized. Because of that to increasing leader behavior which is beter in vocational high school can conduct with increasing emotional honesty and interpersonal skills the headmaster also the task structure which satisfying.

##### 2. Suggestion

In held to increasing leader behavior which more and more better in vocational high school, so the headmaster should have emotional honesty and interpersonal skills which good. The things that should be concerned are; accustomed self to have authentic attitude, not using life mask, using good and right language in verbal nor written, able to cooperative with another people, and have social sensitivity to another people.

To government side should considering emotional honesty factor and interpersonal when appointment the headmaster of vocational high school.

Because of the limitation of this research which focused on testing the variable effect of emotional honesty, interpersonal skills and task structure on leader behavior still needed further research, because based on the hypotheses testing which conducted by researcher still saw any another variable (*epsilon*) which effecting the leader behavior of vocational high school headmaster.





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EI-05-009

## THE STUDY OF AVAILABILITY LAND USED TOWARD SUSTAINABLE CAMPUS DEVELOPMENT (CASE STUDIES IN SEVERAL LOCATIONS OF THE FKIP UNS CAMPUS)

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**ABSTRACT:** *The purpose of this research is to map the situation of the campus, the infrastructure observation and environmental conditions, towards strategy plan of a sustainable campus development on UNS campus (SebelasMaretUniversity of Surakarta Indonesia). The type of research is qualitative diskriptif focused on specific targets which consist of 3 of the 6 campus locations owned by the Faculty of Teacher Training and Educational sciences ( FKIP - UNS), namely PTK pabelan, PGSD and FKIP campus. The results showed that PTK Pabelan campus has wide land 18.774 m<sup>2</sup> (1.8774 Ha) which consists of 13.023 m<sup>2</sup> (69.37%) open spaced and 5.751 m<sup>2</sup> (30,63%) is developed area. PGSD campus consists of 27.619 m<sup>2</sup> (2.7619 Ha) wide of land, with a total area 18.540 m<sup>2</sup> (59%) is the open spaced and 11.079 m<sup>2</sup> (40,11%) is developed area, also FKIP Kentingan campus has 57.835 m<sup>2</sup> (5.7835 Ha) of wide land area, with 19.100 m<sup>2</sup> (33.02%) is the open spaced and 38735 m<sup>2</sup> (66,98%) is developed area.*

**Keywords:** *Sustainable land used -environmentally friendly material – a comfortable campus*

### I. INTRODUCTION

SebelasMaret Surakarta University (UNS) as one of the campus in Indonesia, is currently experiencing a rapid development of real fields, including the field of the green campus land arrangement. In the news [Republika.Co.Id](http://Republika.Co.Id), Surakarta, Tuesday December 2<sup>nd</sup> 2014, SebelasMaretUniversity (UNS) Solo will be made as a model of the implementation of "green campus" in Indonesia by the Ministry of environment and forestry, it is said by the Rector of UNS Ravik Karsidi. The award was given because the UNS has gained UI Green Matric ranking seven of Indonesia eco-friendly campus.

One of the campuses that support the success of the land arrangement is FKIP UNS which has the most extensive lands than any other faculty. With the large number of land owned by the FKIP UNS, will become a wealth and at the same time its own problems when there is not siteplan where the data is not permanently available in detail describe existing conditions (existing) including infra structure.

By considered progress and achievement recently, UNS in General and FKIP in particular, will require land/space that is always incremented, such developments should be examined carefully against the use of land (land used), since the power support of space there is a limit. In the explanation of the law No. 32, 2009 on the protection and management of the environment, explained that the use of natural resources must be aligned, in harmony and balance with environmental functions. As a consequence, policies, plans and/or development programs should be imbued by the obligation of conduct sustainable environment and achieving sustainable development.



In order to address the vision mission FKIP UNS (berkarakter kuat dan cerdas) with strong character and intelligent, then it should not be left out anyway, the specificity of the infrastructure and facilities owned by FKIP that must be developed by having a character, so that would be a trade mark (characteristic) of a college. Development of the characterized campus has become a necessity in order to be known by the public, for example the University of Indonesia (UI) in Jakarta, known as the program *go green campus*, is currently carrying out a the first special bike lanes in Indonesia. This program works with the concept of *green campus and world class campus* (green campus with international standard), which will be equipped with 1000 bikes to operated commuter line (local line). Such programs as evidence in solving issues related to *global warming*. (Antara, August 5<sup>th</sup> 2010).

Support the long-term strategic plan towards the development of the characterized FKIP UNS campus, then need to be prepared a data of land owned in order to become a data bank for the purposes of a more comprehensive development in the long term (RENSTRA) FKIP UNS. Data availability of land for the campus contains of themap situation and the condition of land use in support of the comfort of occupants of the land. The data also serves to study the development and management of campus space with environmental insight.

### **Power Support Environment**

Based on law No. 23 of 1997 about the management of the environment, article 1 point 6 states that the power support of environment as the ability of a living environment to support the mans living and other living beings. The statement above was reinforced by Sumarwoto's opinion (1997; 205) stated that the power support of environment pointed the ability of the environment to support human life and other living beings on an area of land. Darsono (1995; 18) expressed that the support power of environment is the ability to support life is in it. If power support environment exceeded then mankind will experience various difficulties. From the opinions above can be put forward that the power support that environment there is a limit, so, it's expected in a development must heed the power support, because people will have trouble if it does not heed the limits the ability of the environment.

The type of power support environment or the ability of the environment according to Tohir (1991) can be differentiated into four types, namely:

- a. Power support or the ability of environment to bear the load in the form of traffic, housing, sewage effluents, sports and so on, including the land power support.
- b. Power support or ability of the environment production, i.e. the ability of producing plants biomass, animals, dioxide and carbon dioxide substances, water and so on.
- c. Power support of environment information or environmental appeal because of the structure, shape, color, quality, depend on the structure, diversity and organization of ecosystems.
- d. Power support of the environment in the ability that is regulation or set ourselves to do the self cleaning to obtain the ecological balance.

### **Environment Capacity**



The conservation of environmental functions according to Law No. 23 of 1997 about the management of the environment, article 1 point 7 defined the environment capacity is a series of efforts to protect of the environment against pressure changes and/or the negative impact brought by the activities, in order to remain capable of supporting the mans living and other living beings. The term of the word "conservation" according to Hardjosoemantri (1999) comes from the word "sustainable" that means lasting, unchanging. When this is associated with the word sustainable environment, it means that the environment was not changed, still in the original state. Whereas in the implementation of development is a change, that change something desirable to achieve a better state, so that the case will not be the same as the original.

The term of conservation of environmental functions include the environment conservation and conservation of the environment ability. The harmonious and balance environment ability needs to be conserved, so the changes being held always accompanied by the efforts of achieving harmony and balance of the environment on a new level in order to bring harmony between development and the environment.

### **Campus Development With Envorinmental Insight**

Campus development should pay attention to the various requirements that served to achieve the desired needs. Construction of the campus would not be separated from the environment, both of these are interrelated and cannot be separated. In the construction of the campus must also comply the requirements specified by the Government. According to the decision of the Minister of the environment no. 4 of 2000, there were five (5) main principles in the construction of environmentally campus, namely: a) maintain and enrich the existing ecosystem, b) the use of minimal energy, c) Control of waste and pollution, d) keeping a socio-cultural system of the local continuation, e) Increased the understanding of the environment concept.

In line with the concept above, there are regulations that strengthen existing, some rules are:

- 1) Minister of Internal Affairs instruction No. 14 in 1988 About the set up of open green space in urban areas with the first goal of improving the quality of urban living environment in comfort, fresh, beautiful, clean, and as a means of security for the urban environment. Second, creating a harmony of the natural environment and the under jurisdiction environment that is useful for society.
- 2) Regulation of the Minister of public works no. 06/Prt/M/2007 March, 16<sup>th</sup> 2007 about the General guidelines plan of the layout of the building and environment (2007:20) states that the principles of intensity arrangement of the land use functionally include:
  - a) The clarity of the distribution of land use intensity, i.e. the direction of system settings and the distribution of the maximum floor area that can be built in various sub sections area so that created a magnitude space/buildings that will occupy the land in accordance with the respective provisions of the land applied.



- b) A humane scale and pedestrian-oriented, i.e. the creation of the environmental balance of the user-oriented pedestrian-friendly scale buildings, and turn the city space with various activities at the level of the pedestrian environment.
- c) The use of open spaces to give comfort to the environment in comparison to the scale of 60% to 40% as opposed to the open green space.

A comfortable campus (environmentally insight) is the dream of every community that is in it.

Criteria for environmentally campus equated with the housing or settlement, which can be approached with the fulfillment of some provisions as follows:

1) The adherence to the legislation in force, namely:

- a) Law No. 23 of 1997 about the management of the environment, article 3 point 1, b) Law No. 24 of 1993 about the space management, c) Law No. 4 of 1992 about housing and settlements.

2) Greening

Greening Studies conducted within the campus environment are:

a) Land wide

Land wide is assessed from a minimum of three criteria, namely:

- 1) the open green space, (2) the roadside, (3) the yard, (4) the land Limit contain of a) The types of crop planted and b) maintenance

3) Clean water management

a) Clean water management System

4) Dirty water management

- a) The existence of dirty water management System, (b) Dirty water disposal system, (c) dirty water disposal system.

5) Flood control

- (a) drainage system in compliance with the construction plan and function, (b) the existence of flood, how much is the frequency if its exist, (c) flood control facilities, (d) development participation and maintenance of on-site preventive flood.

## II. RESEARCH METHOD

In this study, researchers used the form of a qualitative descriptive study, with a single case study or case study were established which focus on specific goals (Sutopo, 2002:40-45). Researchers used field surveys, mapping the land, observations of the environment mapped, its was compared with the standards of land use, reforestation, handling of the floods, and the handling of garbage.

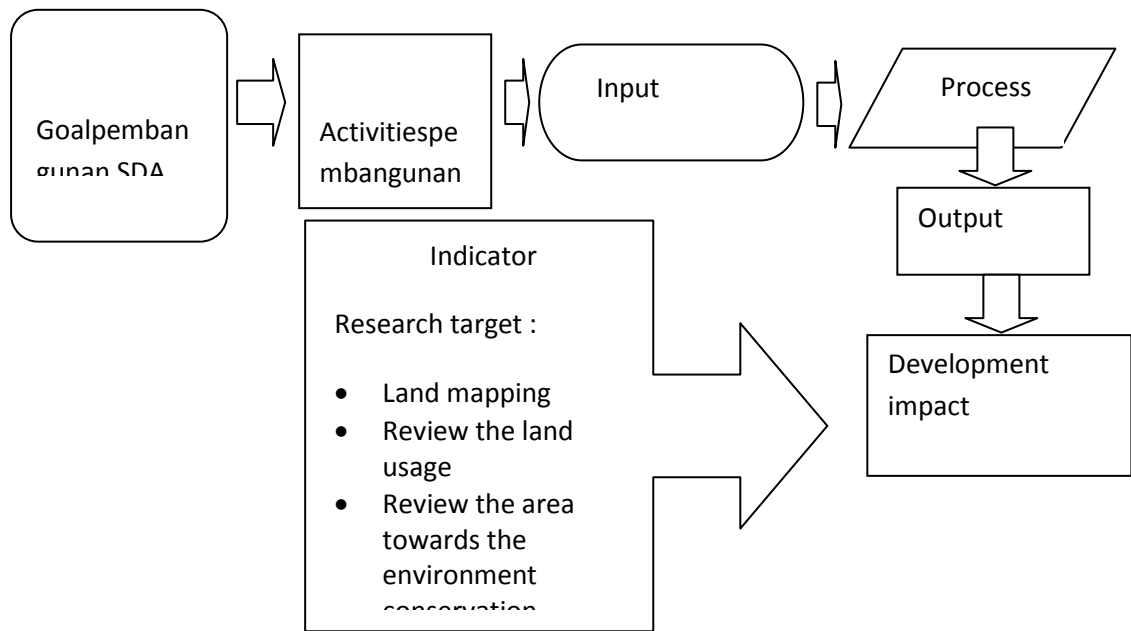
The object examined was the mapping of the land, the comparison of the develop land against the area of open area, and the evaluation of the situation of the land against environmentally campus needs.

Review of land facilities owned by FKIP UNS this time, noted there are 6 areas with separate

locations are: 1) Pabelan campus occupied by Ex the majors of vocational and technical education; 2) Kerten campus, occupied by the Teacher Education Primary Schools (PGSD); 3) Manahan campus assigned Education Sport and Health (POK); 4) Ngoresan campus assigned to student dormitories; 5)

Kebumen campus occupied by BKK PGSD; 6) Kentingan Faculty Campus occupied by most of the majors and programs of study/BKK as well as central control of the activities of the whole civitas Academica at the Faculty of pedagogy and educational sciences (FKIP) UNS.

The study of availability of FKIP UNS land reviewed from the strategic plan development sustainable campuses can be made of the chart as shown below:



**Picture1:** Evaluation planing chart towards the land condition

### III. RESULTS AND DISCUSSION

#### Campus Area Mapping

The early research have done by mapping areaof the FKIP campus, but due to some limitations, the mapping is done at 3 locations namely, the campus of education sport and health (POK), the campus of Department of teacher education primary School (PGSD) and the campus of Department of Vocational and technical education (PTK). From the mapping has been done, researchers got the extents of land mapped with a closed polygon as follows:

**Table 1 :**FKIP UNSArea

	A Building	B Building	C Building	D Building	E Building	F Building
Area (m2)	1161,040	1309,56	1185,43	581,66	1327.57	1327.56

	BEM Building	Galeri Building	UKM Building	Magister Building	Cafetaria	Parking lot
Area (m2)	116,55	157.98	374,45	1289,86	61,60	1622,40

	Road	Futsalcourt	Tenniscourt
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Area (m2)	4854,48	307,21	1316,86
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The total area of FKIP UNS building = 19100,95 m<sup>2</sup>

**Table 2.** PGSD Kerten area

	College building 1	College building 2	College building 3	College building 4	College building 5	College building 6
Area (m2)	2662,33	235,62	117,26	631,67	377,53	810,99

	Road	Parking lot 1	Parking lot 2	Tennis court	Volleyball court	Soccer field
Area (m2)	186,32	186,04	316,75	788,06	166,34	4414,13

The total area of PGSD building = 11079,29 m<sup>2</sup>

**Table 3.** PTK Pabelan area

	Lecturers & academic building	Hall	Practicum building 1	Machine practicum building	Construction practicum building	PTM lab 2
Area (m2)	592,43	255,27	504,53	373,84	377,53	155,05

	Construction Lab	Store room	Glass building	College building	Library	Mosque
Area (m2)	124,39	76,94	114,95	444,70	342,91	27,80

	Machine building	Parking lot	Road	Tower	Veranda 1	House
Area (m2)	80,97	569,69	1400,6	12,00	21,68	64,17

The total area of this building = 5751,68 m<sup>2</sup>

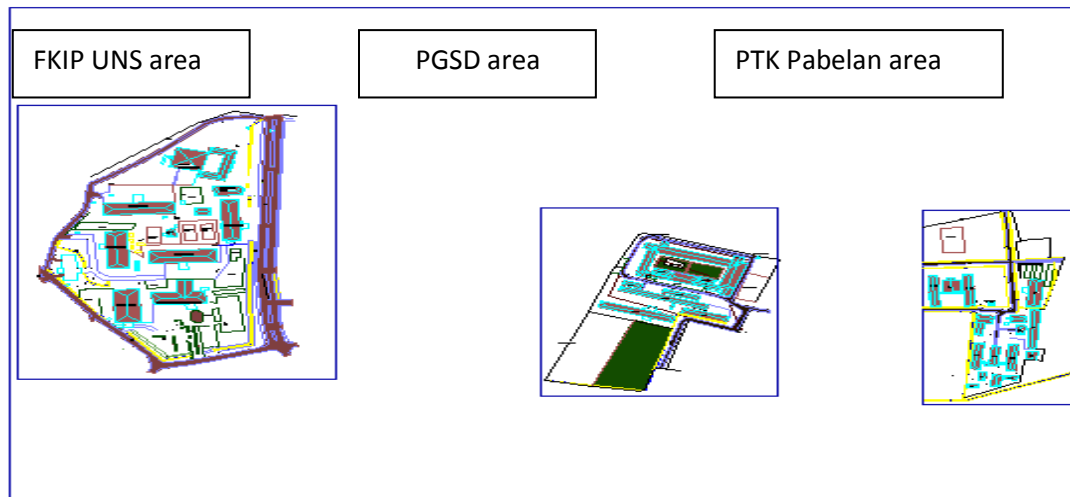
**Table 4.** The total area of land that was mapped as the following data:

	Total Area (m <sup>2</sup> )/ %	Built Spaces (m <sup>2</sup> ) %	Open Spaces (m <sup>2</sup> ) %
FKIP campus	57.835,53 (100%)	19100 (33.02%)	38735 (66,98%)
PGSD campus	27.619,57 (100%)	11.079 m <sup>2</sup> (40%)	18540 (60%)



PTK Pabelan campus	18.774,10 (100%)	5751 (31%)	13023 (69%)
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Following is site plan of FKIP UNS, PGSD, and PTK Pabelan land.



**Picture 2 : Mapping of land FKIP, PGSD, and PTK Pabelan  
The Adequate FKIP Campus Land Used With Environmentally Insight**

The adequate FKIP campuses land with environmentally insight can be observed from the observation of land environment with existing parameters on criteria and assessment of housing with environmentally insight on the three settlements legislation has been described above. As for the adequate land conditions that exist today in each area of the campus can be put on the chart below:

**Table 5. Regulation and Law Assessment**

	<b>Parameter and assessment criteria</b>	<b>The adequate area of the result of study</b>
Approval	construction license (principle permit, area permit, Building construction License,	Available
Area Design	site plan	Available
	Percentage of the land use and density is suitable with the regulations, i.e. 60% is developed and 40% is open land.	Appropriate

	The wide of the building is appropriate and the height of buiding is accordance with the regulations.	Appropriate
	A plus value when environmental studies done and utilized in the planning and designing of the area. There is evidence of study and its application.	Unavailable
	The existence of social and public facilities in accordance with the applicable provisions	Available, generally in the form of sports facilities. For Pabelan campus and PGSD are the most widely visited by the society for exercise, there are even school/SMK around campus which use the for exercise.

**Table 6.** Greening and Landscaping

	<b>Parameter and assesment criteria</b>	<b>The adequate area of the result of study</b>
1. Green strip	The highest value if the entire road has green strip at least along the main road	The green strip along the streetof campus is trustworthy thing of FKIP campusto get shade, with a variety of perennials with the diameter of the tree most of them are more than 20 cm.
2. Green space	Diversity and green space area provided (field sports, green park, etc).	Greening in FKIP campus is pretty nice and set well. Structuring the best green space exists in FKIP Kentingan where every tree was given the name and a

		large number of big trees.
3. Material	High value if the provided materials can absorb the water (Paving, Road, gravel, etc).	Pavingstreet has been implemented for more than 70% of the main roads and footpaths in FKIP Kentingan, the yard of Dekanat building, and also in the the PTK Pabelan department building.
4. Land space	The yard of building is green and well taken care, it has more value when the yard has a hard plant (height).	Green space in each land of the campus is still adequate. A plus given to FKIP campus and Pabelan campus which still have open area that is quite extensive and cozy yard.

**Table 7.** Waste management

	<b>Parameter and assesment criteria</b>	<b>The adequate area of the result of study</b>
1. The area is clean, well maintained and kept.		All FKIP campuses are clean its because be handed over on a private.
2. Rubbish bin	The rubbish binavailable in the public area, with enough load capacity.  A plus value if there is a recycling bin.	Waste management in FKIP uses the city garbage management, the garbage then transported to the disposal city.

**Table 8.** Flood control

	<b>Parameter and assesment criteria</b>	<b>The adequate area of the result of study</b>
1. Free flood area		All areas of FKIP campus is free of flood. This caused by the land



		surrounding the campus is composed of public places that have good water management.
2. Rain water disposal system	There are sufficient environmental drainage channels.	FKIP campus Kentingan with the contoured land. It has a rainwater sewerage large enough and sufficient.

#### IV. CONCLUSION

Based on the results of research and discussion on the implementation of research study about the availability of FKIP UNS land campus review of strategic plan development sustainable campuses can be drawn the conclusion that the comparison of total area compared to the open space and the build space campus is still in accordance with the regulation of the Minister of public works no. 06/Prt/M/2007 March, 16<sup>th</sup> 2007 about the General guidelines plan of the layout of the building and environment. Concluded that FKIP campus developed area based on sustainable campus.

#### V. SUGGESTION

1. To get an ideal campus, then all FKIP campuses should not add to the buildings horizontally, but can develop in vertical campus with remodel the old buildings.
2. FKIP campuses can improve the sustainability campus and winner of UI green matric competition held on annually UNS campus.

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**EI-05-010**

## **INTEGRATING THE QUALITATIVE AND THE QUANTITATIVE SWOT FOR DEVELOPING THE EFFECTIVE STRATEGIS WITHIN THE TECHNOLOGYCAL AND VOCATIONAL EDUCATION**

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**ABSTRACT:** *The study was to describe the results of a study regarding the implementation of SWOT concept that had been integrated qualitatively and quantitatively in order to develop the strategies in the process of drafting the strategic planning in the education domain. Strategic planning refers to the roadmap that guides an institution to go toward the objectives that will be achieved and in the process the strategic planning should be drafted through a sequence of appropriate analysis and methods. Within the System of Higher Education Unit Quality Assurance (SPMPT, Sistem Penjaminan Mutu Perguruan Tinggi), it has been mentioned that each Higher Education Unit should have strategic planning because strategic planning is the main reference for the achievement of overall quality standards within the national education system. Based on the theoretical and juridicial foundation, the researcher might conclude that the strategic planning that has been drafted under the appropriate method might increase the effectiveness and the productiveness of the strategy. Based on the preliminary study, the researcher found that the Strategic Planning Team in several High Education Units had some difficulties in drafting the strategic planning. The difficulties were caused by several factors and one of these factors were the lack of understanding toward the concept and the method that should be used in drafting the strategic planning. Then, the objects of the study was the Department of Technological and Vocational Education, the Faculty of Teachers Training and Education, Surakarta State University Surakarta and the Department of Technological and Vocational Education, the Faculty of Teachers Training and Education, Sarjanawiyata Tamansiswa Yogyakarta University. The subjects of the study were the Team of Strategic Planning Formulation, the Head of Department and Study Program and the related stakeholders. The results of the study shows that the formulation of strategy has been a job that demands serious attention regarding the fact that Higher Education Unit has unlimited internal and external environment. As a result, the Higher Education Unit demands special attention in performing the environmental analysis. The SWOT analysis that integrates the qualitative and the quantitative method has been able to provide practical and effective guide for developing the strategic issues into the strategy itself.*

**Keyword** : *sources of Technological and Vocational Education, SWOT integration, effective strategic planning*

### **I. INTRODUCTION**

With the implementation of Strategic Business Unit-based Higher Education Unit management system, each Department and even each Study Program is demanded to have strategic planning. In the efforts of improving the quality and the relevance of the graduates, the Technological and Vocational Education is demanded to have the effective and efficient strategic planning. Many organizations, both the profit and the non-profit ones, draft their strategic planning by referring to the SWOT analysis; however, in the reality most of the planners have difficulties in implementing the SWOT analysis appropriately. Based on a preliminary study toward the Strategic Planning Team of Technological and Vocational Education in three universities (Surakarta State University Surakarta. Sarjanawiyata Tamansiswa University Yogyakarta and Cendana University East Nusa Tenggara), the teams in the three universities had some difficulties in implementing the SWOT analysis appropriately. The



difficulties had been caused by several factors and one of these factors were the lack of understanding toward the concept and the method that should be used in performing the SWOT analysis. Other factors that caused the difficulties were the lack of support provided by the leaders and the minimum fund that had been available. These inhibiting factors have caused the formulation of strategic planning to slightly miss the objectives that will be achieved. Even there have been many organizations/institutions perform the activity program (the strategy) without having been based on the previous planning.

## **1. Strategy**

In the Oxford English Dictionary, strategy refers to a plan, a method or a sequence of tactics (maneuver) for achieving the objectives that have been set. On the other hand, according to Oster (1999: 2), strategy is a commitment to perform a set of action that will be better from the other set of action. Hitt (2005: 7) defines strategy as a set of coordinated and integrated action planning for exploiting the existing capacity and for gaining the competitive edge.

Abraham (2006: 7) describes that Strategy is how actually a company competes. The statement implies a definition that strategy shows how an organization actually has the capacity in performing its capacities. Strategy is related to what an organization conducts and how the activities of an organization should be well implemented within the planning. Meanwhile, Allio (1990: 8) defines that strategy is the art of deploying resources toward market opportunities in a way that distinguishes a business from its competitors.

Bryson (2006: 7) states that strategy might be defined as a pattern of objectives, policies, programs, actions, decisions or resources allocations that shows the true identity of an organization, the activities that the organization performs and the reasons behind performing these activities. Thereby, strategy is the expansion of the mission to facilitate the organization with its environment. The strategy is generally drafted for responding to the strategic issues and serves as the guidelines of organization's responses toward the fundamental option of policy. If the approach of general objective is implemented then the strategy will be formulated to achieve the general objective and if the approach of vision is implemented then the strategy will be formulated to achieve the vision. Tedjo Tripomo (2005: 46) suggests that strategy is a planning of what an organization would like to be or would like to achieve in the future (direction) and how to achieve the expected position (route).

In the Substantial Dictionary of *Bahasa Indonesia* (p. 1092) strategy means: (1) a science and an art of deploying all of the national resources in performing certain policies within the war and the peace; (2) a science and an art of commanding the troopers in battling the enemies under the advantageous situation; (3) a careful plan regarding the activities of acquiring specific targets; and (4) a good place according to the war strategy. On the other hand, still from the source, strategic means: (1) having been related to, been associated to and been based on the strategy; and (2) good position. Thereby, the researcher would like to conclude that strategic means having been based on a smart plan regarding the activities of acquiring specific targets.



Based on the definitions that have been provided above, actually the managerial experts explain that strategy has the following definition: (a) having been the long term objectives for achieving the competitive edge; (b) having been the adaptive response toward the upcoming situations; (c) having been increasingly continuous activities; (d) having always been customer-oriented; (e) having been the motivational strength for the host and the community; (f) having departed from opportunity and threat and strength and weakness; and (g) having always departed from what might happen instead of what has happened. Strategy is the combination of concept and art of formulating, implementing and evaluation in order to achieve the organizational objectives.

Historically, the term strategic initially means tactics, plans and methods that have been used by the military domain specifically for gaining victory in a war. In the subsequent stage the strategy is applied in the business domain that aims to gain victory over the competition of product and service quality. Strategic means having been based on smart tactics, methods and plans regarding the activities of acquiring specific targets. Regarding the extraordinary contribution, the term strategic has been frequently implemented in the public or non-profit sectors. As a result, the Institutions of Technological and Vocational Education that operates in the public and the non-profit sectors, with their business that is related to the graduates and the science, should implement the strategic pattern in order to gain the objectives that have been set.

## **2. SWOT**

SWOT is one of the managerial tools that have been implemented for performing the environmental analysis within the process of strategic planning draft. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. The matrix of SWOT analyzes the internal strengths and weaknesses as well as the opportunities and threats in order to attain the promising strategy in the future (Rauch, 2007). It should be noted that SWOT has been a strategic device for accomodating the internal strengths and weaknesses altogether with the external opportunities and the threats.

SWOT Analysis is a systematic analysis for identifying the internal and the the external factors of an organization and then the systematic analysis will be implemented as the basis for designing and formulating the strategy and the working program. So, through the analogy of multiple factors, a strategic team might present four types of strategy namely SO, ST, WO and WT (Abraham S.C., 2005: 36).

The internal analysis covers an assessment toward the factors of Strengths and Weaknesses. Meanwhile, the external analysis covers an assessment toward the factors of Opportunities and Threats. There are two types of approach in the SWOT analysis namely the qualitative approach of SWOT matrix and the quantitative approach of SWOT matrix (Rangkuti, 1997: 17).

The qualitative approach of SWOT matrix, as having been developed by Kearns, displays eight boxes as follows: the two boxes on the top belong to the external factors (Opportunities and Threats) and the two boxes on the left belong to the internal factors (Strengths and Weaknesses). The other four



boxes refer to the strategic issues that occur as the results of meeting points between the external and the internal factors.

## II. RESEARCH METODOLOGY

In the study, the researcher selected the Construction Engineering Education Study Program (PTB, *Pendidikan Teknik Bangunan*), Faculty of Teachers Training and Education, Surakarta State University Surakarta as the model. The focus of the study was to formulate the strategy for the Construction Engineering Education Study Program by implementing the qualitative and quantitative SWOT analysis. The internal and external variables that would be analyzed in the study covered 15 components (Table 1). Then, the steps that the researcher took in order to formulate the strategy for the study program were as follows.

### Step 1: Identifying the internal-external factors (qualitative SWOT analysis)

The objective of performing the first step was to classify the key factors that influenced toward the improvement of educational quality in the Technological and Vocational Education both internally (SW) and externally (OT). In this step, the planning team would develop the internal and the external key factors in the form of questions/statements list that would be turned into a questionnaire.

### Step 2: Performing the quantitative SWOT research

In this step, the strategic planning team performed a quantitative SWOT research by means of the instrument (the questionnaire) that had been generated in Step 1. The respondents were the planning team, the related lectures, the university student and the other stakeholders that had influence; the total number of the respondents was 100 persons for each study program. The researcher selected the sample by means of purposive sampling. By performing the SWOT quantitative researcher, the strategic issues would be uncovered.

### Step 3: Looking for the quadrant position qualitatively and quantitatively

Based on Step 2, the researcher might define the quadrant position of the organization under review both qualitatively and quantitatively. By subtracting S by W and O by T, the researcher would find acquire the quadrant position of the organization. Based on the quadrant position, the researcher might predict to which direction the organization would be developed.

### Step 4: Developing strategies

Based on the strategic issues that had been attained from the qualitative SWOT research, the strategies now might be developed. The method that the researcher implemented for accomplishing this step was the qualitative SWOTmatrix that contained eight boxes. These boxes contained the strategic issues from each SWOT and the strategies among SO, ST, WO and WT. By balancing the internal and the external factors, the strategy might be developed.

### Step 5: Defining the alternative strategy

This step was the continuation of Step 4. In this step the strategic planning team performed inventory toward multiple strategies that might be defined in order to answer the strategic issues that had been attained from Step 2. These multiple strategies then would be regarded as the alternative



strategies; in other words, all of the existing strategies had the same opportunity to be selected as the chosen strategy. The more alternative strategies that the strategic planning team had, the easier the strategic planning team would decide one of the best chosen strategies.

#### Step 6: Chosen Strategy

Step 6 provided multiple options of strategy (alternative strategies). In this step, the strategic planning team performed careful analysis toward the existing alternative strategies in order to decide the best strategy that would totally respond to the strategic issues. In finding an effective way for avoiding the ambiguity and the subjectiveness on the decision, the strategic planning team might refer to qualitative SWOT diagram (the quadrant position for each variable). In this step, the team might also recapitulate the options of strategy that might be suggested to the decision makers for making the strategic program decisions.

### III. RESULTS AND DISCUSSIONS

#### 1. Results of Quantitative SWOT Research

Based on the results of quantitative SWOT research, the researcher would like to display the score recapitulation from each variable. Based on Figure 1, it was apparent that the organization (namely the study program) belonged to Quadrant I (positive, positive). The position implied that the Construction Engineering Study Program had been in the strong condition and had gained opportunities. Therefore, the researcher would like to recommend the Progressive strategy. The progressive strategy means that an organization is fit and is established so that it is very possible for the organization to expand their development and to gain opportunities maximally for the sake of continuous improvement.

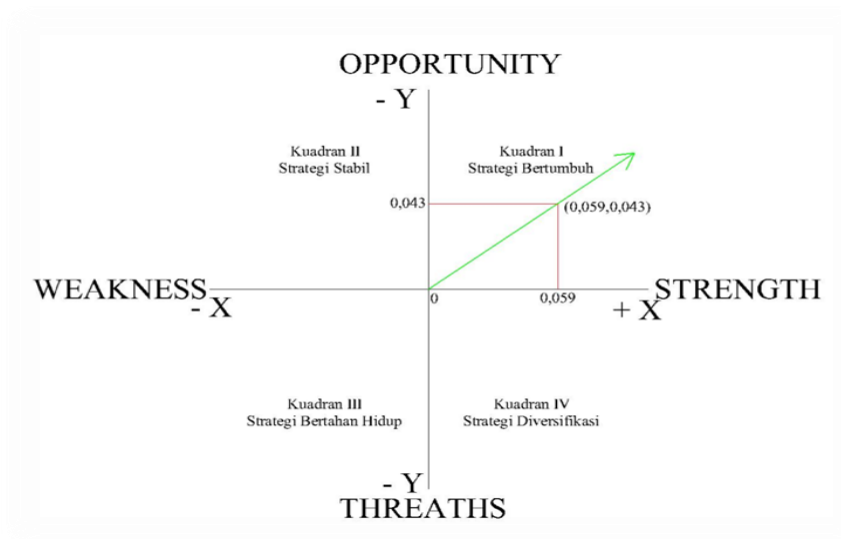
The description of the organization's position above that depicts that the organization had been in the strong condition and had gained opportunities might be a generally enjoyable sentence. What should be given attention was that mathematically the different number within the different angle under the same quadrant might be translated into the different language of strategy. Furthermore, the strategic planning team should remember that the statement above was still general (quantitative) and would be meaningful if the strategic planning team followed up the general description into the partitions (qualitative). It is the qualitative description that will be useful for the Team in developing the strategy of each variable.

**Table 1:** The recapitulation of SWOT analysis in the Civil Engineering Education Study Program

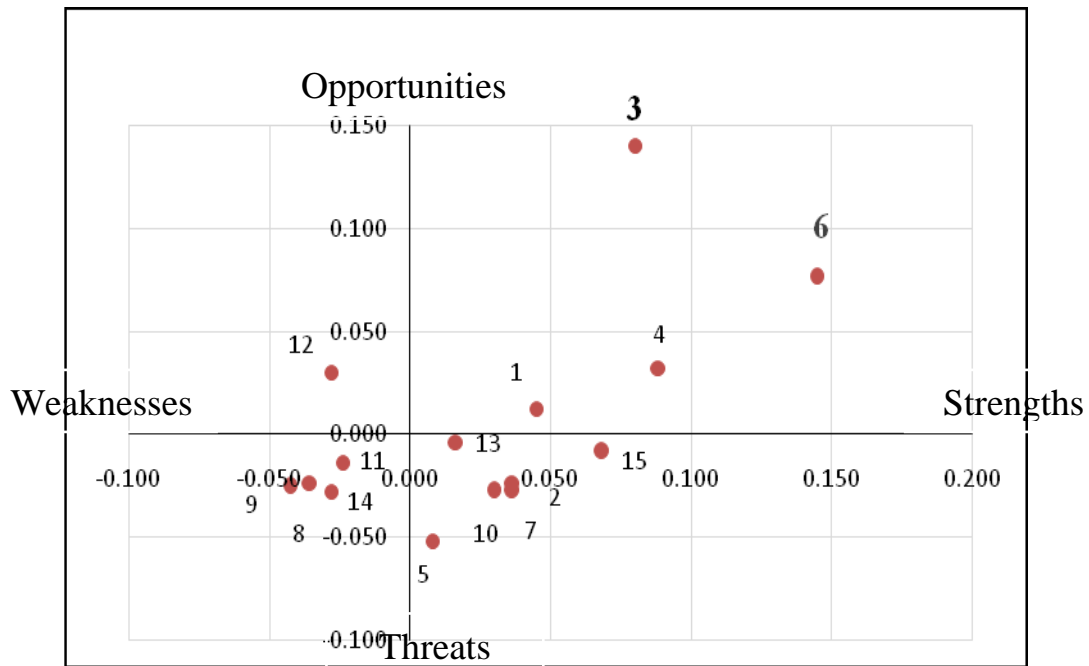
No	Variable	S	W	O	T	Axis x	Axis y
1.	Vision and Mission	0,231	0,186	0,240	0,228	0,045	0,012
2.	Students	0,260	0,224	0,256	0,280	0,036	-0,024
3.	Curriculum	0,304	0,224	0,320	0,180	0,080	0,140
4.	Lecturers	0,296	0,208	0,336	0,304	0,088	0,032
5.	Facilities	0,268	0,260	0,256	0,308	0,008	-0,052
6.	Finance	0,252	0,107	0,224	0,147	0,145	0,077

7.	Learning Process	0,306	0,270	0,351	0,378	0,036	-0,027
8.	Management	0,232	0,268	0,296	0,320	-0,036	-0,024
9.	Role of Business and Industrial	0,138	0,180	0,175	0,200	-0,043	-0,025
10.	Information and Communication Technology	0,170	0,140	0,148	0,175	0,030	-0,027
11.	Production Unit	0,100	0,124	0,130	0,144	-0,024	-0,014
12.	Cooperation	0,120	0,148	0,190	0,160	-0,028	0,030
13.	Government Role	0,288	0,272	0,288	0,292	0,016	-0,004
14.	Technician/Laborant	0,108	0,136	0,120	0,148	-0,028	-0,028
15.	Research and Service	0,308	0,240	0,312	0,320	0,068	-0,008
	<b>Total</b>	<b>3,381</b>	<b>2,987</b>	<b>3,642</b>	<b>3,584</b>	<b>0,43</b>	<b>0,059</b>

Based on Table 1, the researcher might define the position of Construction Engineering Education Study Program as follows.



**Figure 1.** The position of Construction Engineering Education Study Program  
 Figure 1 above displayed the position of the institution quantitatively (general), while Figure 2 below displayed the position of each variable.



**Figure 2.** The Quadrant Position of Each Variable  
(Source: Results of the Study)

Based on Figure 2, the researcher might interpret the meaning of each point. For example, point 1 (vision and mission) belonged to quadrant 1 and therefore the meaning was that the vision and the mission of organization had been in the strong condition and had gained opportunities to be implemented as the basis of the direction toward achieving the organizational objectives. Point 15 (P2M) belonged to quadrant 3. Point 15 implied a statement that actually the study program had enormous human resources capacity but there were some inhibiting factors that caused the P2M to be stagnant. The recommendation was that the Construction Engineering Education Study Program should change the strategy in order to maximize the already possessed capacity so that the study program might avoid the threats related to the P2M. Under the same pattern, the strategic planning team might develop a strategy by creating the qualitative SWOT matrix for each variable by viewing the location of the point for each variable.

Up to this step, the strategic planning team had accomplished the internal and external environmental analysis. Then, based on the findings that had been attained from the quantitative SWOT analysis, the team might proceed to the next step in order to uncover the strategic issues, the strategy development and the strategy alternatives by performing the qualitative SWOT analysis.

## 2. Strategic Issues, Strategy Development and Strategy Alternatives

This part of the study would like to answer three problem formulations in a row namely to find the strategic issues, the strategy development and the strategy alternatives in order to handle the existing strategic issues. The three problem formulations might be handled by implementing the qualitative SWOT analysis.

In this step, the strategic planning team should design tables for each variable. By referring to the quantitative SWOT analysis, the researcher would like to display the simulation of the analysis (Table 2).

Under the similar manner, the team might also develop the strategy for the other variables. If 15 variables had been analyzed by means of qualitative-quantitative integration technique then the next step would be that the team should perform another review and, as a result, the team would find that there had been several strategy alternatives that might be selected. These strategy alternatives should be selected and be decided as the strategy alternatives. The strategy alternatives that had been decided by the team would be recapitulated and be turned into the documents of the institution's strategy development.

**Table 2.** The qualitative analysis for deciding the strategy in the factors of Construction Engineering Education Study Program students

EXTERNAL INTERNAL	OPPORTUNITIES	THREATS
		A. There has been the capacity of working independently
STRENGTHS	Strategy-SO	Strategy-ST
1. The students have the high level of Academic Potentials. 2. The students' learning motivation	<ul style="list-style-type: none"> <li>- Increasing the scholarship allocation through by improving cooperation with the governmental/private institutions for the students who have achievements in the academic domain and the skilll domain (1 &amp; A).</li> <li>- Increasing the intensity of coaching vocational high schools, scientific week, practical job course and teaching practice as part of students' activities (1, 2 &amp; A).</li> </ul>	<ul style="list-style-type: none"> <li>- Increasing the students' involvement in the research and community research and service activities conducted by the lecturers</li> <li>- Providing opportunities of researcg for the students under the authority of the lecturers</li> </ul>
WEAKNESSES	Strategy-WO	Strategy-WT
1. The students' creativeness has not been empowered. 2. The students who gain achievements have not been provided with appropriate award.	<ul style="list-style-type: none"> <li>- Improving the students' competence in the English language, the ICT, the soft skills and the life skills (1&amp;A)</li> <li>- Increasing the students' project-based creative study (1&amp;A)</li> <li>- Providing appropriate reward for the students who become the assistant lecturer and win contests for the Study Program (2&amp;A)</li> </ul>	<ul style="list-style-type: none"> <li>- Increasing the training on the students' creative study (1&amp;A)</li> <li>- Composing a Remote Study Circle in the Construction Engineering Education (1&amp;A)</li> <li>- Requiring the students to compose at least one creative study (1&amp;A)</li> <li>- Facilitating the students who pass the students' creative study competition (2&amp;A)</li> </ul>

Up to this step, the strategic planning team had already had a list of strategic planning but they did not have the priority of the strategy yet. The followings were the results of recapitulation.

**Table 3.** List of strategy alternatives for the Construction Engineering Education Study Program

No	Strategy Formulation	Variables
1	Strengthening the human resources capacity for achieving the vision and mission	Vision and Mission
2	Establishing a more qualified relationship with the partners	Vision and Mission – Cooperation – Role of Business and Industrial Domain
3	Empowering the students' creativeness	Students
4	Improving the research-based learning (RBL) and the work-based learning (WBL)	Students – Research and Service – Facilities
5	Strengthening the top-priority courses	Curriculum
6	Empowering the lecturers under the <i>Tridharma</i> of Higher Education Units	Lecturers
7	Establishing virtual laboratory	Facilities
8	Holding vocational training programs	Finance
9	Improving the effectiveness of science week	Learnign Process
10	Increasing the effectiveness of learning evaluation	Learning Process
11	Developing the Customer Relationship Management	Management
12	Improving the students' soft skills competence	Role of Business and Industrial Domain
13	Holding expert (practitioner) lecture for the productive courses	Role of Business and Industrial Domain
14	Improving the service by means of Information Technology implementation	Information and Communication Technology
15	Holding regional, national and international scientific seminars	Cooperation – Community Research and Service
16	Opening new study programs in accordance with the direction of government's policy	Government's Role
17	Improving the achievement of grants especially for the Community Research and Service	Research and Service

#### IV. CONCLUSIONS

The Institutions of Technological and Vocational Education are the organizations that have unlimited resources. The role of these institutions are very strategic in supporting the economic development and the improvement of national competitive edge. Therefore, the Institutions of Technological and Vocational Education should work hard in order to be able to formulate effective strategy for the sake of realizing the expectations of Indonesian people. The strategic planning for these institutions should be drafted in such a way that the improvement of these institutions and their role in increasing the quality as well as the relevance within the education domain might be monitored



and be evaluated measurably. In order to formulate the strategy within the strategic planning, there should be careful environmental analysis so that the strategic planning team will attain the effective strategy. The integration of qualitative and quantitative SWOT has proved to be effective in formulating the strategy for the Technological and Vocational Education Education.

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EI-05-011

## THE OVERBURDEN BLAST PLANNING STUDY OF BANKO BARAT PIT I MINE PT BUKIT ASAM (PERSERO) TBK, TANJUNG ENIM, SOUTH SUMATERA

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**ABSTRACT :** PT Bukit Asam (Persero) Tbk Coal mining activity is conducted an open pit system. Its activities include the exploration, land clearing, soil removal, overburden removal, coal mining, hauling, processing and coal marketing. The overburden blast planning was examined by applying ripping method. The ripping method wasn't efficient and economicly advantage because it would spend high cost and take a long time, so it will be planned a blasting activity in order to make overburden blast more efficient and quickly. The overburden blast technical of Banko Barat Pit I Mine was used ripping-dozing method and will be planning the blasting method. Banko Barat Pit I Mine B2-C layer is in the Rock Mass Class II with 62 total RMR (Rock Mass Rating), 61% RQD (Rock Quality Designation), 46,16 Kpa maximum compression strength, 5,14 Mpa for maximum UCS, and the density of the area is 2,45 ton/m<sup>3</sup>, thus the B2-C layer can be stated with good rock conditions and its blast can be conducted by using ripping or even blasting method. The blast cost with ripping method is Rp. 3.519,-/BCM where as for blasting method is Rp. 2.218,-/BCM. The ripping is more efficient and economicly advantage to apply at overburden blast volume below 91.000 BCM where as the more of 91.000 BCM its volume the more efective the overburden blast with blasting method.

**Keyword :** The overburden blast, Ripping, Blasting, Cost

### I. INTRODUCTION

PT Bukit Asam (Persero) Tbk (PT BA) Tanjung Enim is one of State Owned Company that conducts in coal mining. PT Bukit Asam (Persero) Tbk has Mining Business Permit includes 7,700 Ha for Tambang Air Laya's area, Muara Tiga Besar 3,300 Ha, and Banko Barat 4,300 Ha. The overburden blast that used by PT Bukit Asam (Persero) Tbk was ripping method. This method had low productivity for equipments so production forecast was unoptimum.

In order to get technical and economic mining activity more effcient and effective then it should be conducted the preliminary study to figure out the best overburden blast method.

The quality of Banko Barat Pit I Mine PT. Bukit Asam (Persero) Tbk coal has BB55 type with 5500 kkal/kg calory. The coal production forecast can be seen at table 1 belows.

**Table 1.** Coal and Overburden Production Forecast 2016 - 2017

Description	Year	
	2016	2017
Coal	3.498.000 Ton	3.498.000 Ton
Overburden	8.745.000 BCM	8.745,000 BCM

*Sumber : PT. Bukit Asam (Persero) Tbk, Long Term Work Unit Plan*

As suited to Rock Mass rating Data that has been collected by The Detail Exploration Work Unit, so B2 – C layer is in Class II with 62 total RMR, 61% RQD, and 4616 Kpa maximum



compression strength, 5,14 Mpa maximum UCS, and 2,45 ton/m<sup>3</sup> material density, B2 – C layer is sandy clay siltstone classified as good rock category and its blast can be conducted with tipping and blasting. In order to determine productivity of bulldozer while dozing/excavating operation can be decided with the equation (*Application Handbook Komatsu*, 2007). The blasting calculation that will use R.L.ASH equation.

The factors that effect equipments rent cost calculation is depreciation. Depreciation is the assigning or allocating of a plant asset's cost to expense over the accounting periods that the asset is likely to be used. Depreciation cost is distributed based on life time equipments each year with straight line so the beginning project wouldn't be high. Operating cost are costs associated with running equipments or costs that needed to operate the equipments.

The factors that effect blasting cost calculation such as rocks condition, drilling cost, and blasting cost.

The aims of this research is to calculate overburden production and its blast cost with ripping method, figure out the appropriate geometry to blasting plan, calculate overburden production and blast cost with ripping method at Banko Barat Pit I Mine PT. Bukit Asam (Persero) Tbk. Regard to those matters, the author want to examine a research “**The Overburden Blast Planning Study Of Banko Barat Pit I Mine Pt Bukit Asam (Persero) Tbk, Tanjung Enim, South Sumatera**”.

## **II. RESEARCH METHODOLOGY**

This research was conducted on August, 2015. The location was in PT Bukit Asam (Persero) Tbk, Tanjung Enim South Sumatera The methodology that used is quantitative research. This method is explaining phenomena by collecting numerical data that are analysed using statistic mathematically. This research directs to explorative experiment which is a research that provide answers of the questions, give practical solutions of matters questioned. In conducting this research, there were two primary data such as bulldozer cycle time, blasting geometry, explosives number, and blasting pattern. The secondary data from the company was included to this research .

The bulldozer cycle time process is to obtain bulldozer productivity and overburden blast cost with ripping method. Afterwards, to obtain blasting geometry calculation with R.L. Ash equation, then it will be calculated the overburden blast cost with blasting method and compare both of the overburden blast method.

## **III. RESULT AND DISCUSSION**

### **1. Materials Characteristic of Banko Barat Mine Pit I**

The B2 – C layer is classified in class II with 62 total RMR, 61% RQD, and 4616 KPa = 5 MPa maximum compression strength, 5,14 Mpa UCS and 2,45 ton/m<sup>3</sup> material density, material of B2 – C layer is sandy clay siltstone group with good rock condition and its blast can be revealed by ripping or even blasting method.

### **2. Productivity of Bulldozer D375A**



$$\begin{aligned}
 QD &= q \times \frac{60}{cm} \times e \times E \\
 &= (q^1 \times a) \times \frac{60}{CT \text{ dozing}} \times e \times E \\
 &= (18,5 \text{ m}^3 \times 0,8) \times \frac{60}{0,5 \text{ minute}} \times 0,7 \times 0,85 \\
 &= 1018,98 \text{ m}^3/\text{hr} \\
 QR &= RP \times D \times \frac{60}{CT \text{ ripping}} \times FK \\
 &= 1,075 \text{ m}^2 \times 20 \text{ m} \times \frac{60}{0,6 \text{ minute}} \times 0,58 \times 85\% \times 90\% \\
 &= 1025,50 \text{ m}^3/\text{hr} \\
 Q &= \frac{QR \times QD}{QR + QD} \\
 &= \frac{1018,98 \text{ m}^3/\text{hr} \times 1025,50 \text{ m}^3/\text{hr}}{1018,98 \text{ m}^3/\text{hr} + 1025,50 \text{ m}^3/\text{hr}} \\
 &= 511,12 \text{ m}^3/\text{hr}
 \end{aligned}$$

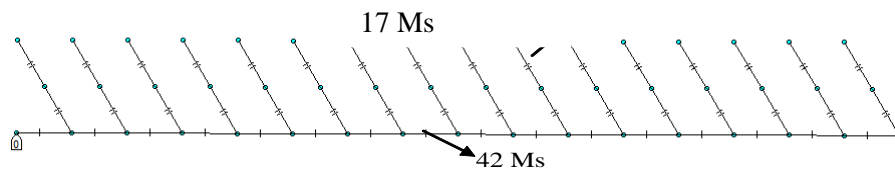
### 3. Blasting Geometry

**Table 2. Geometri Peledakan**

Blast Geometry	Unit	Drilling
Hole Diameter	Mm	171
Burden	Meter	6
Spacing	Meter	7
Bench Height	Meter	13
Sub drill	Meter	1
Stemming	Meter	6
Coloum of charge	Meter	6
HoleLength	Meter	12
Loading Density	kg/m	19.2
Powder factor	kg/BCM	0.22

### 4. Blasting Pattern

The blasting pattern that will be planned to Banka barat Pit I area is control echelon where as the switch pattern is hole by hole which can be seen at Figure 1 below.



**Figure 1. Blasting Pattern**

### 5. Blasting Cost

**Table 3. Blasting comparative cost**

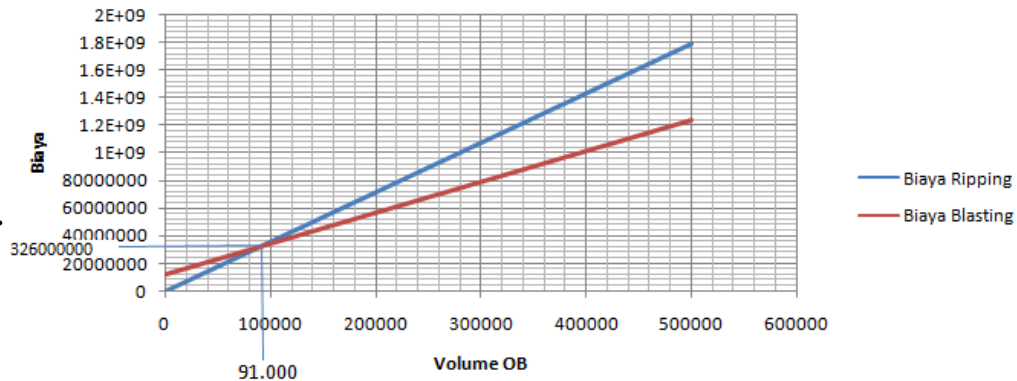
Description	Blasting	Unit
Ripping	3.591,-	Rp/BCM
Blasting	2.218,-	Rp/BCM

**Table 4. Comparative cost of overburden blast**

Year	The total cost of overburden blast
------	------------------------------------

	<i>Ripping</i>	<i>Blasting</i>
2016	Rp. 31.403.700.000,-	Rp 19.399.500.000,-
2017	Rp. 31.403.700.000,-	Rp 19.399.500.000,-

Figure 2.



Regard to graphic above it explained that at 91,000 BCM of overburden volume can be finished by ripping and blasting method. The cost for > 91,000 BCM overburden blast is cheaper /economically advantage with blasting method while if it is below 91,000 BCM of overburden blast is cheaper if it is using ripping method.

#### IV. CONCLUSION AND RECCOMENDATION

##### 1. CONCLUSION

- The ripping cost is Rp 3,519/BCM for removal cost times overburden blast volume.
- The blasting geometry that will be planned are 6 meters burden, 7 meters space, 6 meters stemming, 1 meters subdrilling, 13 meters bench high, the depth of blasting hole will be suited to 12 meters of drilling equipment, 4 meters length of charge concentration, 25,000 BCm blast volume, 19.2 kg/m loading density, 5760 kg ANFO with 0.22 kg/bcm powder factor.
- The blasting cost is a sum of initial investment with 2,718,-/BCM times to overburden blast volume.
- The ripping activity is more effective and economically advantage used to overburden removal below 91,000 BCM. While to remove over 91,000 Bcm volume of overburden so it eill more effective to apply blasting method.

##### 2. RECCOMENDATION

Banko Barat Pit I Mine until today is applying a riiping method to remove the overburden. The Author therefore suggests because overburden volume 8.745.000 BCM > 91,000 BCM it'll benefit to use blasting method. Since according to the study that has been finished, the blasting method is more efficient and economically advantage in overburden blast.

**Note :** this article is written from the author's thesis with Mr Raimon kopa as the first supervisor and Mr. Dedy Yulhendra as the second supervisor.



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EI-05-012

## THE EFFECT OF ADDITIONAL ORGANIC MATERIAL AT TEMPERATURE ON ENVIRONMENT ROAD

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**ABSTRACT :** Once Cement boarded board, as material leading to organic composite material (cements and timber raffle sengon). Which is one of alternative of lessen level of radiation of the sun. Whereas radiation of the sun is different climate primary factor, amount received by equiamplitude surface of ground depend on the sun radiant energy, in the end forms is so-called radiation balance. To lessen level of radiation of the sun hence an equiamplitude surface is expected to has relevant reflectivity value and emmisivity, this thing can be done at damp tropical climate. And based on assaying of quality of value conductivity and conductance, material result of organic raffle processing of this timber expected able to increase comfort is mall. With quantitative method and observation-experimental in doing retrieval of data at this research. Then is done treatment at environmental passage way wall by adding cement boarded board. From treatment of cement boarded board wall, measured reduction of temperature outside yielded. After calculated temperature sol-air at cement boarded board wall and wall existing. Hereinafter, cement boarded board wall compared to result of reduction of its the temperature and sol-air temperature with passage way using wall existing. While as a means of assists applied in observation of research is computer simulation ecotect, test device hot-wire, and pyranometer weather station. Result got, outdoor temperature (TO) wall existing and outdoor temperature (TO) cement boarded board wall there is difference 1.906°C, (temperature outdoor lower cement boarded board wall). Its the consequence is at usage of cement boarded board, balmy temperature (23-29°C) longer stayed 1 hour compared to wall existing. At temperature data sol-air lower cement boarded board wall, with the range of difference between 1.9-9.19°C. Difference which this fluktuatif caused receiving of different radiation and wind velocity every its(the hour/clock. This thing will reduce electrical usage for cooling equal to 50% from cupola yielded by brick material so that happened thrift that is supporting mitigasi climate change.

**Keyword:** cement bonded board, conductivity, conductance, climate change, sol-air

### I. INTRODUCTION

#### 1. Background

##### 1.1. The Development Of The Urban Climate Solutions

Environment-climate research outside of the building is often referred as the urban climate research (T.R. Oke, 1987, p. 274). The solutions related to Built environment are usually in the form of engineering view factor in the corridors but not yet filed material engineering building as one of the solutions of the outside air temperature regulation (TO). This research, theoretically attempts to develop diverse solutions in the area of the urban climate.

##### 1.2. Climate Change: Outside temperature reduction (TO) as the mitigation element

Global warming is the phenomenon of increased concentrations of Green House Gases (GHGs), then trap the solar energy in the atmosphere, further increasing the Earth's temperature (Agus P. Sari (ed.), et.al, 2007, p. 38). To cope with the matter need to be done the mitigation (climate change management) which includes energy efficiency.

##### 1.3. Potential of organic Material As Regulators Radiation Budget

Brick Wall padded with mortar is the common vertical wall surface is a species that is already used by most of Indonesia society, because the price is reasonable and easy to find. Nevertheless, the bricks have the the high value of absorptivitas (0,89), high conductivity (1.210 W/moC), middle embodied energy values (1,2). Therefore required the solution of other material which has the difference absorptivitas and sufficient conductivity than the bricks, so that the outside temperature reduction can be achieved in a significant way

#### **1.4. The determination of the Research location**

Corridor housing circles which are meet the qualifications of the urban area with mixed various urban elements (Anonim, 1997). The diversity function of this area creates the specific transition spaces between the non-housing with housing area, namely the typology of the corridor with brick fence wall as the boundary properties of a building on one side and residential area on the other. The corridor itself is a technical term, in the research of the urban climate, which defines the operational air-flow area of the street between the buildings. (T.R. Oke. 1987, p. 274).

#### **2. Problem Formulation**

Urban areas which are increasingly dominated by roughness (impermeable pavement), making the heat accumulation that occurs will be hotter when compared with the suburbs climate.

One of the efforts by adding cement particle board which is a composite of organic materials sengon wood waste (which is better able to absorb heat (Ibid)), on the walls lining the corridor. It is expected the accumulated air temperature that occurs on the environmental corridor became smaller.

#### **3. Research purposes**

This test aims to find out to what extent the effectiveness of the material related to the thermal comfort of the environment, with details as follows: (1) to find out the difference between the average temperature around (TO) between the vertical surfaces of the bricks with vertical surfaces of composite panels. (2) to find out the difference between the surface temperature (sol-air) between the vertical surfaces of the bricks with vertical surfaces of composite panels. (3) For elaborating the application of composite panel architecturally.

#### **4. Theory Review**

The review in the discussion of a climate they are tropical humid climate and urban climate. It also discusses about *thermal comfort*, *heat transfer*, solar radiation, interactions, sol-air temperature (T-solair), properties of materials and finished with previous research. More specific information about the tropical humid climate may be stated as follows: (Soegijanto, 2000, p. 8-9).

- a. Air temperature: (maximum average is between 27 ° C-32 ° C; Minimum average is between 20 ° C to 23 ° C).
- b. Air humidity average is 75%-80%. Rainfall over the year between 1000 mm-5000 mm.
- c. Sky conditions generally cloudy with a number of clouds between 60%-90%.

- d. The luminance of the sky for the sky entirely covered in thin cloud is quite high, can reach more than 7000 kandela/m<sup>2</sup>, while entirely covered thick clouds approximately 850 kandela/m<sup>2</sup>.
- e. The wind speed average is low about 2-4 m/s.

Man-made environment (urban climate) can create a micro-climate for that environment. Deviations from the micro-climate that occurs depends on the development of human intervention in it, such as intervention against natural environment in an urban, this can be described as the urban climate.

#### 4.1. Thermal Comfort

A pretty high temperature (24 ° c-32 ° c) will be accompanied by high humidity (50%-94%) (Mas Santosa, 18 November 2000). Thus obstacles for the convenience of humans in the area of the Equatorial tropical humid, such as in Indonesia (Prasasto Satwiko, 2004, p. 2).

The Prime research done by Houghton and Yahlou that produced the term "effective temperature" or abbreviated as TE. While TE is determined by air temperature, humidity, and air movement (HOUGHTON and YAHLOU, 1923, vol. 29). The TE diagram shows the practical usefulness of TE with the help of diagrams *Psychrometric*.

#### 4.2. Heat transfer

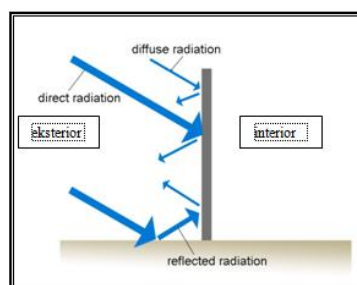
Heat energy tends to be distributed when its been spread evenly. The tendency that is flowing from the high temperature zone, leading to a lower temperature. This process involves one or all of convection, conduction, and radiation processes.

#### 4.3. Solar radiation

Our Earth receive the energy almost as a whole are derived from the Sun through radiation, therefore the Sun effect climate against dominant. Direct and *diffuse* radiation is short wave radiation. Meanwhile, the reflected radiation of a surface is the long wave radiation (Victor Olgyay, 1962, p. 32).

The radiation reflection from the atmosphere to the Earth (*diffuse radiation*), the radiation from horizontal surfaces reflection (*reflected radiation*), and the evaporation process by wind flow around the surface (*conceptive impact*), (Ibid., p. 33 and 113).

To reduce the heat level of acceptance on a surface, it can be reached in various ways, one of it performed by the addition of vegetation. The other way that allows is using a surface that has a value of *reflectivity and emmissivity* that are relevant to the conditions of the humid tropical climate.



**Figure 1.** The distribution of the radiation falls to a surface (Source: Researcher, 2009).

#### 4.4. Cement Particle Board

The character of cement particle board

Board of cement particles produced laboratory research center Settlement Bandung (Anonim, 2009) has the physical properties are as follows:

- The density of 1.15 g/cm<sup>3</sup>
- Comparison of wood with cement 1:2.75
- The dimensions of the wood filler 2 cm long and 2 mm thin

In the picture below shows the application of cement particle board aplikasi which apply.



**Figure 2.** Application of cement particle board as a form of house (Source: Researcher, 2010).

#### 4.5. Sol-air Temperature

The temperature of a surface due to solar radiation and the temperature of the outside air is called *Sol-air temperature*, the formulation to calculate the sol-air are:

$$T_s = T_o + [I \times a/f_o] \dots \dots \dots (1)$$

By :

- $T_s$  = sol-air temperture in °C
- $T_o$  = temperature of the outside air in °C
- $I$  = radiation intensity in W/m<sup>2</sup>
- $A$  = surface absorption indeks
- $f_o$  = outside surface conductance in W/m<sup>2</sup> deg C

#### 4.6. The characteristics of the Material Against temperature (*Thermal Properties*)

Each of the materials has its own characteristic in its ability to resist heat. As already communicated by the Rosenlund (2000), the ability of a material against heat affects buildings, called *thermal properties*.

Other material characteristics is *admittance*. Milbank and Harrington-Lynn (1974) stated, *admittance* is the *thermal resistance* which related to reaction againts *heat flow* from the *cyclic condition*, it has a unit such U-Value.

Other opinions from experts Markus T. A and Moris E.N. (1980) stated, the larger the *admittance*, the lower its swing temperature. Solid material has greater *admittance*, while the *heavy*



*weight structure* has a small *swing* temperature. The material also has a *thermal capacity*, i.e. the amount of heat stored by the material, and then released again.

Meanwhile, *decrement factor* according to Szokolay (1987), is a comparison between the *output* deviation of top heat of the *mean* heat flow, against the same condition but had *zero thermal mass*.

The opinions of all the experts above, indicates that the *thermal properties* and characteristics of materials associated with the storage of heat, insulation against the heat, the top of temperature, the low temperature of the building wall material and comfortable temperature for humans.

## II. RESEARCH METHOD

The step of this research, they are two lines i.e. examining wall bricks and walls that given additional treatment in the form of a panel of cement particles. This study discusses about the influence of the use of composite panels in the form of cement particle board on the wall in the environment corridor of the against the reduction of temperature environmental corridor. After the initial data obtained the material, carried out the research of environmental corridors to get to temperature difference between the temperature outside. Then based on the temperature outside, conducted a simulation with *ecotect* for describing situations of the corridor temperature.

### 1. Data and device

Data collection procedure is done by:

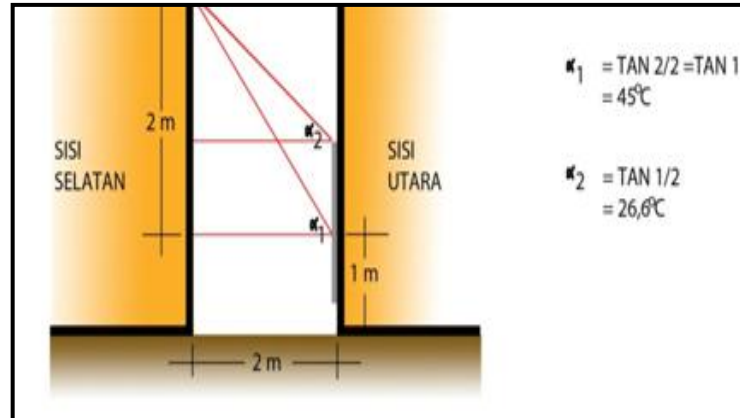
1. The study of the literature to obtain information on the value of the variables that affect the temperature of the surface of a material.
2. Laboratory Test and simulation calculation with *ecotect software* for variables that have no factual references.
3. Field testing to find out the impact of a material against environmental temperature (TO).

The required data in this study are: the direct solar radiation, or direct radiation ( $I_D$ ), solar radiation is not direct or sky reflected, *diffuse radiation* ( $I_d$ ), radiation reflection coefficients by horizontal surfaces, or ( $\rho$ ), a value absorpsivity ( $\alpha$ ) and outer surface conductance ( $f_o$ ) a material, outside temperature (TO), wind speed ( $W_v$ ), hours of observation ( $H_o$ ).

### 2. Observation place

The surface temperature measurement of both wall elements as well as its influence on the outside temperature will be relevant when a location is specified in accordance with the effective implementation of both the element, with the following criteria: the test location is an area with activities that require the exterior of the thermal comfort (such as roads, alleys), the wall extends from brick, don't allow it to tree planting peneduh (canopied), the reflectivity level of the horizontal surface is pretty high so that the effect on the temperature of the surface of the wall.



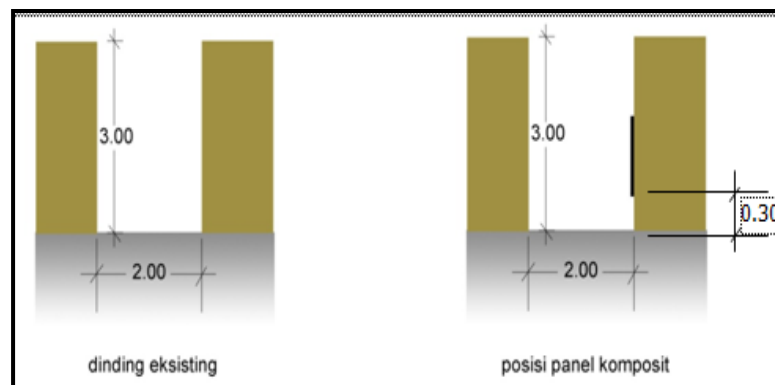


**Figure 3.** Pieces of the sun shines observation location and the position of the cement particles board on the corridor (Source: Researcher, 2010).

### 3. Data collection

- a. Observation of direct radiation to the computer simulated (*ecotect*).
- b. Observation value of material conductivity
- c. Observation value of absorptivity ( $\alpha$ ) in the field.

Field testing conducted to know the empirical difference outside temperature due to the use of different materials. Data collection of dry tube and TO, done through the measurement at a height of 1 metre on a 9-point measurement with the composition of 3 rows and 3 columns, modules of the distance 50 cm, use a thermometer protected from the direct sunlight that is recorded each hour ( $H_o$ ), (as the representative time for the measurement) for 1 day, at 6 am until 6 pm.

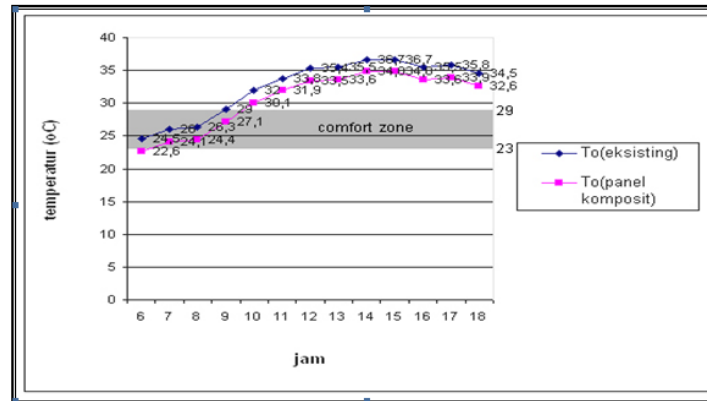


**Figure 4.** Corridors piece of 2 types of observation materials (Source: Researchers, 2010)

### III. DISCUSSION OF THE RESULTS

Based on the results of observation and calculation of each variable data value is a known the data value, then the next step is to perform an analysis of the data. The outside temperature data from both types of walls compared with thermal comfort requirements, outside temperature variable (TO), *Insolation* (I), absorptivity ( $\alpha$ ), and outer surface conductance ( $f_o$ ) of each material.

## 1. The difference between existing TO with the cement particle board TO



**Figure 5.** Diagram of the correlation between temperature measurement with thermal comfort zone.

As described in the figure below, appear that results of observation and calculation. The difference between the temperature of the existing brick walls with cement particle board walls is 1.906 oC. Thermal comfort zone is in the range 23 °C – 29 °C. Thus, when using the existing walls, comfortable temperature exceeds the *thermal comfort* starts at 09.30 BST. While when using a cement particle board the *thermal comfort* limits will be exceeded at 11:00 am EST.

The reduction of the maximum temperature value (31°C) to 29°C level requires the reduction of 2°C, when compared with the ability of the reduction of 1,9 °C (~ 2 °C) by cement particle board material then it is already a highly instrumental in giving solutions to decrease the temperature of the outside air.

In particular, in the case of cement particle board materials producing  $\Delta T = 1,9 \text{ }^\circ\text{C}$  as well as increasing the range of *thermal comfort* be 5 hours (42% of the daily temperature) or increased by 12,8% of the brick wall material performance (3,5 hours or 29,2% daily temperature).

## 2. The difference between T-solair with T-solair solair cement particle board

**Table 1.** Comparison chart of T-solair both types of material

Ho	T <sub>s</sub> d dg eksisting °C	T <sub>s</sub> papan semen partikel °C	Selisih suhu °C
6	25,00	23,10	1,90
7	26,49	24,17	2,32
8	30,58	26,76	3,83
9	33,38	28,99	4,38
10	38,76	32,87	5,90
11	41,76	35,10	6,66
12	45,39	38,95	6,44
13	40,53	35,62	4,91
14	41,14	36,21	4,93
15	47,58	38,39	9,19
16	41,68	35,19	6,49

17	30,00	28,10	1,90
18	29,00	27,10	1,90

Based on the results of the calculation of T-solair both types of material can be seen that the surface temperature of the cement particle board has a lower number than the existing wall surface temperature, with the difference that fluctuates between 1.9 oC (06.00, 17.00 and 18.00 GMT) to 9.19 oC (15.00 BST).

### 3. Comparison of effectiveness of temperature reduction between cement particle board material position as a wall with positions as the roof.

Comparison of effectiveness of temperature reduction between cement particle board material position as a wall with positions as the roof.

This comparative effectiveness is done by simulation towards corridor, i.e. scenario that puts cement particle board as (a). the walls along the corridor, and (b). as the roof along the corridor. Values that compared are the *average value* of outside temperature. Simulation results show that in the span of 6 am to 6 pm, average temperature beyond which is presented by the cement particle board position as a wall is much better than the cement particle board as the roof.

**Table 2.** The results of the average calculation comparison simulation of the cement particle board for wall and roof

Ho	Cement particle board as the wall (°C)	Cement particle board as the roof (°C)
06.00	24.94	25.43
07.00	24.58	25.32
08.00	24.90	25.40
09.00	24.79	25.31
10.00	24.96	25.43
11.00	25.28	25.88
12.00	25.52	25.88
13.00	25.48	25.87
14.00	28.10	28.23
15.00	25.47	25.92
16.00	25.41	25.89
17.00	26.55	27.57
18.00	24.93	25.27

(Source: Researchers, 2010)

Here showed the lowest temperature in cement particle board made the roof along the corridor are 25,31°C at 09.00 BST. While at the same time happens the temperature of 24,79 °C or 0,52 °C difference lower for cement particle board that is mounted as a wall of the corridor. While the highest temperature of cement particle board as when walls occurred at 14.00 GMT, i.e. 28,10 °C. And at the

same time when the cement particle board as the roof temperature is 28,23 °C. So the difference in temperature caused is 0,13 °C.

#### 4. Architectural applications

The Panel attaches flat to the wall flat

Architectural application of cement particle board walls based on the optimization of the composition panel spacing settings so that it reaches the optimum TO temperature. When the attainment of maximum required then the composition of the panel should be tight, but architecturally it will generate a monotonous composition.

The composition is not monotony is based on awarding the distance between the walls of the cement particle board. Based on the results of measuring the outside temperature in the corridors, as seen in the table above. For example, at 14.00, a distance of  $x = 0$  m;  $y = 1$  m produce 34,21 °C, a distance of  $x = 2.4$  m;  $y = 1$  m produce 34,32 °C, and the distance  $x = 4.8$  m;  $y = 1$  m produce 35,55 °C. Therefore between the edges of the panel up to 2.4 m distance ( $x = 4.8$  m) there is a rise in temperature of 1,23 °C.

Thus when range of temperatures rise planned below 1 °C, then the distance between the panels (cement particle board) must be on  $(2.4 \text{ m} : 1,23 \text{ °C} = 1.95 \text{ m})$ . Some examples of architectural application made by the author can be seen in Figure 4.4, with a distance between the composition of the panel is 1 m.

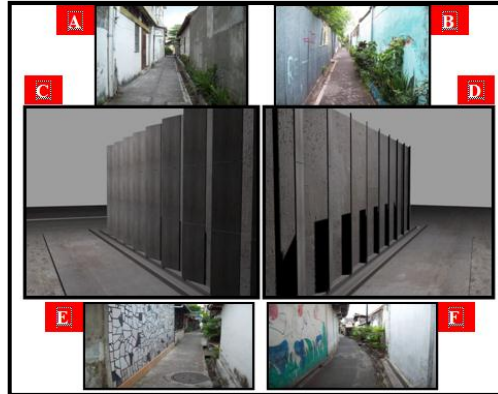
##### 4.4.1. The Panel formed a pattern of the fins against wall

To be able to display the impression not monotonous, then it can be done the installation of cement particle board panel with double decker layout like a sail. Thus the panel function keep covering the wall but does not reduce the width of the road. Some examples of Alternative architectural applications are as follows:



**Figure 6.** The fins walls with a pair of cement particle board

The picture above shows some of the existing wall locations that can be fitted to the panel Board of cement particles with fins positions. Panel mounted does not reduce the width of the road, so they saw can be done on top of the existing small ditch on the right or left side of the road.



**Figure 7.** Alternative architectural applications some places where can apply the cement particle board can be mounted fin model, a corridor (a, b, c, d, e, f)

This Comparative effectiveness is done by simulation towards the corridor, i.e. scenario that puts cement particle board in the corridor stretching North-South: (a) wall on the East side of the corridor and (b) the wall on the West side of the corridor. Values that are compares means average value. Simulation results show that in the span of 6 am-6 pm, average temperature beyond which is presented by partikelsebagai cement particle board position is much better than the brick wall.

Because in a situation of wall stretching North-South was not fully illuminated during the span of the Sun 06.00-18.00, so radiation Sunburst on the west wall occurred in before noon, in contrast to the Eastern walls occurred in after 12 pm.

**Table 3.** Table of calculation results the average simulation comparison of horizontal North-South corridor

Ho	Cement particle board as the experiment wall	Transition wall	Bricks as the existing wall
06.00	25.50	26.30	26.65
07.00	25.41	25.82	26.61
08.00	25.45	26.10	26.63
09.00	25.45	26.07	26.60
10.00	25.55	26.13	26.77
11.00	25.64	26.47	27.04
12.00	25.94	26.63	27.78
13.00	25.89	26.75	27.22
14.00	28.63	29.12	29.85
15.00	26.07	26.75	27.30
16.00	25.87	26.57	27.21
17.00	26.70	27.30	27.87
18.00	25.55	26.32	26.80

(Source: Author, 2010)

At the time the Sun is in the position of 14.00 shown temperature corridor is at the highest level on the wall with cement particle board 28,63 °C. While the existing wall corridor temperature the corridor 29,85 °C transition temperature 29.12. So there is a difference in temperature of the corridor on the walls of cement particle board was lower than the existing wall 1,22 °C.

Thus, the correlation of the use of particle board panel against the reduction of the environmental temperature of the walls of the corridor stretching north and South (the Eastern and

Western walls), is nevertheless lowered the temperature of the corridor. For more details of the results of the simulation found in the attachments.

## V. CONCLUSION

From the results of the analysis it can be concluded that:

- a. The difference between the existing wall (TO) with (TO) the walls of cement particle board is 1,906 °C, where the temperature of the outer wall of cement particle board has a lower temperature. The consequences are on cement particle board consumption, comfortable temperatures (23 °C - 29 °C) for longer than 1 hour survive existing walls.
- b. Temperature of sol-air cement particle board walls is lower than the temperature of sol-air existing walls with a range difference between 1,9 °C - 9,19 °C. The difference is due to the fluctuating reception of radiation and wind speeds are different at each hour.
- c. Field test results show that the cement particle board (emissivity = 0.61, conductivity = 0,31 W/m°C, embodied energy = 0.1) capable of producing 42% comfort temperature daily, it means that the corridor air temperature corridor hang on a comfortable range for 6 hours (2 hours longer than the bricks).
- d. The application of cement particle board wall architectural based on the optimization of the composition Panel spacing settings so that it reaches the optimum TO temperature. While the distance between the panels is optimal for architectural

Testing against both these materials give the conclusion that the cement particle board walls has a better performance than a brick wall related to the thermal comfort, in accordance with the conditions stated in the following table:

**Tabel 4.** The calculation of embodied energy which is produced by each materials

Material Properties	TO	TO	TO
	(brick-a)	(brick -b)	(particle cement board)
Emisivity ( $e_w$ )	0.89	0.65	0,61
Density (kg/m <sup>2</sup> )	1800	1500	300
Conduktivty (W/m °C)	1.210	0.650	0.310
Embodied Energy	1,2	1,2	0,1
Ho			
6	25	24.8	23.1
7	25.5	25.3	23.6
8	26.6	26.2	24.7
9	27.5	26.9	25.6
10	29.3	29.1	27.4
11	30.5	29.4	28.6
12	34.5	32.8	32.6
13	31.8	30.5	29.9
14	32.5	31.1	30.6
15	32.5	31.1	30.6

16	31.5	30.3	29.6
17	30	29.0	28.1
18	29	28.2	27.1
Percentage	0.33	0.33	0.50
Daily Comfort Thermal			

The difference corridors temperature phenomenon between the brick material ( $e = 0.89$ ,  $t\text{-lag} = 3$  hours) and panel ( $e = 0.61$ ,  $t\text{-lag} = 0.3$ ) caused by the difference of material properties, especially the emissivity and time lag. The mechanism as follows: at the same time and the same radiation intensity then the bricks will emit radiation into the environment amounted to 89%. While the particle cement board amounted to 61%; this will cause the temperature of the outer zone of the bricks will be higher than that of cement particle board material zone. In addition, in the same condition then the radiation will tend to hold by the brick material within 3 hours such that the accumulation of hot environment and in brick materials tend to be larger.

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**EI-05-013**

## **AN EXPERIMENTAL REVIEW OF THE SQUARE THE FIN TUBE IN THE UPPER TANK OF RADIATOR AND THE ADDITION OF BIODIESEL INTO THE DIESEL TOWARD THE OPACITY OF DIESEL ENGINE**

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**ABSTRACT:** *The objective of this study was to investigate the effect of radiator-tube heater and biodiesel-diesel combination in diesel engine opacity reduction. The radiator-tube heater was designed by adding a finned tube in the radiator upper tank, with plain tube as the variation, and a rectangular finned tube with 10 mm, 20 mm and 30 mm fin spacing. The different percentage of biodiesel rate – 0%, 5%, 10%, 15%, 20%, 25% and 30% – was added to the diesel. The study was conducted through the following stages: preparation; data gathering; and data analysis. The preparation stage included the tube manufacture, the rectangular finned tube manufacture and the tube installation into radiator upper tank as well as diesel engines tuned up. The researcher performed the preparation stage in order to prepare all necessary tools and materials for the study. Then, the data gathering stage consisted of the assembly toward all of the components in the study. The combined fuel was pre-heated by flowing the fuel into tube-heater that had been installed in upper tank of radiator and the upper tank of radiator had different tube: the plain tube and rectangular finned tubes. The data was measured in terms of diesel engine opacity. Last but not the least, the results of the study shows that the implementation of radiator-tube heater has led to a opacity reduction in all fuel combination. The highest opacity decrease has occurred in the 25% biodiesel rate for all treatments and in the radiator-tube heater with 10 mm-distance rectangular finned tube, namely 36.500%.*

**Keyword :** *fuel heating, rectangular finned tube, biodiesel-diesel combination, upper tank of radiator, opacity*

### **I. INTRODUCTION**

The presence of motor vehicles is very important but also causes several problems such as accident, traffic jam and air pollution. The air pollution that the researchers refer to is caused by the residual gas that comes from the exhaust tube and the residual gas contains hazardous substance for the community health. In addition, the residual gas also damages the environment. In relation to the fuel efficiency, there are several methods that might be performed namely: magnetic method, heating method, combined method (variation between heating method and electromagnetic method), cyclone method, octane increasing method, increasing air pressure method and engine conditioning method (Sudirman, 2006).

Looking at the high emission of residual gas, there should be preventive efforts for decreasing the impact of residual gas toward the community health. One of such efforts is decreasing the emission rate of the vehicles. The emission rate of residual gas might be decreased by increasing the fuel temperature so that the fuel will easily evaporate as it mingles with the air. The easily evaporated fuel will be easily burned; as a result, the burning process might occur perfectly. One of the ways for increasing the fuel temperature is to heat the fuel itself. Fuel heating might be done by using a heating

medium and, in relation to the heating medium, a person might benefit a circulation of radiator cooling water or a heater (Danar et al., 2014).

Fuel should be evaporated first in order that the fuel will be easily burned. Sukarmin (2009) states that since fuel might only be burned in the evaporated stage the fuel should be evaporated within the carburetor before it is burned in the engine cylinder. The fuel evaporation might be conducted by means of heating method. In relation to this method, Sudirman states that the heating method flows the fuel into the fuel channel through the heating medium and the heating medium that might be benefitted is either a circulation of radiator cooling water or a heater (2006: 34).

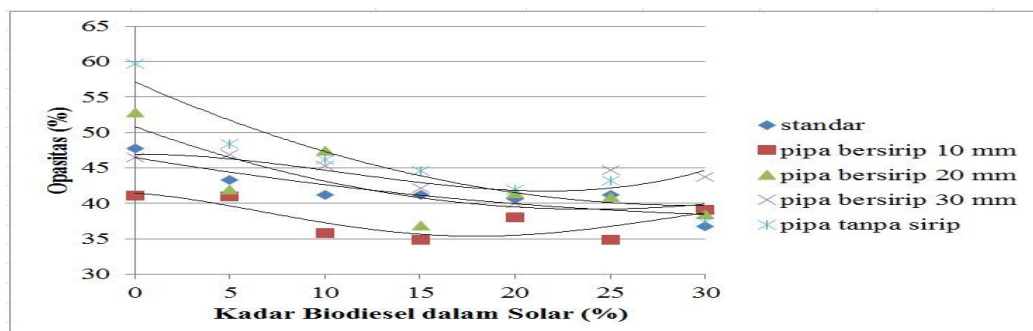
## II. METHOD

The study that had been conducted was to the implementation of heat transfer in the diesel heating through the rectangular finned tube in the upper tank of radiator in order to improve the diesel engine performance. Specifically, the study was to measure the size of residual gas opacity that had been resulted.

The experimental study was conducted in order to measure the influence of diesel heating through the rectangular finned tube in the upper tank of radiator toward the emission rate of residual gas within the L300 diesel engine by comparing the standard results and the treatment results. The treatment that the researchers performed was adding the rectangular finned tube into the upper tank of radiator and the distance of the fin was designed in variation namely from 10 mm, 20 mm and 30 mm. Then, the fuel that the researcher used in the study was the combination between the diesel and the biodiesel; the researcher combined the pure diesel with the biodiesel and the biodiesel rate was as follows: 5%, 10%, 15%, 20%, 25% and 30%. The residual gas emission was measured by means of Smoke Tester based on the SNI 19-7118.1-2005.

## III. RESULTS AND DISCUSSIONS

Figure 1 displayed the data from the results of the testing for the influence of fuel heating through the rectangular finned tube in the upper tank of radiator and the variation of diesel-biodiesel mix toward the residual gas opacity.



**Figure 1.** The Residual Gas Opacity in the Diesel Engine Resulted from the Installation of Rectangular finned tube in the Upper Tank of Radiator

The results of the testing toward the residual gas opacity resulted from the diesel-biodiesel mix in the diesel engine showed that the residual gas opacity inclined to decrease until there had been 15%

of biodiesel within the diesel. A reverse inclination occurred when the biodiesel rate in the diesel was increased both by means of standard tube and of rectangular finned tube. The reason was that there had not been any sparkles within the diesel engine unlike the other engine such as the premium engine. The burning process within the diesel engine occurred because of the compression/pressure.

The results of the testing toward the residual gas opacity resulted from the fuel heating showed that the fuel heating by means of 10 mm-distance rectangular finned tube had been 41.067%. The lowest opacity inclination was resulted in the fuel heating by means of 10 mm-distance rectangular finned tube for all condition of biodiesel-diesel mix. The fuel heating by means of rectangular finned tube in the upper tank of radiator would increase the fuel temperature. The closer the inter-fin distance, the higher the heat transfer that occurred in the fuel; as a result, the 10 mm-distance rectangular finned tube would cause the fuel to evaporate faster and, therefore, the perfect burning process would occur. The perfect burning process was caused by the high heat transfer from the radiator water that heated the fuel that went through the rectangular finned tube. The 10 mm inter-fin distance created more effective heat transfer, in comparison to the other inter-fin distance, so that the temperature of the fuel that came to the injector was higher and was able to produce almost perfect burning process. Eventually, the residual gas opacity became lower.

On the other hand, another test that the researchers performed by adding the biodiesel into the diesel showed that the lowest opacity had been found in the addition of 30% biodiesel to diesel namely 36.775%. The higher the biodiesel rate in the diesel, the higher the cetane value within the diesel. The higher cetane value caused the fuel to be burned more perfectly and, as a result, the opacity rate would decrease.

The test by considering the fuel heating by means of rectangular finned tube and of biodiesel addition into the diesel showed that the lowest residual gas opacity had been attained in the fuel heating through the 10 mm-distance rectangular finned tube with the 25% biodiesel addition, namely 34.900%. The reason was that through the two treatments the fuel might be burned more perfectly. However, the higher biodiesel rate in the diesel has not assured the more perfect burning process. The statement was supported when the researchers performed the two treatments and the researchers found that the best result was attained in the 25% biodiesel rate.

#### **IV. CONCLUSIONS**

Based on the data and the testing results for the influence of fuel heating and of biodiesel addition into the diesel within the L300 diesel vehicle, the researchers would like to conclude that:

1. The implementation of fuel heating through the rectangular finned tube in the upper tank of radiator has decreased the residual gas opacity that is resulted by the L300 diesel engine. The lowest residual gas opacity has been attained in the fuel heating through the 10 mm-distance rectangular finned tube, namely 41.067%.



2. The biodiesel addition into the diesel has decreased the residual gas opacity that is resulted by the L300 diesel engine and the lowest residual gas opacity has been attained in the combination of 30% biodiesel – 70% diesel, namely 36.775%.
3. The lowest opacity by means of fuel heating and of biodiesel addition into the diesel has been resulted by the 10 mm-distance rectangular finned tube and by the 25% biodiesel, namely 34.900%.

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EI-05-014

## MODULAR BEAM SEGMENT FOR BUILDING CONCRETE BEAMS

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**ABSTRACT:** *Moduler concrete beam segment prefabricated is for sloof beams and ring beams building, registered patent no. P002015665. The form of the moduler beam segment is a rectangle lengthwise, moduler deminsion, can be for a variety of length beam dimensions corresponding multiples dimensions module 15 cm, the upper part there is an overdraft extends to make the front looks like the U letter, the middle part of the base there are holes and each end shaped plinth connection tongue-groove. Make a sloof and ring beam conventional building requires the formwork, while using the beam segment beam did not need formwork. To be used as a beam of buildings need to be tested early strong press and absorption of water, whether it meets the Indonesia National Standard (SNI).The research method is experimentation with concrete compositions 1 pc: 4 on aggregate. The aggregate used was skimmed off rock fragments sand 4.75 mm, sand off the strainer 4.75 – 12.5 mm, and ash of stone fragments mess 100, with different composition. The number of samples 60, comprising 15 variations of composition of the aggregate, each 4 products. The feasibility of the product based on SNI-03-0349-1989 that is the value of a strong press and absorption of water. The results of the study is that all the composition of aggregate quality meets compressive strenght II and III SNI, i.e. with the highest compressive strenght is 7.58 Mpa., the lowest commpressive strenght is 4.17 MPa and water absorption fulfill the Indonesia National Standard (SNI), with the biggest value of water absorption at 11.29%.*

**Key words:** *segment, beams, moduler, concrete, building*

### I. INTRODUCTION

Simple building Structure generally consists of three components, namely: the foundation, columns, sloof beams, and also ring beams. The sloof beam is a horizontal structure component is above the foundation, ring beams above a pair of brick walls, shouldering the load components on it, forwarded to the column and to the ground through the foundation. Truss in addition to building houses made of wood, mild steel can also be made from reinforced concrete. Beam serves as a component of the structure, along column also serves the broad framing every 12 m<sup>2</sup> ½ wall bricks.

The way of the implementation of the concrete sloof beam building is to put a series of reinforcement on the top of the foundation, set formwork on each side a series of reinforcement with outer reinforcement with the formwork at least 2 cm, and then place the concrete slurry gradually, press with a rod of iron until solid, as well as the top of reinforcement covered with concrete slurry about 2 cm and the hole of sloof beams formwork is full of slurry-filled solid concrete.

The way of the implementation of a concrete ring beams building is to put a series of reinforcement on the top of a pair bricks wall, put up the formwork at each side of the reinforcement circuit with the space of outer reinforcement to the formwork at least 2 cm, and then place the concrete slurry gradually and press with a rod of iron until the top of reinforcement covered with concrete slurry about 2 cm and the hole of ring beams formwork is full of slurry-filled solid concrete.

The way of the implementation of sloof and ring beams take a long time and high construction costs. Moduler beam segment prefabricated components which is molded in place of the production, made of concrete, moduler dimension, consists of segments, the top is elongated and there is basin to

make the segments look like the U letter, for a series of reinforcement and the mortar concrete beams, in the middle of the base there are holes and each end of the modular beam segment base formed tongue-groove connection. Modular beam segment is designed to be used long range sloof beam, and ring beam fits multiples of 15 cm modules dimensions. Modular beam segment consists of the modular beam segment type 1 (Tb1-1), and modular beam segment type 2 (Tb1-2).

The way of the implementation of sloof and ring beams using ring modular beam segment is constructing the segment above the foundation or on the top of a pair of walls, in accordance with the dimensions of the space which is a multiple of 15 cm modules dimensions, embodying a series of reinforcement in the segment beam hole, then pour the mortar concrete beams, press with a rod of iron to solid as high as the wall surface modular beam segment.

Study of modular beam segment in this paper as a first step to see if the sloof and ring beam using modular beam segment can be used as part of the sloof and ring beam building. Modular beam segment that will be used as the part of the sloof and ring beam component, should meet the quality os strong press and water absorption fulfill the Indonesia National Standard (SNI)03-0349-1989. As a part of component to make the sloof and ring beam, needed further study that is testing the bending beams created using beam modular beam segment.

## **II. PURPOSE AND SCOPE**

The purpose of this paper is that the first is to get the aggregate composition that produces a compressive strenght, absorption of water that fulfill the SNI-03-0349-1989 quality from the sample product modular beam segment in comparison with pc, part of aggregate and aggregate composition showed in table 1. The second objective was to gain a compressive strenght level on aggregate composition of the with a maximum absorption of water that fulfill the SNI-03-0349-1989 quality. In this paper does not examine the bending beam using modular beam segment.

## **III. A REVIEW OF LITERATURE**

### **Simple Building beam**

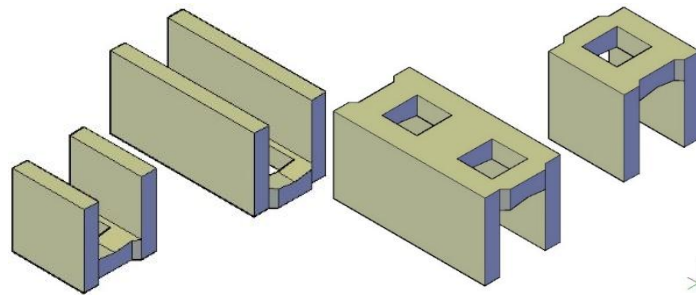
Building beamis a horizontal structure component that serves as a sloof beam and ring beam. The sloof beam is a horizontal structure component located above the foundation that serves to tie up between one column with another, upholds the burden upon it to be forwarded to the structure component below. Ring beam is a horizontal structure component which is on the top of the wall of the simple building (Guntur Siamsono, 2010).

### **Prefabricated Building Beam Components.**

Prefabrication of building concrete beams components are prefabricated concrete beams shaped like the T letter in reverse. The bottom of the pedestal beams for the connection (joint) with columns, there is a rectangular hole for the entrance of the end column. Connection of beams and columns given flat and screw to place bolts. This beam prefabrication is partly the implementation done in field at least 10% of l total beams (Matehw Ley, 2013).

Prefabrication of beams that similar to this product is Universal Beam Construction System, i.e. a flat-shaped beam that can be strung together for beams, floor components, wall components and ceiling components of the building. Slab-shaped flat with each side of the flat, the angles of 45°, in the middle section of the angles formed tongue connections and the other end shaped groove connection, each of the outer side of flat there is a groove line. That flat can be strung together became a form of the L and U letter or the top of the U form can be installed again with lat, so it shaped rectangle. The form of tongue-groove connection flow for retaining the connection between flat. While the groove line at the outer side of flat for stringing between flats or beams which given the X-shaped pin inserted into that groove line (Richardl., 1983).

This prefabricated of beam of this paper is the moduler beam segment which can be used for sloof and ring beams building. Moduler beam segment shape is rectangle lengthwise, moduler dimension, can be used for a variety of dimensions length beam according to the multiples dimensions module 15 cm, the upper part there is an overdraft extends to make the front looks like the U letter, the middle part of the base there are holes and each end shaped plinth connection tongue-groove. Moduler beam segment has Patent register No. P002015665, dated November 25, 2015.



**Figure1.** Moduler beam segment design (Tbl-1and Tbl-2)

### Compressive strength

The compressive strenght is one of the concrete performance. Compressive strength is the ability to load the pressure per unit area.

Compressive strength form  $P = F/A$

- By :
- F = max force of compressive machine, N
  - A = the width section that given pressure,  $\text{cm}^2$
  - P = compressivestrength  $\text{N}/\text{cm}^2$

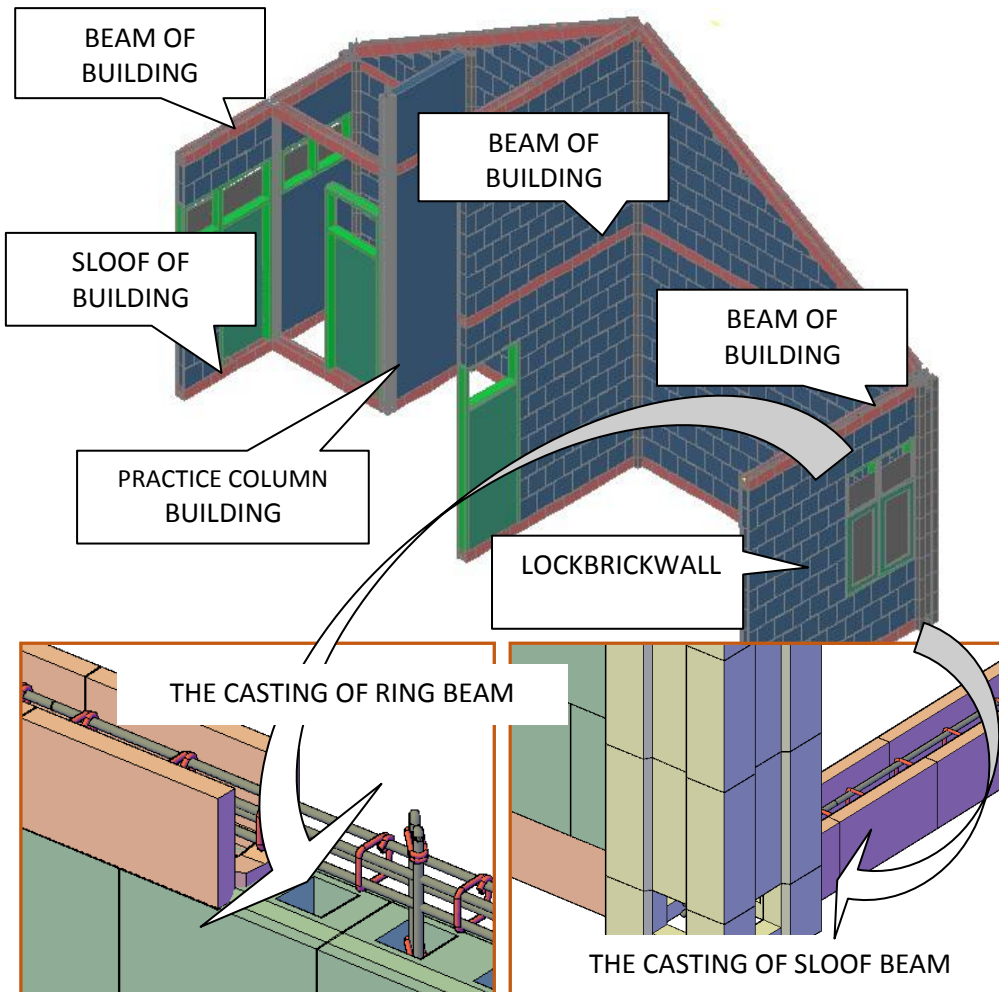
### Water Absorption

Absorption is the ability of aggregate to absorb the percentage of the water weight in the water. Much or little of absorption depends on the pore or cavity in concrete. The more porous concrete contained within the greater absorption of the water so the resistant will less.

Water AbsorptionForm (WA) =  $\frac{Mj - Mk}{Mk}$

- By :
- WA = Water Absorption (%)
  - Mj = water weight (gram)

$M_k$  = dry sample weight (gram)



**Figure2.** The use of moduler beam segment for the Building

### Concrete maintenance

Treatment of concrete after final setting, put away from the direct sunlight in order the next hydration process run gradually, slow drying and doesn't fragile.

Concrete compressivestrength is equivalent with concrete. According to Dipohusodo (1994), generally at the 7 days concrete, the concrete compressivestrength up to 70% and 14 days concrete reaches 85%-95% of concrete compressivestrength 28 days.

### SNI-03-0349-1989

The reference of SNI in this study is Indonesia National Standard (SNI) this is a quality standard for pejal brick concrete products and hollow concrete. The SNI that as a specific guidelines moduler beam segment prefabricated techniques specifications has not been found, therefore, in the discussion refers to this SNI. The moduler beam segment product segment is the segment for sloof beam, and ring beam, which serves to cover mortar concrete and reinforcement column, then this product is similar to the brick-concrete components as in this SNI.

**Tabell1.** Compressivestrength requirements, water absorption SNI-03-0349-1989



No	Fisis requirements	Pejal concrete steel quality			
		I	II	III	IV
1.	compressivestrength bruto* min average (kg/cm2)	100	70	40	25
2.	compressivestrength bruto each of object test min (kg/cm2)	90	65	35	21
3.	Max average water absorption (%)	25	35	-	-

- Compressive strength is all the compressive load at the time the object was attempting to break apart, divided by vast real-size brick including vast holes as well as basin edge.

#### IV. RESEARCH METHODS

This research was purely quantitative through experiments approach, which carried out in the laboratory with conditions and equipment adapted to the needs to get the mechanical parameter searched. Mechanical parameter which is searched is sought is compressive strength and water absorption.

##### Time and place of Research

This research was conducted from March – June 2016, and the place of making sample product in the Laboratium of Education Technical Engineering FKIP UNS Building, while the sample testing in the Laboratory at Civil Engineering FT. UNS.

##### Materials and Material Composition of the concrete

The material that used is PCC (Portland Cement Composite), with an aggregate consisting of lava or rubble ash of mess stone 100 (Ld), sand off the dimenion 4.75 mm (Ps1) and sand off the dimension 4.75 – 12.5 mm (Ps2) fulfill SNI-03-682-2002. Comparison 1 PCC: 4 aggregate, with the composition of each aggregate as follows:

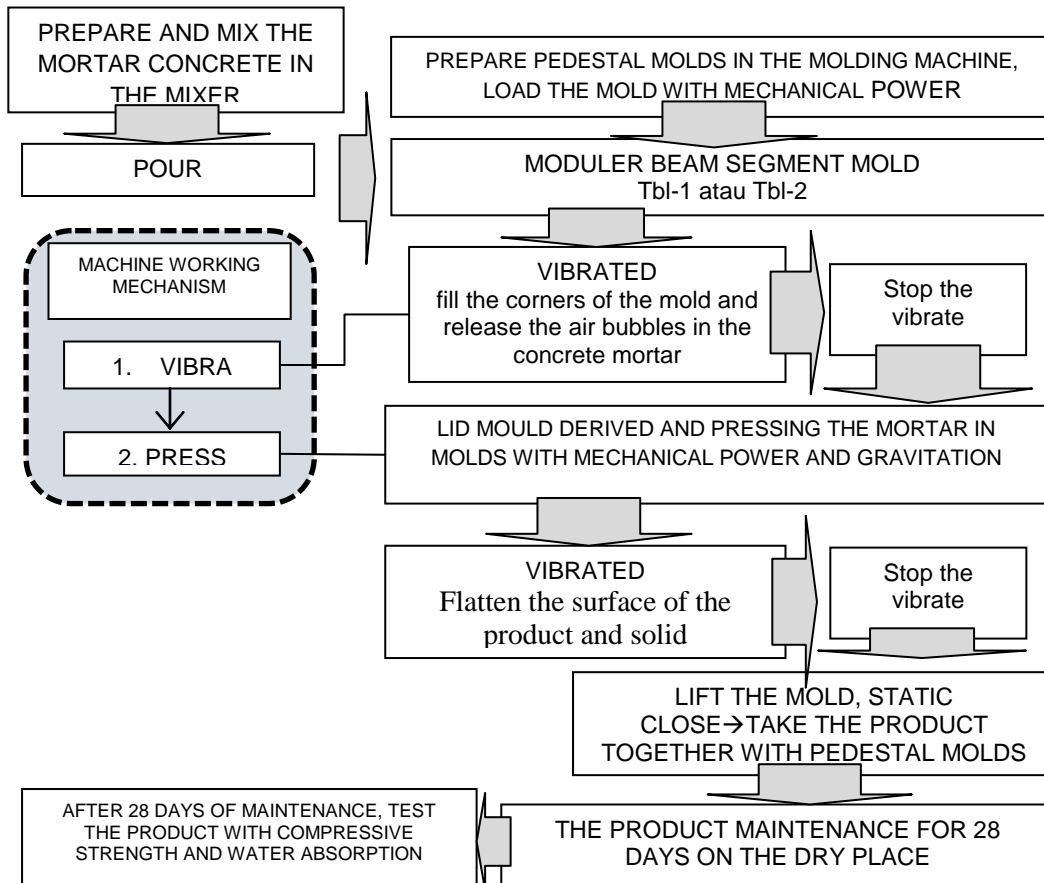
**Tabel 2.** Aggregate composition

Sample	Aggregate	Sample	Aggregate
1	50% Ps1,40% Ps2,10% Ld	9	30% Ps1,40% Ps2,30% Ld
2	50% Ps1,30% Ps2,20% Ld	10	20% Ps1,60% Ps2,20% Ld
3	50% Ps1,20% Ps2,30% Ld	11	20% Ps1,50% Ps2,30% Ld
4	40%Ps1,50%Ps2,10%Ld,	12	20% Ps1,40% Ps2,40% Ld
5	40% Ps1,40% Ps2,20% Ld	13	10% Ps1,60% Ps2,30% Ld
6	40% Ps1,30% Ps2,30% Ld	14	10% Ps1,50% Ps2,40% Ld
7	30% Ps1,60% Ps2,10% Ld	15	10% Ps1,40% Ps2,50% Ld
8	30% Ps1,50% Pr2,20% Ld		

Each composition made 4 moduler beam segment product for sample test objects, so the overall sample amount is 60 sampel.

##### The Mechanism of MoldingMachine

The molding machine that used was paving blocks molding machine with vibra using motor movers, and heaving the mold and cover the mold with mechanical power. The vibrating mechanism to distribute mortar into the corners of the mold and removing air bubbles trapped in the dry mortar concrete. Lid mould pressing mortar and flatten the surface of the product. In schematic the way of mold machine work can be described as follows:



**Figure3.** Product Order And Machine Mechanism

Source : Chundakus, 2015

### Compressive strength test of moduler beam segment

The sample of the study is a moduler beam segment Tbl-1 and Tbl-2. Dimensions of the thick sample 2.5 cm, 15 cm high and 30 cm length (Tbl-1) and a 15 cm length (Tbl). Testing conducted in the Laboratory of Civil Engineering Concrete Kentingan UNS Surakarta.

Compressive strength is done at the day of 28<sup>th</sup>, where the strength of the concrete has reached 100%. To flatten the load of beam segment at the time of the compressive test then the flat steel made for the pedestal while the bottom does not need pedestal because pedestal table UTM (Universa Testing Machine) are already adequate for the pedestal of objects test.

### Water Absorption test of moduler beam segment

The sample test in the form of moduler beam segment Tbl-1. Water absorption tests performed in the laboratory of Education Building Engineering FKIP UNS Pabelan Surakarta.

## V. RESULT AND DISCUSSION

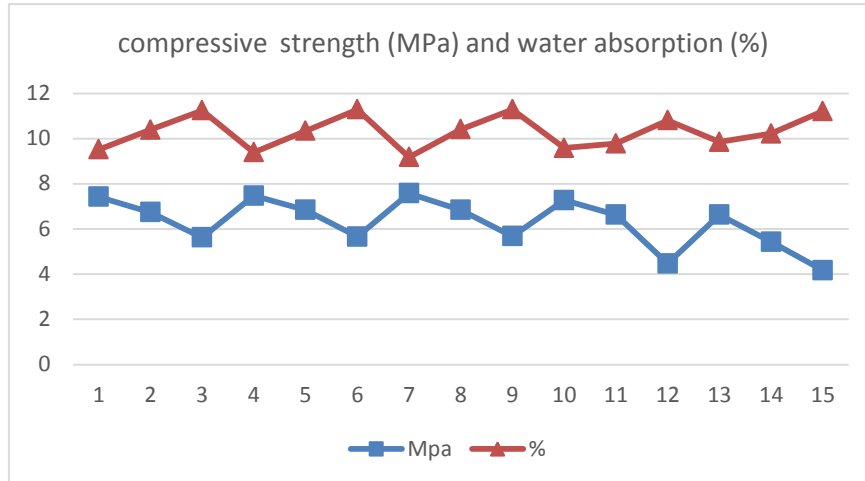
The products that used for sample test is using the comparison of cement and aggregate was 1 Pcc : 4 aggregate. Aggregate consists of sand-1, sand -2 and lava, with various composition such as table 2. Next with the formula of Compressive strength, and water absorption formula, obtained a value of Compressive strength and water absorption on average each aggregate composition as in table 3 below.

**Tabel3.** Weight test result, Compressive strength and water absorption

Sample	Average weight (kg/m <sup>3</sup> )	Average Compressive strength (Mpa)	Average water absorption (%)
1	2305,29	7,42	9,52
2	2207,60	6,74	10,39
3	2117,86	5,62	11,25
4	2310,48	7,47	9,39
5	2212,70	6,84	10,34
6	2127,38	5,66	11,29
7	2315,70	7,58	9,18
8	2217,15	6,84	10,41
9	2126,64	5,68	11,29
10	2221,95	7,27	9,58
11	2131,06	6,63	9,78
12	2047,32	4,47	10,81
13	2135,15	6,63	9,85
14	2051,41	5,43	10,22
15	1973,69	4,17	11,21

From table 3 above shows that the compressive strength rate of the aggregate composition 1, 4, 7 and 10 meet the compressive strength quality II SNI-03-0349-1989, while the aggregate composition in beside the four composition mentioned meets the compressive strength quality III SNI-03-0349-1989. The biggest compressive strength 7.58 Mpa, retrieved on 7 composition, and lowest compressive strength 4.17 on the composition of aggregate 15.

While test results of water absorption sample of all compositions meet the quality I SNI-03-0349-1989. The biggest water absorption rate on the aggregate composition 6 and 9, the lowest water absorption 9.18% on the aggregate composition 7.



**Figure4.** The compressive strength and water absorption each of the aggregate composition

From table 3 and Figure 4, shows that by the aggregate percentage of sand-1 fixed (50%), and the percentage of the aggregate of sand-2 is getting smaller (40%, 30% and 20%), while the larger percentage of ladu (10%, 20% and 30%) the result of compressive strength the less (7.42, 6.74 and 5.62 MPa) are more water absorption is greater (10.39, 9.52%, %, 12%). The tendency of compressive strength values the smaller and the larger water absorption is valid starting with the aggregate percentage of sand-1, 50%, 40%, 30% and 10%.

Fact the case showed that the more the aggregate percentage of large dimensions, that is 4.75 – 12.5 mm, with the low presentae of lava produces a little stronger rate of compressive strength. Valid contrary that the less percentage of aggregate with large dimensions and the more percentage of lava produces larger water absorption.

## VI. CONCLUSION

The aggregate composition 1, 50% Ps1, 40% Ps2, 10% Ld, composition 4, 40% Ps1, 50% Ps2, 10% Ld, composition 7, 30% Ps1, 60% Ps2, 10% Ld and composition 10, 20% Ps1 .60% Ps2, 20% Ld, fulfill the compressive strength quality II SNI and besides the composition of 1, 4, 7 and 10 fulfill the compressive strength quality III SNI. All the composition fulfill water absorption Quality I-SNI 03-0349-1989.

Composition 7, 30% Ps1, 60% Ps2, 10% Ld, which made a maximum compressive strength 7.58 Mpa fulfill quality II and water absorption 9.18% fulfill the quality I SNI-03-0349-1989

## VII. SUGGESTION

Moduler beam segment to be used as part of a sloof beam and ring beam of a building needs to be done the further research to get the rate of the bending test. In addition to the use of beam bending test of Moduler beam segment so that retrieved the rate of the feasibility, it also need to carried out product cost savings between the segment with the conventional beam.



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EI-05-015

## SOFT SKILL AND ENTREPRENEURIAL CAREER GUIDANCE MODEL FOR ENHANCING TECHNICAL VOCATIONAL EDUCATION AND TRAINING'S GRADUATES COMPETITIVENESS

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**ABSTRACT:** *The globalization and free trade era have implications for the high competition for vocational institutions. Problems faced by vocational education are (1) lack of relevance of the graduates competence with the industrial need, (2) low absorption of the graduates by industry, (3) discrepancy of skill competencies program that developed with the needs of industry, (4) there is lack understanding of the vision mission and objectives of vocational education among practitioners in the industry, (5) learning infrastructure gaps with industrial need, (6) absence of career standardization structure development on industry, and (7) unfavorable the academic climate in vocational education. Facing these challenges is necessary required soft skills and entrepreneurial career guidance model as solutions to enhance the graduate competitiveness.*

*Keywords: career guidance, competitiveness, vocational education.*

### I. BACKGROUND

The globalization era and advances of information technology led to an employment competition between countries. Free trade agreements between countries such as AFTA, CAFTA, and Asean Economic Community (AEC) ultimately lead to labor competition in all sectors of work. Technological Vocational Education and Training (TVET) has an important role in preparing high quality of labor to improve national productivity. Vocational High School (SMK) in charge of preparing and competitive intelligent beings (intelligent spiritual, emotional, intellectual, and aesthetic kinesthetic) which has competitiveness. However, the competitiveness of SMKs graduates are still low. Many find facts relevance of TVETs graduates did not meet with industry requirements (Sanyoto 2008, Kamdi, 2011).

The implications of the information age coloring peoples lives by virtual communication very quickly. Everyone expected have ability to adapt to changes in the complex, lateral, and conformed quickly to the character of advances in information technology. Globalization also foster the changing demands of labor competencies from rigid to flexible competence. The workforce who have ability to adapt to changes easily, independent, collaborative in a team work, able to solve problems, be able to communicate, and have high initiative (Deseco, 2003; Wagner 2008).

Central Statistics Agency (BPS) (2014) in Table 1 shows that the open unemployment of the vocational school graduates nationwide as February 2011 was 13.87%, February 2012 9.50%, February 2013 amounted to 7.67%, and 2014 at 7:21%. It illustrates that the industry has not been able to absorb the graduates of vocational and even more absorbing a high school graduate. In other words, the competitiveness of vocational graduates is still low.

**Table 1.** Unemployment Rate Population Age 15 and Over by Educational Attainment



2011-2014 ( percent )

Education Attainment	2011		2012		2013		2014
	February	August	February	August	February	August	February
Elementary	3.37	3.81	3.59	3.55	3.51	3.44	3.69
Junior High School	7.55	7.45	7.76	7.75	8.13	7.59	7.44
Senior High School	11.90	11.90	10.41	9.63	9.39	9.72	9.1
Vocational High School	13.81	11.87	9.50	9.92	7.67	11.61	7.21
Diploma I, II, III	15.71	12.78	7.45	6.19	5.67	5.95	5.87
Universitas	14.24	11.92	6.90	5.88	4.96	5.39	4.31
Σ	7.41	7.14	6.24	6.07	5.82	6.16	5.70

Source: BPS, 2014 (No. 38/05/Th. XVII, 5 Mei 2014)

Thus SMK was require to prepare graduates who have readiness to face these changes. In anticipation of the necessary character, intelligence, and health. Growing health consciousness that comes from education. Career guidance has an important role in enhancing the academic ability, personal, and career choice of graduates of vocational education (Rashid, 2011).

The Indonesian labor competitiveness compared with 84 countries in the world is still low. World Economic Forum (2010) in the Table 2 illustrates the competitiveness of labor in terms of basic needs Indonesia occupy 60 rankings, in terms of increasing the efficiency of Indonesia was ranked 51, while in terms of innovation and sophistication of human resources 37. Job readiness of Indonesia workforce in the industry at a low level in terms of aspects of talent and training eye productive learning process. Young age, minimal stock of knowledge and inadequate skills often become the main obstacle vocational school graduates to get a decent job and can support her career.

The implementation of career guidance in the vocational schools has not handling seriously. Awareness of the importance of handling has not been done in a professional career. Career guidance in vocational schools is still limited on labor market information. Many schools focus on improving the technical competence and lack of attention to soft skills in the sphere of formal or as the foundation of development. Winstead (2009) stated most business school curricula, however, focus only on technical skills, and do not address on the soft skills in a formal setting or on a consistent basis. As graduates Compete for fewer jobs, business schools must develop creative and innovative ways to give Reviews their graduates a competitive edge. Most adults do not understand that in the contemporary world of work it is important to develop the skills to be able to manage one's own career and life pathways.

Career guidance is a services provided to students and community at all ages and all aspects of life through education, training, employment, and managing his/her career (OECD, 2004:19). Career guidance services is recommended to include five elements: (1) professional guidance to personnel guidance, (2) anticipatory risk of limited resources, (3) impartiality / avoid bias institutions, (4) labor market information that is relevant, and (5) evaluation the impact of the service.

**Table 2.** Competitiveness Ranging of Indonesian’s Workers

Indicator	Competitiveness of Indonesian Workers				
	Ind	Mly	Bru	Sin	Tha
Efficiency	51	24	67	1	39
Basic need	60	33	20	2	48
Inovasi and sophistications	37	25	72	10	49

Source: WEF, 2010.

Career guidance refers to services intended to assist people, of any age and at any point throughout their lives to make educational, training and occupational choices and to manage their careers. Career guidance helps people to reflect on their ambitions, interests, qualifications and abilities. It helps them to understand the labor market and education systems, and to relate this to what they know about themselves. Comprehensive career guidance tries to teach people to plan and make decisions about work and learning. Career guidance makes information about the labor market and about educational opportunities more accessible by organizing, systemizing, and making available when and where people need it.

Career development includes a range of practices designed to help people think about, planning and managing reviews their careers. Career development is related to vocational education, but is applicable to all students in vocational or academic whether programs. Career development provides a mechanism for linking the curriculum with the learning that students do in extracurricular activities and their wider life (Hooley, 2010). A strong culture of career development needs to be built in TVET, one which has a focus on all age groups and which encourage older adults to consider career and learning options.

In the AEC era, the industry needs graduates who have the soft skills competencies include (1) the ability of critical thinking and problem solving; (2) ability to work and learn in teams with different individuals across the nation; (3) the ability to make plans based on accurate information; (4) ability to adapt to rapid changes; (5) international communication skills both oral and written; and (6) have an insight into the future and want to expand (Dardiri & Hajji, 2011). Ana, Gaffar, and Hakim (2011) state, students not only learn technical skill, but also develop their communication skill and project management.

Based on this background formulated the problem as follows: (1) how the concept of soft skill and entrepreneur career guidance?, (2) how the implementation of soft skill and entrepreneurial career guidance?, and (3) is soft skill and entrepreneurial career guidance can improve competitiveness of vocational graduates.

## II. DISCUSSION

### a. Industrial Development and Labour Competence

The development of science, information technology, and modern economic growth resulted in a cultural change society. It also resulted in changes in labor competencies essential. Work force of the





21st century is not enough just to have basic knowledge related to the three "R's" (reading, writing, and arithmetic) as the capital's ability to work, but also need to be mastered skills applicable. Furthermore, it is stated that soft skills are very important for the competence of the workforce to be ready to work ([Http://www.dol.gov/odep](http://www.dol.gov/odep)). Besides soft skills competencies is seen as crucial to the ease of someone adapting the work situation. (<http://www.sdf.gov.sg/>). Thus it can be stated that the face of the competitive era, soft skills is the key to success for labor.

According to the forum Continuous Progress Development [CPD, 2002], soft skill is a personal advantage related to non-technical matters, including the ability to communicate, socialize, and the ability to control himself. Soft skills is an ability that is affective one has, besides its ability on technical mastery of formal intellectual one field, which allows a person to be accepted in the work environment (Tripathy, 2006); (Mirza, 2005); (Dev 2006), (Kaipa 2005); (Swiderski, 1987); (Alsop, 2006).

*Wagner (2008) states that entered the "New World" of Work in the 21st century survival skill needed seven, namely: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence; (3) agility and adaptability; (4) initiative and entrepreneurialism; (5) The effective oral and written communication; (6) Accessing and analyzing information; and (7) curiosity and imagination.ormation; dan (7) curiosity and imagination.*

In the new world era, the economy evolved from traditional pattern to the industry, and now to the knowledge based economy (KBE). KBE is characterized by a pattern of trade that promotes the use of modern technology and science as a driver of growth, development and job creation to prosper (Zuhal, 2008). In KBE the workforce must have the ability to solving problems, to work planning , and ability as teamwork.

The concept of teamwork is very different today compared to 20 years ago. Technology has been providing virtual model teams. Virtual teams to work with people around the world by solving problems using software. They do not work in the same space, do not go to the same office, each week doing conference calls, working with web-net meeting. The challenge of virtual and global collaboration is a cooperation network (nertwork). Skillfulness of individually working with networks of people across boundaries and from different culture is an essential requirement/underlying a number of multinational companies. Her core competencies are strategic thinking.

Understanding and appreciating on the different cultures are core competencies of the vocational graduates. Wagner (2008: 25) states that concern for global change refers to the needs of the student's ability to (1) use the ability of critical thinking and problem solving to understand global issues; (2) learn from and work collaboratively with individuals of different cultures, religions, and lifestyles in the spirit of mutual needs and open dialogue in the context of work and communicate; (3) understand the culture of the countries, including the use of English. To survive, the necessary capabilities are flexible and can adapt as a lifelong learner. The key competence is the ability to handlers ambiguously, ability studying the parts of the core and fundamental, strategic intelligence.



Based on the above analysis it can be said that the graduates of vocational excellence requires soft skills in order to have the high competitiveness. Thus career guidance conducted at TVET should be based on the development of soft skills.

b. Entrepreneurial Career Guidance

The Intense of the competition and the lack of jobs is a reality challenges faced by the vocational educational. The number of educated significantly (BPS, 2014). Unemployment in Indonesia is increased Darmaningtyas (2008) stated that there is a tendency the persons who have the higher level of education they have the lower desire for entrepreneurship. The college graduates prefer desire to get a job securely. They did not dare take the risk occupations such as entrepreneurship. The main choice of the college graduates are as employer or laborers. Being self-employment is often viewed as a career option which is not favored because faced with everyday situations that are uncertain, full of obstacles, and frustration associated with the establishment of new businesses.

Various studies show that education and training affects one's perception of entrepreneurial career. On the other hand the entrepreneurial spirit is significant effect on the job readiness vocational students (Indriani, 2014). Therefore, entrepreneurship education should be designed in such a way in order to give effect in boosting interest in the graduates for entrepreneurship.

The entrepreneurial learning pattern contains five elements minimally. There are: thinking, feeling, skill, mental readiness, and direct experience. The empirical studies also indicate that the need for achievement (n Ach) is a key factor in the success of entrepreneurship. For the school to be able to create an atmosphere that encourages the development needs within the student achievement through career guidance. Vocational career guidance demanded to prepare graduates for entrepreneurship. The TVET graduate's readiness as entrepreneurship is the fulfillment of the minimum standard of competence that have been established which includes managerial skills, planning of production and marketing, and financial management indicators: (1) the ability of entrepreneurship; (2) the prediction business fields; and (3) potential graduates sought.

Career guidance is basically an orientation with services, information services, and job placement (Waat, 2010). Career Guidance is services to prepare the students to choose a future career. Proper and sufficient information about an individual is an asset that is essential for the individual to develop his career. Individual understanding of the weaknesses and strengths. student since grade one guided his career that he has the readiness to enter the workforce.

Based on above analysis concluded that to improve graduates competitiveness can be done through the spirit of entrepreneurship. Career guidance was developed based on the effort to improve the ability of students to entrepreneurship.

The challenges of the global era led to the demand that graduates have the ability to develop his/her mental attitude of entrepreneurship. In the global competition era required the guidance career development pattern that different with traditional career development (OECD, 2004, Herr, 1997).



Development of new career is career development based on soft skill and entrepreneurial focus development. This is in line with the dynamics of career guidance system framework that emphasizes more complex aspects include motivation, competence, experience, and interaction with the environment. Career guidance is conducted continuously so that students can make choice independently.

c. The Principals Role

The school principal is one of the keys to success in achieving the vocational educational institutions goals (Usman, 2006:302; Hoy and Miskel, 2005:374; Bush & Coleman, 2000). The principals has role to set the vision, to build values, norms and culture of schools, to develop commitment and encourage motivation of organization, so that he can give their best performance until the school reached a quality results (Hadi, 2008; Adam & Gamage, 2008).

Dardiri (2011) confirmed that to achieve success school takes principal who have entrepreneurial souls. The principal also serves to empowering SMK's stakeholders for able and willing to give support in capacity building, institutional, systems, resources, culture and the direction so that the trust of stakeholders towards vocational education has increased. Usman (2010) state of seven role of the principal there are (1) educator, (2) manager, (3) administrator, (4) supervisor,(5) leader, (6) climate creator, and (7) entrepreneurial.

In the context changes era, school principal plays the vital role in building orientation of the learning-based competence to constructivist learning, change of the curriculum that emphasizes hard skills into the curriculum oriented hard skills and soft skills. It is required principals reliable to give strong directions, provide motivation and facilitate all stakeholders to achieve the goal of competitiveness of graduates.

d. The Relevan Reseach Roadmap

Research and studies on the implementation of career guidance, soft skills, and efforts improving the graduate's competitiveness carried out as follows. Principals have an important role to play, in association with other stakeholders, in exercising strategic leadership so that career guidance services can be better planned and better coordinated. In many schools this role has not been exercised well, although some recent examples exist of more effective planning and co-ordination mechanisms that can encompass at least the key schools portfolio. Principals should also strengthen the voice of consumers in the ways that services are delivered. Instruments include need and satisfaction surveys and community consultations.

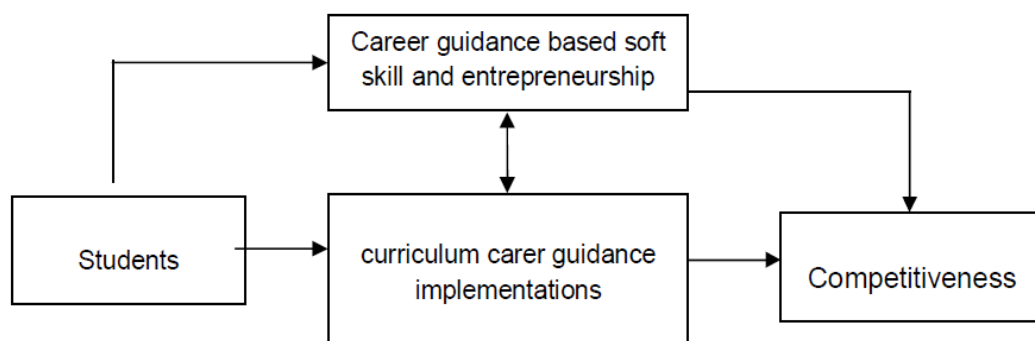
OECD (2004) stated that career guidance policy has strong impact on ; Corry, Hurton, & Lane (2007) Career developmental level: individual, organizational, and societal; OECD (2011) Learning for Job Review of Vocational Education and Training; Rashid (2011) reveal that career development interventions are important regardless of students with good academic performance or students at-risk. If schools counsellors are continued to hold the thinking that career development intervention only for good academic performance students to plan for getting into college only, this will not benefit the at-

risk students.; Dardiri, (2011) Soft Skill and Entrepreneurship can improve graduate’s competitiveness; Dardiri (2012) showed that the vocational schools that has high soft skills and entrepreneurial gain the trust of the industry. SMK requires principals whose have able to develop a vision, direction, become role in preparing graduates character. Principals who has able to foster entrepreneurial spirit and attitude for graduates.

Recognized the rapid growth of jobs and careers expand employment opportunities, but it is becoming more difficult choice, career guidance is needed to avoid mistakes career for the young generation. Providing career guidance resources reliable and impartial guidance so that young people do not have to rely on informal sources of guidance, like family and friends who have the power, but may only offer choices. Thus, TVET institution must being encourage to implementing soft skill and entrepreneurial career guidance model. Its linked to wider competency-oriented school reforms. Personal and career planning is defined as one of five “broad areas of learning” throughout schooling. The aim is to provide support for students’ identity development in secondary school and guidance in career planning throughout school. This linked to ensuring that students understand the usefulness of their studies (in languages, mathematics, sciences and so on) and why they are studying them illustrated on Diagram 1.

### III. CONCLUSION

Conclusion can be drawn from the above discussion are: (1) Soft skills and entrepreneurial career guidance model is the system of career guidance in vocational education oriented on entrepreneurial spirit and soft skill development. (2) implementation of soft skill and entrepreneurial career guidance model encompass: (a) strengthening input (students) against potential self-awareness, (b) preparation of guidance materials that focus on strengthening entrepreneurship and soft skills student, (c) provision of information and type of working competency required of industry/world of work; (d) teaching learning implementation based on teaching factory; and (d) teaching learning evaluations based on authentic assessment; (3) soft skills and entrepreneurial career guidance model can improve the TVETs graduates competitiveness.



**Diagram 1** Soft Skill and entrepreneurial career guidance model



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## CLOUD COMPUTING BASED ONLINE LEARNING FOR STUDENTS VOCATIONAL EDUCATION (D-3) ELECTRONIC ENGINEERING DEPARTMENT

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**ABSTRACT** : The last few years the concept of Cloud Computing is already a lot of interest of industry and education. Cloud-based solution seems to be the key for IT organizations who have a problem of budget constraints. Cloud Computing is a new paradigm in distributed computing presents many ideas, concepts, technologies, and the type of architecture that served as a service-oriented. According to Foster Cloud Computing is a "paradigm of distributed computing on a large scale are motivated by economic factors, which contains a set of virtualization abstract, dynamic scalability, setting the computing power, storage, platforms and services that can be accessed in accordance with the requirements by external customers through the Internet "(Foster et al., 2008). Objectives to be achieved in this research are: 1) To know how to develop online learning model based on cloud computing (cloud computing) for vocational education students (D-3) FT UNM's department of electronics engineering; 2) To know how to design online learning model based on cloud computing (cloud computing) for vocational education students (D-3) FT UNM's department of electronics engineering; 3) To know the result of the development of online learning based on cloud computing (cloud computing) for vocational education students (D-3) department of electronics engineering FT UNM may meet the criteria for a valid, practical, and effective. The method used in this research is the development of research methods (Research & Development), which focuses on online learning based on cloud computing (cloud computing). Students today can not live away from the Internet. Through programs such as facebook, twitter, instagram, and gmail, students are accustomed to using cloud-based technology services (Erkan, 2010). Therefore, the students hope to be able to access digital technology services on campus anywhere and anytime, including cloud services that support social media. Likewise pendidik vocational students who are currently in the industry are already using advanced technology. So should students have to understand the process and the system. Besides, in the learning process also greatly contribute to improving student achievement, especially in the learning lab. Thus researchers are interested in developing research to develop an existing model into a new model in online learning based on cloud computing (cloud computing).

**Keywords:** Cloud Computing, vocational education

### I. INTRODUCTION

The role of which is owned by the College in the development of science and technology in society in a country is not in doubt. The university uses IT-based infrastructure as a foundation for learning activities and research-based knowledge. Along with the technological evolution that happens, many traditional forms of education service transformed into an online form. Such services require a reliable IT infrastructure, using appropriate technologies, guaranteeing scalability to be used by many users, has a reliable performance and have good access security (EricKurniawan, 2015).

Universities in Indonesia still faces many challenges to adopt new technologies to support quality education. The process of adaptation of new technologies in PT bejalan relatively slow, one of them due to the high cost of procurement of IT infrastructure. Transformation is carried costs and huge investments are of course difficult to be met by most universities in Indonesia who have limited funds. The grants from the government are also found to be sufficient and not all of these funds can be



realized in the form of IT infrastructure. With limited financial condition of the IT departments of universities in Indonesia and megalokasikan required to manage the budget effectively and efficiently. The last few years the concept of Cloud Computing is already a lot of interest of industry and education. Cloud-based solution seems to be the key for IT organizations who have a problem of budget constraints (Teng & Magoules, 2010). Cloud Computing is a new paradigm in distributed computing presents many ideas, concepts, technologies, and the type of architecture that served as a service-oriented. According to Foster Cloud Computing is a "paradigm of distributed computing on a large scale are motivated by economic factors, which contains a set of virtualization abstract, dynamic scalability, setting the computing power, storage, platforms and services that can be accessed in accordance with the requirements by external customers through the Internet "(Foster et al., 2008). Users can access these resources through a network connection berkecepatantinggi Internet without having to connect directly to the hardware store these resources. Because the computing process is on a remote server, then the need for hardware and software to access the resource is lower, which can reduce the cost and process of care (Erenben, 2009). For several reasons already mentioned, the Cloud Computing should be an attractive solution for universities in Indonesia who want to reduce the budget in IT.

Students today can not live away from the Internet. Through programs such as facebook, twitter, instagram, and gmail, students are accustomed to using cloud-based technology services (Ercan, 2010). Therefore, the students hope to be able to access digital technology services on campus anywhere and anytime, including cloud services that support social media. Likewise pendiidkan vocational students who are currently in the industry are already using advanced technology. So should students have to understand the process and the system. Besides, in the learning process also greatly contribute to improving student achievement, especially in the learning lab. Thus researchers are interested in developing research to develop an existing model into a new model in online learning based on cloud computing (cloud computing). Objectives to be achieved in this research are: 1) To find out how online learning design based on cloud computing (cloud computing) at D3 Electronics FT UNM; 2) To find out how the prospect of the development of online learning based on cloud computing (cloud computing).

Urgency (virtue) of this research are: 1) The creation of an online learning-based Cloud computing is the use of technology that is Internet-based computing offers resource sharing without enhancements, a more affordable cost, and unlimited data storage; 2) Increasing student motivation in the process of learning through online learning methods; 3) Increased motivation motivation of vocational students in the process of online learning.

## **Online Learning**



In one publication on the website [about-elearning.com](http://about-elearning.com), the Association of American Society for Training and Development Activity (The American Society for Training and Development / ASTD) (2009), the proposed definition of e-learning as follows:

"E-learning is a broad set of applications and processes roomates include web-based learning, computer-based learning, virtual classrooms and digital. Much of this is delivered via the internet, intranet, audio and videotape, satellite broadcast, interactive TV, and CD-ROM. The definition of e-learning varies Depending on the organization and how it is used but basically it is involves electronic means of communication, education, and training. "(The American Society for Training And Development / ASTD: 2009).

That definition states that e-learning is a process and implementation of web-based learning activities (web-based learning), computer-based learning (computer-based learning), virtual classroom (virtual classroom) and class or digital (digital classroom).

Opinions Haughey (in Rusman, 2007) about the development of e-learning. Stating that there are three possibilities in the development of Internet-based learning system, the web course, web-centric courses and web-enhanced course. Web course is the use of the Internet for educational purposes, in which students and teachers are completely separated and no need for face to face. The entire teaching materials, discussion, consultation, assignments, training, examinations and other learning activities entirely delivered over the internet. In other words, this model uses the system remotely.

Web Centric Course is the use of the Internet that combines distance learning and face-to-face (conventional). Most of the material delivered over the internet. Enhanced Web Course is the use of the Internet to support the quality of learning done in class. Internet functions is to provide enrichment and communication between students and teachers, fellow students, members of the group, or students with other resource persons.

### ***Cloud Computing***

The definition of cloud computing is still varied and many people still disagree about what is cloud computing. For applications and users of IT, cloud computing is ITaaS (IT as a services). Provide computing services, data storage, and applications can be accessed via the Internet from a centralized data center. For application developers, internet, cloud computing is Internet-based application development platform that is scalable. For the service provider infrastructure, cloud computing is a distributed data centers that are massive and connected to the IP network (G. Lin et al., 2009). The divergent views are clearly reflected in the services provided by cloud service providers such as Google, Microsoft, and Amazon (J. Cappos, et al., 2009).

Generally there are three types of cloud computing services, where the architecture of the third user does not regulate directly, namely:

- Infrastructure as a Service (IaaS): IaaS provides a service to the level of Operating Systems. So the user can choose the operating system that will be used in the form of a virtual machine. Users

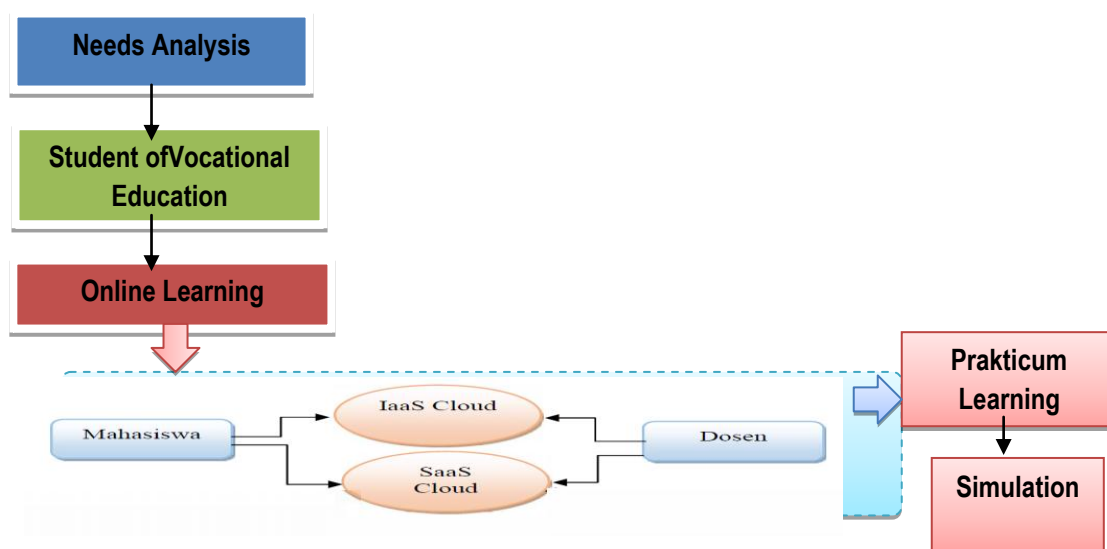
can also set for the allocation of hardware resources such as memory size, hard drive size, and the size of the processor. Examples of IaaS services are Microsoft Azure IaaS, Amazon EC2, Rackspace Cloud, and Open Stack.

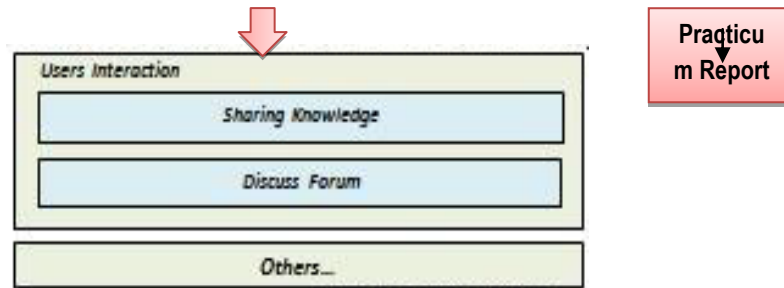
- Platform as a Service (PaaS): PaaS provide services at the level of the platform, so users no longer bothered with the installation of operating systems, web servers, database servers, and other applications. PaaS service providers already providing a complete operating system and its applications needed for hosting applications such as web servers and database servers. Users can upload applications made through the control panel that has been provided. Users can also choose a package customized to the needs of small applications with limited user, to applications with large user. Examples of PaaS services are: Microsoft Azure PaaS (IIS, ASP.NET, Open Source technology), Google App Engine, Amazon Elastic Beanstalk, Cloud Foundry and Heroku.
- Software as a Service (SaaS): SaaS provides direct services to users in the form of ready-made applications. Form of application services that offer such services office applications, email, data storage services, etc. Examples of SaaS services are: Office 365, Gmail, Google Docs, DropBox, and Salesforce.

## II. METODE PENELITIAN

The method used in this research is the development of research methods (Research & Development), which focuses on online learning based on cloud computing (cloud computing). Technology Cloud Computing is a new paradigm in the delivery of computing services. Cloud Computing has many advantages compared with conventional systems. The planned study is a research and development in education (educational research and development). In accordance with the understanding that this research aims to produce products.

The procedure of research and development models Borg and Gall (1983: 772-774) basically consists of two main objectives, namely: (1) develop products, (2) to test the effectiveness of the product to achieve goals. The first goal leads to the development of a product and the second aim is to lead to validation. Through the adaptation of various research makadiperoleh prototype development used in this study (shown in Figure 3) .Membangun prototype is a stage where the draft is realized in the form of application products.





**Figure 2.** Development Procedure Cloud Computing

### III. RESULT AND DISCUSSION

In the model of cloud computing lifecycle of Marks & Lozano (2010) there are five stages to adopt cloud computing, some of them: a) Determining the stage of concept / pilot cloud project The purpose of this stage is to learn about cloud computing for planning and implementing the use of cloud computing to travel memaksimalkan layanan in the field of information technology. Activities undertaken at this stage are: 1) The trial implementation of cloud computing; 2) Learning, evaluation and input to input cloud computing strategy; 3) Determination of cloud computing application decision whether to proceed or not; b) Determine strategy and mapping in the process of adoption of cloud computing objective of this phase is to determine the application of cloud computing strategies and action plans of the future are predetermined. Activities undertaken at this stage are: 1) discovery and research on cloud computing; 2) Determine the mapping strategy and cloud computing; 3) mobilization and application of cloud computing transition planning; c) Determining the stage of Cloud Computing Model and Architecture. The purpose of this phase is the modeling and the steps in the implementation of cloud computing. Activities undertaken at this stage are: 1) modeling of cloud computing; 2) reference model of cloud computing; 3) The application of cloud computing models; 4) Governance and the operating model of the cloud (quality of service, security, and planning); 5) cloud computing reference architecture; d) Cloud Computing Implementation Planning Phase. The objective of this phase of planning electoral cloud computing technology that is appropriate for the kebutuhan. Kegiatan performed at this stage include: 1) Analysis and selection of providers of cloud computing services; 2) The implementation and procurement planning cloud computing; 3) governance and lifecycle planning cloud computing; 4) Determination of cloud computing program decisions continued or not; e) Cloud Computing Implementation Phase. This stage is the stage of the application of cloud computing. Activities undertaken at this stage are: 1) Search reference implementation of cloud computing; 2) Planning planning and governance of cloud computing security; 3) Event management, monitoring, operation and support of cloud computing; 4) Evaluate feedback and strategies applied in the implementation of cloud computing.

Faculty of Engineering, University of Makassar has five departments, namely the Department of Mechanical Education Electronics Engineering, Department of Electrical Engineering, Department of Mechanical Engineering, Automotive Engineering Department, the Department of Civil Engineering



and Planning Pendidikan. Cloud computing services in the Department of Electronics courses Electronics Engineering D-3 can be used via an email service that uses the University's official domain. Although the service is still functioning properly, but there are some obstacles faced by them are:

- a. User interface is provided for accessing these services are not user friendly, although the user interface is web based, but is less responsive to use. The user interface is also less than the maximum if the user uses the device has a small screen size such as smartphones and tablets.
- b. In some cases an email addressed to unmed.ac.id server is not up or rejected by mail servers unmed.ac.id.
- c. Not reliable, because they use their own server machines that are stored in the server space, so there is a possibility of unexpected events such as power outages that cause the user can not access the mail server unmed.ac.id.
- d. Lack of uniformity username and password that can be used to access all systems (single sign on). Users in the UNM had to use several different accounts to access some services such as email, blogs, e-libraries, etc.

Because some of the problems already mentioned above, the lecturers in the neighborhood Faculty of Engineering UNM took the initiative to look for another alternative email service that can replace your old email system, and has many advantages that can be the solution to many problems. Prodi D-3 Electronics for the use of cloud-based email service provided by Google, Google Apps for Education. The choice to use this service based on several things, namely:

- a. Services are provided by major vendors cloud computing service providers who have an excellent reputation that is google. Google already proved itself as a provider of cloud computing services that are reliable, it can be seen by the number of products owned service like gmail, youtube, google plus, google docs and much more.
- b. Very economical because Google offers Google Apps for Education is free for educational institutions.
- c. Integrated with other cloud computing services such as google docs, google plus, google scholar, and so forth.
- d. Users in this case students and university staff are already accustomed to using the service personally.

After applying the cloud-based email service on D-3 student of Electronic Engineering for more than one semester, then of observations conducted found that the application of this service has many benefits and advantages, namely:

- a. Students more often than before the email access using Google Apps services. Students found new email service more reliable, have greater storage capacity, has a user interface that is easier to use, and can be accessed from a variety of mobile devices at their disposal such as smartphones and tablets.



- b. The university staff, particularly human administrators and professors also found that the new services are more reliable and easier to use. Some of them also found the use of the new services is easier as it is integrated with other services such as Google docs for storing and accessing data.
- c. Because the cloud-based service was not disrupted as services pernah before, for example when the power goes out.
- d. Large storage capacity. Because Google Apps for Education itself provides unlimited capacity (unlimited) so users do not need to worry because running out of space.
- e. From an economic perspective, the service is also very advantageous because it does not need to provide a special server for the mail server, no need power for server maintenance, no need to buy a hard drive with a huge capacity for storage media.

In addition to cloud-based email service, FT UNM is going to the other cloud services like Google Docs for document storage media. FT have problems in performing document archiving because the number of documents that must be managed as a file rank professors, lecturers certification file, a letter of assignment, subject accreditation files, and many other documents. With cloud-based document storage service is some of the admin staff faculty and staff lecturer argues THAT this service has many advantages compared to the electronic file storage to a local server computer. Some of the gains are;

- a. Does not require a server / local computer to store electronic files.
- b. Electronic files can be accessed from anywhere and at anytime.
- c. Does not require data backup on the local computer, because all the data is already in the cloud.
- d. Large storage capacity.
- e. It is possible to do a collaboration between users when working with certain documents.

Due to the success in the implementation of cloud-based email service in the FT UNM faculty then the party is expected to recommend the use of this service to the university level, so that these services can be used and enjoyed by all the faculty at UNM. However, there are some issues that need to be considered by the university in the use of this service. The main issue is the confidentiality of the data, though the service providers own standardization and ensuring data security but for data that are highly confidential, should the university to stay put data on the local server but still can be connected to cloud services available, this approach is often referred to as Hybrid Cloud.

## **BENEFITS OF ONLINE LEARNING BASED ON CLOUD COMPUTING**

### **ICT Class budget efficiency in D3 Electronics FT UNM**

During this time the investment is earmarked for ICT in education is synonymous with expensiveness, or a reason as long term investments. However, cloud computing technology has changed all that assumption, the budget savings will be the excess caused by the ease of sharing resources, such as infrastructure and services. In addition, the use of minimal equipment to access the



internet to use the service for users without the need to worry for updates or to pay for the generation or the next level in the services provided, because everything is done in the center. For hardware is also quite well built the center, you no longer need a server-serverdi each region or other branches. Then, if necessary, then its nature is a training operation with leveloperasional applicative that can be done by sekolahatau mutual learning or studying alone.

### **he effectiveness of learning resources for students D3 Electronics FT UNM**

As it is known that most of the learning process is done in the cloud. For example, to source materials for students learning D-3 Elelektronika FT UNM all put into the cloud, the evaluation process of learning, a progress report student learning, sharing knowledge with others lecturers, and so on. So that the school can manage the lecture material requiring the lecture hall or lab space, managing the learning resources, manage time lectures in accordance with the needs and conditions, as well as optimizing the advantages in the flexibility of time and place. The same thing with the professor as the main source of learning, will have more time to improve their ability for teaching and learning time to become lighter and the sharing of learning resources among faculty and students.

### **Cooperation and sharing of e-learning**

Work together and share a central concept of cloud computing environments. This technology offers the ease of cooperation between institutions, interaction and sharing among education stakeholders and the ease of evaluation for each job is well documented. Therefore, in any cloud computing environment development, should be designed based on the concept of ease of sharing and working together as a characteristic of this technology.

### **Rationality of navigation settings,**

In use it is necessary to use an interface module structure that is clear and easy to understand so that the application easier to use, and easy to learn, it is not difficult because it is the core of the use of cloud computing technology.

## **IV. CONCLUSSION**

From the discussion on the implementation of cloud computing to maximize online learning in the D-3 Electronic Engineering FT UNM can take the following conclusions: a) Cloud computing is the use of computing technology based internet facility that offers sharing of resources without enhancement, cost more affordable, and unlimited data storage; b) There are 5 stages to implement cloud computing in the D-3 Electronic Engineering FT UNM some of them define the concept stage, the stage of determining the strategy, determining the stage of cloud computing that you want to use as well as the implementation plan.



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## **ADVANTAGE WASTE THE CEIBA PENTANDRA SEEDSTO ALTERNATIVE FUEL DIESEL ENGINES**

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**ABSTRACT** : The purpose of this research to know influence to use the mixture of fuel biodiesel from the ceiba pentandra seed oil of were performance and opacity on a diesel engine. Testing were engine performance with the methods full open trottle valve with a standard SAE J1349 yaitu “Engine Power Test Code-Spark Ignition and Compression Ignition-Net Power Rating”. While testing opacity with a standard SAE-J1167 (Snap Acceleration Test Procedure). By the use of fuel mix with biodiesel (B0, B10, B20, B30, B40, B50 and B60 ) there was an increase in were engine performance maximum with fuel B50 (torque up 18,15 % in 2000 rpm, power up 18,92 % in 3500 rpm, mean effective pressure 17,96 % in 1750 rpm ), a decline in sfc of 23,443% in 2750 rpm and decrease in opacity 48,12 % in 2000 rpm.

Keywords: biodiesel, ceiba pentandra seed oil, performance and opacity

### **I. INTRODUCTION**

The tendency of energy needs of diesel fuel from year continue to increase, while reserve that is in the earth skids. Impact from this gap in the near future will pose a problem, besides engine gas emissions and opacity increases, so will increase global warming (Wardana, 2015). This should be immediately in find a solution that reliable that dependence with fossil fuels of diminishing, gas emissions and opasitas smoke progressively lower .

Various business had been done by such as increase the efficiency of the use of fuel, technology improve the quality of fuel and looking for alternative fuel that can be renewable. Alternative fuel that can be renewable is now the developing and received support from the government is fuel from vegetable oils (Soerawidjaja, 2011). Vegetable oils containing various fatty acids, good a saturated fatty acid and unsaturated. A saturated fatty acid and unsaturated is very potencial as the fundamental substance of biodiesel. A kind of vegetable oil good as the fundamental substance of biodiesel maker among others from ceiba pentandra seed, the cotton seeds, soybean seeds, peanut seed, sunflower seeds, coconut, moluccana, the soyben seeds (Shereena and Thangaraj 2009, Soerawidjaya 2009, 2011 and Ingle, et. al ., 2011, Demirbas, 2008 ) .

Excess material biodiesel fuel from vegetable oils compared with diesel fuel some of them are of the nature of diesel fuel lubricating better, its flashes point higher, higher cetan number, does not contain sulphur, lower emession, lower opacity (Sathiyagnanam et al. 2011; Shahid, 2011; and Myo , 2008). Time burning biodiesel and their mixtures faster (Sathiyagnanam, Member, Iaeng and Saravanan, 2011). Ignition daely time to light up fuel biodiesel and their mixtures shorter (Anand, et., al., 2009). While a shortage of fuel biodiesel is viscosity higher, combustion space fast dirty, engine efficiency thermis lower, there are still a few containing glycerol (Shahid and Jamal, 2011, Ingle, et. al., 2011, Ali, 2005).

While the results of research concerned with the application of fuel biodiesel used as a mixture of fuel a diesel engine were reported by some researchers among other:Ali in 2005, Anand, et. all.2009, and Ingle, et.al. (2011 ) experiment of biodiesel oil cotton seed on a diesel 1 cylindrical, with the variation of fuel starting from B0, B10, B20, B30, B40, and B50.Results showing that resources and efficiency thermis machine lower than that of use sdiesel fuel, specific fuel consumption increased 2.5 % compared to solar, CO<sub>2</sub> emission higher to mix B5 and B10, smoke lower all these a mixture of compared to use solar, and iqntion daely to light up shorter.Ranganathan (2011 ), shahid and Jamal (2011), and Sathiyagnanam, et. al., (2011), experiment biodiesel from oil of cottonseed on a diesel 4 cylindrical.Variation fuel covering B0, B10, B20, B40, B60, B80 and B100.The results first resources and efficiency thermis enginedecline by increasing the ratio biodiesel in a mixture diesel oil and biodiesel, with B100 efficiency thermis fell 10 % compared to to the use of diesel oil, second specific fuel consumption up with increasing the ratio biodiesel in a mixture diesel oil and biodiesel, with B100 specific fuel consumption up 10%, third a decline in emission CO, HC and smoke significant at when the burden high on fuel biodiesel, and fourth burning began early to biodisel and mixtures of diesel oil. Myo (2008), do research discharging fuel biodiesel from coconut oil in a diesel engine 1 cylindrical 4 tak.Fuel variations ranging from B0 , B25, B50, B75, until B100.The results showed the first properties fuel properties near diesel fuel, both resources and efficiency thermis engine declining, third gas emissions CO, HC and NOx and smoke decreasing compared with the use of diesel oil, and fourth overall biodiesel all a mixture of coconut oil can be used as fuel diesel engine without modifying.The purpose of this research to the characteristics of burning a mixture of biodiesel from of ceiba pentandra seed oil and diesel oil against show employment (torque, power, mean effective pressure, specificfuelconsumptionand opacity) of diesel engines.

## II. METHOD

### a. Equipment and research instruments

Equipment and instrument used to experiments indicated as in Figure 1 .

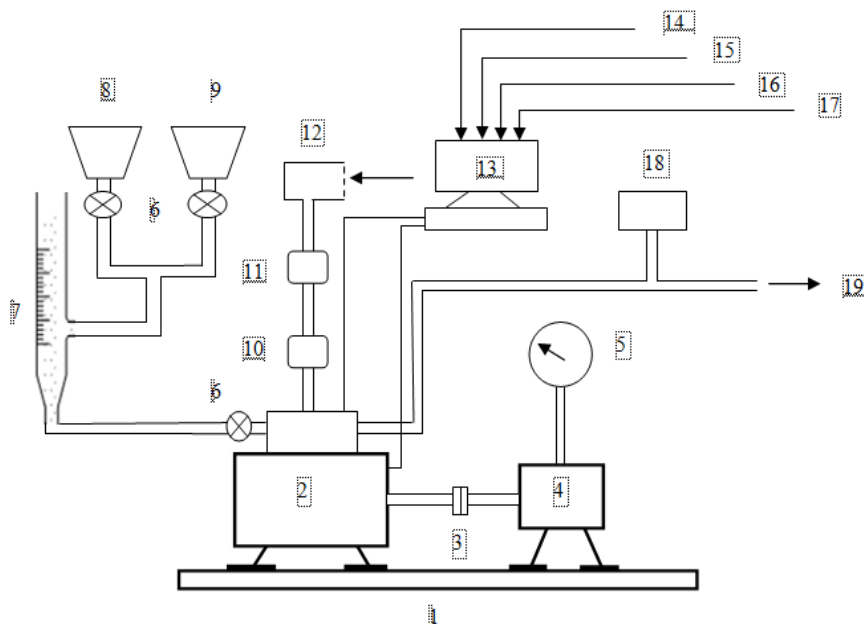


Figure 1: Research instruments and equipment

Explanation:

- |  |                                |
|--|--------------------------------|
| 1. The holder engine and a dynamometer | 11. Measuring the flow of air  |
| 2. Diesel engine                       | 12. Air filter                 |
| 3. Clutch                              | 13. Data system aqusisi        |
| 4. Dynamometer                         | 14. Oil temperature            |
| 5. Torque                              | 15. Pressure the exhaust gases |
| 6. A valve officers fuel               | 16. Cooling water temperature  |
| 7. Tube measuring instrument fuel      | 17. Trotle valve open          |
| 8. Diesel fuel                         | 18. Opacity meter              |
| 9. Biodiesel                           | 19. Channel the exhaust gases  |
| 10. Fuel measuring                     |                                |

a. Research Method

The method testing offered the engine performace with the full open trottle valve with a standard SAE J1349 namely “engine power test code-spark ignition and compression ignition-net power ratings “.While testing opacity with a standard SAE-J1167 (Snap Acceleration Test Procedure). The variation of fuel starting from B0, B10, B20, B30, B40, B50 and B60.

III. DISCUSSION AND RESULTS

a. Torque

The torque generated by engine using a mixture of biodiesel whit diesel fuel has indicated in Figure 2.

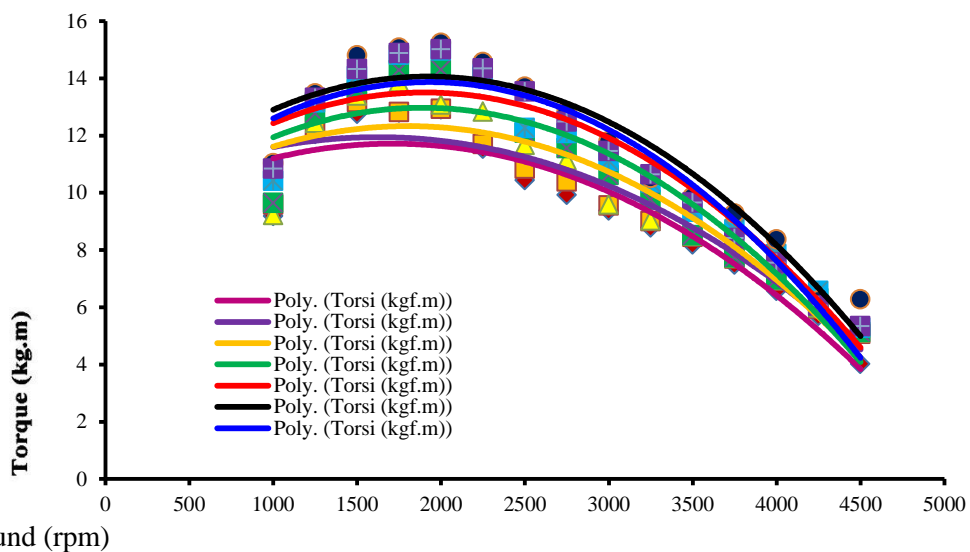


Figure 2. The relationship between torque and round engine

Characteristic of torque as in a Figure 2, where the graph curved up, in the low its torque produced engine is still low, because in the low mixes air and fuel rich, so that combustion not yet dirty. Then between round 1500 rpm until the round 2250 rpm high torque, because mixes air and fuel approaching stioqiometri so combustion are approaching dirty and its torque produced the higher Then torque down start round 2500 rpm until the round 4500 rpm, because the higher round a mixes air and fuel poorer, so that combustion less perfect and friction components engines are becoming high. Its torque produced by a cocktail of fuel oils biodiesel with diesel fuel greater compared to torque on generated by a engine with diesel fuel. The increase in torque highest in fuel B50 of 18,15 % in 2000 rpm, while torque from fuel B60 lower the viscocity has more than standard fuel so atomization fuel not maximum.

b. Power

The power generated by a engine by the use of fuel a mixture of biodiesel with diesel fuel as in a Figure 3 .

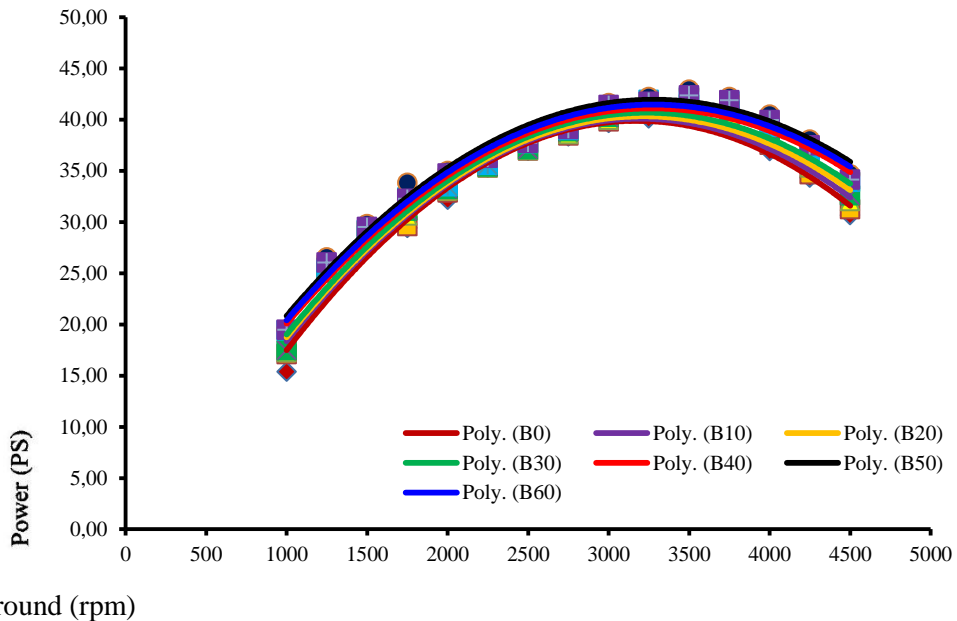
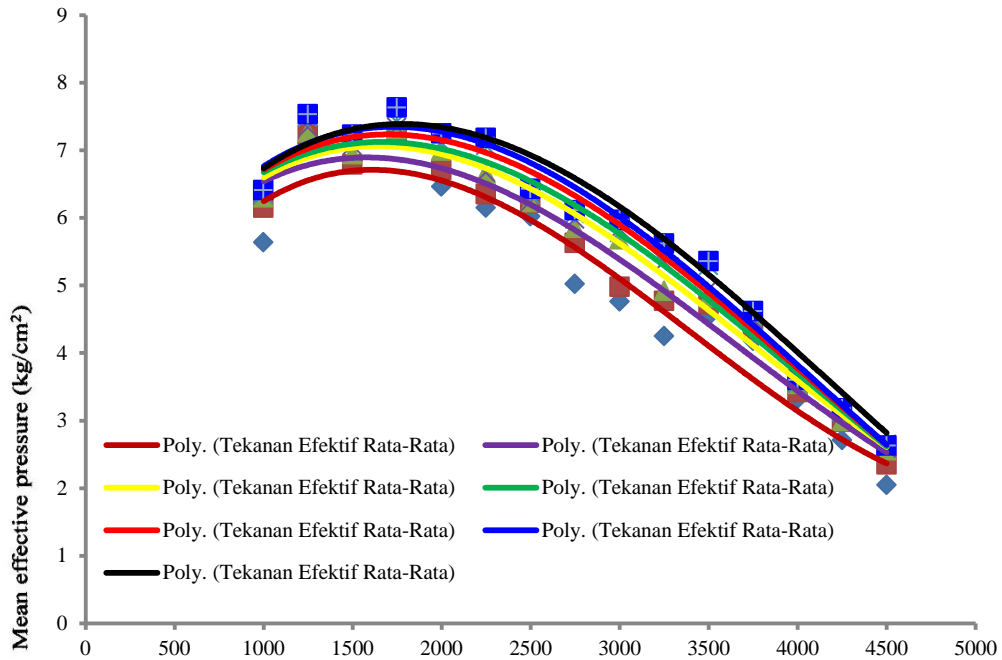


Figure 3. The relationship between power and round engine

Figure 3 shows that the power generated by a engine in the low on rpm 1000 up to 1750 rpm) are still low, then the highest round a power is rising and peaked in the 3500 rpm, because in that is economical round, it means in this round a cocktail of fuel oils approaching a mixture of stoichiometry so that the material fuel burned down and energy the heat produced by the maximum. Then having a round 3500 rpm upward power declining, this is because besides combustion the away from perfect also friction components engine are becoming great that he forgot declining. In general the power generated by a machine by the use of fuel B10 up to B50 engine power are becoming large and peaked in B50 with a rise in of power equal to 18,92 % in rpm 3500, since the fuel biodiesel more containing oxygen so as to combustion faster. While in B60 the power as much as lower, because viscosity B60 has more than standard, so that atomization fuel imperfect.

b. Mean effective pressure

Figure 4 shows that mean effective pressure generated by a engine with using fuel a mixture of biodiesel diesel with fuel.



Engine round (rpm)

Figure 4 .The relationship between mean effective pressure and engine round

The mean effective pressure generated by a engine in the low still, then in round middle (1250 rpm until in 2000 rpm) the mean effective pressure the average effective up and then continue to decline. This happened because in the intermediate combustion occurs approaching perfect so that the pressure resulting be tall. By using a cocktail of fuel oils biodiesel whit diesel fuel effective the average pressure resulting higher if compared to using diesel fuel .The increase in the average mean effective pressure highest happened to B50 is as much as 17,96 % in 1750 rpm.

c. SpecificConsumptionFuel

Specificconsumptionfuel (sfc) generated by a engine the use of fuel a mixture of biodiesel with diesel fuel indicated as in a Figure 5.

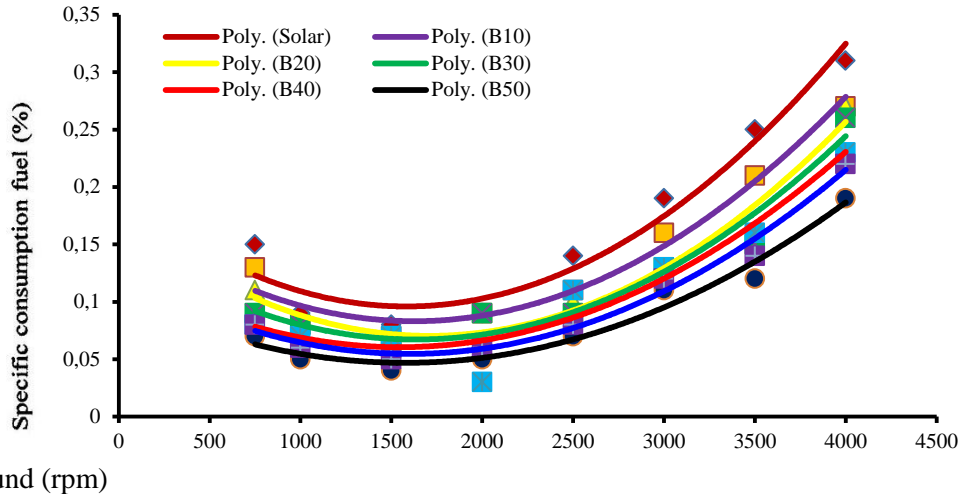


Figure 5. The relationship between specific consumption fuel with engine round

Figure 5 shows specific fuel consumption (sfc) in round a is still low, while in the round medium namely economical round (1250 rpm until the 2500 rpm) declining and the higher revolution sfc s rising. This induced in round low a cocktail of fuel oils rich and the resulting is still low. Whereas in the economical combustion approaching perfect so that the power who be considered the higher. In the high round combustion less perfect, friction the bigger and the resulting declining. In general by using fuel a mixture of biodiesel with diesel specific fuel consumption the lower, it means the economizes, because combustion faster and he forgot the higher. The decline in specific fuel consumption largest in B50, is as much as 23,443 % in 2750 rpm.

d. Opacity

Opacity generated by an engine the use of fuel a mix of biodiesel produced by using with solar indicated as in a Figure 6.

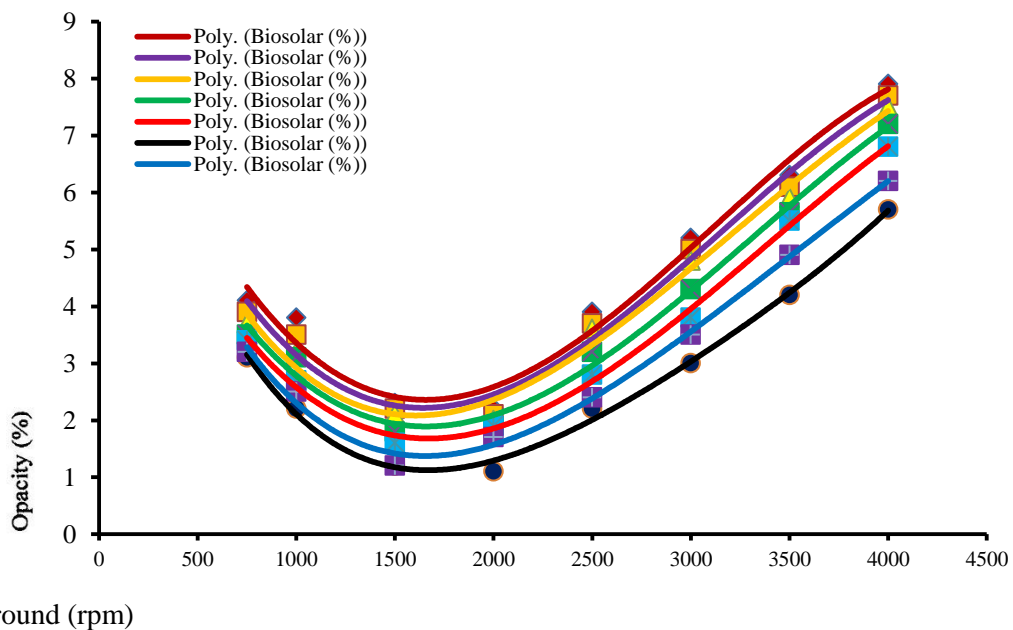


Figure 6. The relationship between opacity with engine round



Figure 6 shows that in the low opacity produced engine is high still, then in the medium opacity low, because in the of these processes combustion the better, so that opacity produced the less. While the higher revolution opacity produceds rising, because combustion less perfect. In general by using fuel a mixture of biodiesel and solar opacity recorded are more low if compared to using diesel fuel. Because biodiesel not containing sulphur and cleaner combustion. The decline in opacity on the highest fuel use B50, is as much as 48,12 % in 2000 rpm.

#### IV. RECOMMENDATIONS AND CONCLUSION

##### a. Conclusion

From the experiment burning with fuel biodiesel of oils of randu seed (ceiba pentandra ) with solar obtained conclusion as follows:

- 1). There was an increase in were engine performance, were engine performance, maximum with fuel B50 (torque up 18,15 % in 2000 rpm, power up 18,92 % in 3500 rpm, mean pressure effective the average 17,96 % in 1750 rpm ).
- 2). The decrease in sfc of 23,443 % on 2750 rpm
- 3) The decrease in opasitas 48,12 % on 2000 rpm

##### b. Recommendations

The more a mixture of biodiesel, so vikositasnya the high that atomization fuel the more severe .To get the maximal result this research need to be extended with to warm up early fuel before atomized.

#### Acknowledgement

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## THE GEOGRAPHICAL INFORMATION SYSTEM (SIG) A RESIDENCY STUDENTS SMART FAST EDUCATION IN THE CITY OF PEKANBARU WITH WEB-BASED

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**ABSTRACT :** *The geographical information system (SIG) is a computer based information system to store, manage and analyze, and called geographical referential data that is growing at a rapid rate in the last five years. The benefits of the SIG is to provide convenience to the users or the decision makers to determine the wisdom that will be taken, especially related to the aspects of spatial) The system information about geographically more needed by many people for example the information the distance between the regions, location, facilities and many other information. The information required for the user to various needs such as research, development, design region and natural resources management. Due to this geographical information system can help the presentation of a more interactive map where the user can access the complete geographical information using only the computer. The geographical information system data processing job apprentice or practice field work Students Smart Fast Education Center Pekanbaru web based designed with supporting software that is used is xampp, macromedia dreamweaver 8.0, and the MySQL database as a builder and program documentation and reports. With the existence of this web-based system to produce a system that provides information about the location of the internship is made to make it easier for students to find a location for the internship in Pekanbaru especially students from outside the area. Not only to find the location in the gis web is students can download the practical work guide, list of values, a thesis advisor list.*

**Key Words:** *Geographical Information System, maps, web, apprentice*

### I. INTRODUCTION

Geographic Information Systems (GIS) is a computer-based information system for storing, managing and analyzing, as well as calling geographically referenced data that is growing rapidly in the last five years. The benefits of the SIG is to provide convenience to the users or decision-makers to determine the wisdom to be taken, especially with regard to the spatial aspect (spatial)

Smart Fast Education Center Pekanbaru as one educational institution or Formal Training Institute that offers multi-skill professional programs to students, especially in terms of education and teaching that has a very important role in printing the candidates professionals are professionals in their fields. Smart Fast Student Education Center Pekanbaru before graduation held apprenticeship workplaces such as government offices, corporate, banking, travel, airports and hotels which is expected to mature and ready to work.

With berkembangnya internet technology, people increasingly make it easy to do all kinds of facilities and processes, one example is looking for an intern existing locations in the city of Pekanbaru, which is sometimes very difficult, especially college students seeking internships students teruta outside the area can be accessed via the Internet by using the web.

Geographical Information Systems are increasingly required by many in the community eg distance information between the regions, locations, facilities and lots of other information. The



information is needed users for various purposes such as research, development, design and management of the area of natural resources. Due to this geographical can help presenting an interactive map, which users can access

Complete geographic information simply by using a computer, a web-browser and Internet networks. So to get all necessary information geographical information system (GIS), known as geographic information systems (GIS).

complete geographic information simply by using a computer, a web-browser and Internet networks. So to get all necessary information geographical information system (GIS), known as geographic information systems (GIS).

Based on the background described above, it can be formulated with the following issues.

1. The difficulty of college students looking for internship locations in a timely manner because students quickly came perusahaan to know the location of the internship or over the phone takes a long time.
2. Lack of presentation of textual information about apprenticeship in detail and clearly, making it difficult to monitor the progress of students during the internship.

The purpose of this study is to help:

1. To generate a geographic information system that provides information in the form of a map in the form of data descriptions and photos.
2. To produce a system that provides information about the location of this practical work is designed to enable students to seek internships at area locations Pekanbaru mainly students from outside the area. Not only interested in the source code of this web gis students can download a guide to the practical work, a list of values, the list of lecturers.
3. The system is implemented in Smart Fast Education Pekanbaru, by providing tools for searching and information about Smart Fast Education, apprenticeship places, the road connecting places and descriptions about the place and the way it does.and descriptions about the place and the way it does.

## **II. LITERATURE**

### **2.1. Understanding System Planning**

System planning activities, defining, drawing a new system to replace the old system as a whole or improve existing systems.

### **2.2. Internet**

#### **2.2.1. understanding the Internet**

Internet comes from the interconnection network and the connection of various computers and various types of computers that form a network system that covers the whole world (global network) and telecommunication such as telephone lines, satellite, infrared, wireless and more.

#### **2.2.2 HyperText Transfer Protocol (HTTP)**



HTTP is a protocol that defines the rules to be followed by the web browser in the request or take a document and by web server to provide documents requested by the browser. HTTP is the standard protocol to date.

### 2.2.3 World Wide Web

World Wide Web is a network that is formed on the internet. The term comes from the WWW consortium held in 1994, to develop a standard for Web technology.

### 2.2.4 Geographic Information Systems (GIS)

Geographic information about the surface of the earth and all objects on it, which is the framework for the regulation and organization for all further action. (Aziz, 2006; 13)

Geographic information systems or geographic information system (GIS) is defined as a system (computer-based) used to store and manipulate geographic information. Geographic Information System is designed to collect, store, and analyze objects and phenomena in which the geographic location is an important characteristic (Prahasta, 2002; 1)

### 2.2.5. Uniform Resource Locator (URL)

Uniform Resource Locator is the address that specifies the location information of a file on a web server. Where the address consists of:

1. The protocol to use a browser to retrieve information
2. The name of the server computer where information is stored
3. Line or path and filename of an update.

The general format of the URL is as follows:

Protokol\_trasfer: // nama\_host / path / filename

Example: <http://www.fith.com/technic/index.php>

Where :

http is the name of the protocol.

www.fith.com is the name of the host.

Technic / index.php is the path and file name.

### 2.2.6 Web Browser

The browser is a program designed to request information from a server and display it.

The browser is often used is as follows:

- Internet Explorer from Microsoft
- Mozilla Firefox
- Lynux working on the Unix operating system
- Artificial NCSA Mosaic
- Netscape Navigator from Netscape Communications
- Opera from Opera Software ASA

## 2.3. Database

### 2.3.1 Definition Database



Database is a complex object to store information structured, organized and stored in a way that allow the wearer can retrieve information quickly and efficiently. The information is broken down and stored in a table, and each table stores entities-entities that are different from one another.

### 2.3.2. Database Management System (DBMS)

Database Management System or abbreviated DBMS is software (Software) that serves to manage the database, ranging from making the database itself, through processes that apply in that database, either in the form of entry, edit, delete, query against the data, create reports and so effectively and efficiently. One type of DBMS that is most popular today is the Relational DBMS (RDBMS), which represents the data in the form of tables that are interconnected. A table is organized in the form of rows (records) and columns (fields)

Lots developing RDBMS software, such as MySQL, Oracle, Sybase, dBase, MS. SQL, Microsoft Access (MS. Access) and others. Basically a lot of people are using MySQL as the database, especially in creating websites for MySQL is considered to be a couple of PHP

## 2.4. Software used

### 2.4.1. PHP Hypertext Preprocessor (PHP)

According to official documents PHP, PHP stands for PHP Hypertext Preprocessor. It is a form of language scripts that are placed in the server and processed on the server. Hasilnyalah that is sent to the client, where the user web browser.

PHP first ditemikan by Rasmus Lerdorf, a unix programmer and perl that time. He tried to spend his spare time to create a macro-perl CGI script, which initially aim is only to know anyone who saw the writing on his personal homepage. And with the presence of a script that made a lot of response from existing netters, then developed rapidly into a programming language widely used web server dijutaan internet. And finally, PHP develops so quickly that php become a mainstay for building sites - sites large and small, and are categorized as the most popular free software.

PHP is a language that digunakan script to create dynamic web pages, meaning dynamic web pages that will be displayed when the page is requested by the client. This mechanism menyebabkan information received by the client up to date, all PHP scripts are executed on the server where where the script is run. Therefore, the specification of the server has more influence on eksekusi of PHP script than spesifikasi client. Still, note that the resulting web page should certainly be dubika by the client.

### 2.4.2. Apache

Apache web server is a program that is open source. Dengannya a computer can be a web server to store the files into the htdocs folder belong to apache. To access it simply pressing localhost URL address in your Web browser.

### 2.4.3. MySQL

MySQL is a database software developed by a Swedish company called MySQL AB, who was named TcX Consulate Data AB. At first MySQL AB wearing mSQL or "mini SQL" as the interface is



used, apparently using mSQL it encountered many difficulties, because it is very slow and inflexible. Therefore, Michael Widenius ( "monthy"), her nickname, trying to develop The interface so ditemukanlah MySQL.

Until now, MySQL can be run as an operating system although initially MySQL can only run on a unix system and its variants. MySQL database server into open source is very popular and is a relational database (RDBMS) that has the ability to very quickly to be able to run SQL (Structured Query Language) with multy user. Therefore, by looking at the high potential so MySQL database to serve as a reliable, all feature continued support is developed so that users can more optimally MySQL in use. Then it will be a pleasure for computer users who use Microsoft Windows as the operating system, because MySQL can also be used in Microsoft Windows.

#### 2.4.4. Google Maps

Google Maps mapping service is an online tool that gives the user a variety of features such as map display street maps, steering the direction of point-to-point, and the lines to find business locations in various cities. With the addition of street maps and terrain view, satellite or aerial views may give the appearance that is easy to understand user and is accessible to anyone via an online connection (Frazel, 2009: 39).

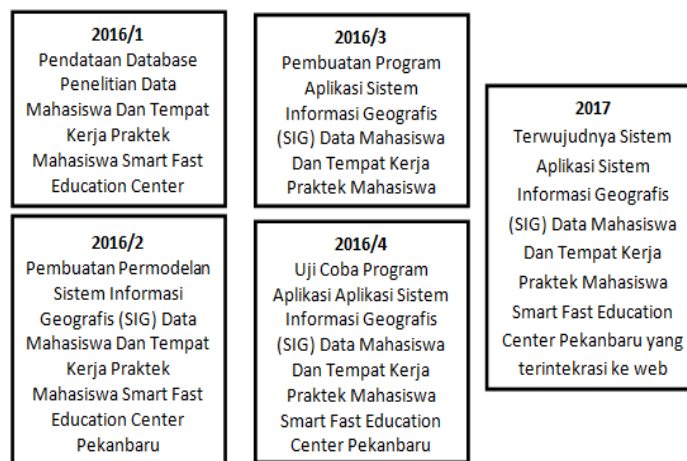
#### 2.4.5. Macromedia Dreamweaver 8

Macromedia Dreamweaver 8 is a software used to create web pages that are supported by the wizard-wizard contained within the software. Macromedia Dreamweaver has the advantages of other software, in which there has been a wide variety of programming languages such as PHP, ASP, HTML, Coldfusion and others.

Not only programming course, Dreamweaver 8 also can help us in web design and animation with menus and tools available and has the function of each. In making this web I use Macromedia Dreamweaver 8.

#### 2.4.5 Road Map Research

In order for this research is more focused then we hereby meyajikan research roadmap as a benchmark for the success of this system.



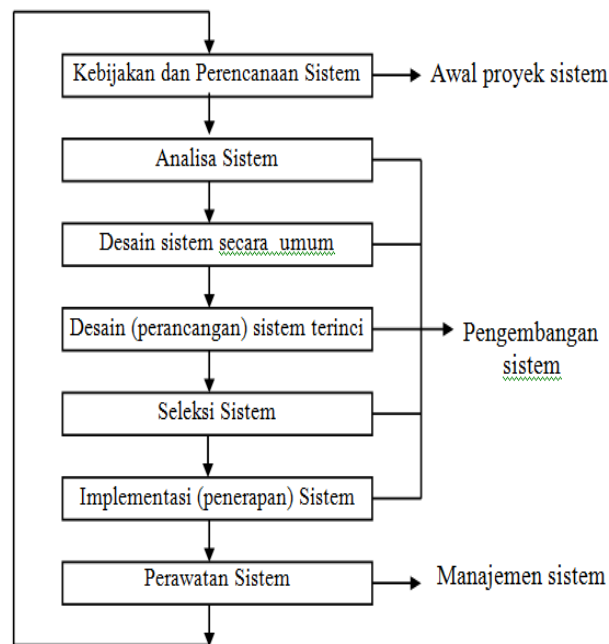
### III. METHODS

The research methodology is closely related to the procedures, techniques, tools, and research design used to give researchers the order of sequence of work continues to be done in a study, thereby helping researchers to control the activities or stages of activities and facilitate the advancement mengetahui (process) research , The research method describes the design of the study, which covers procedures or steps that must be taken. And in this chapter will describe the research methodology section that includes the research object, the unit of analysis, and the frame work (framework).

In the process of this research aims to better understand how to design a web sales on-line. Conceptualization of the design process in the system is then poured into a research method complete with patterns of data collection needed to realize the goal of building a system or program to be established from the initial determination of title

#### 3.1 Research Framework (Framework)

In this chapter will describe the research methodology and research framework used in the completion of this study. Kerangka this work are the steps to be taken in the framework of solving problems aka discussed. The stages in the Development Cycle Systems or System Development Life Cycle (SDLC) as follows:



**Figure 3.1** Systems Development Life Cycle

#### 3.1.1 Problem Analysis

Step analysis of the problem is to be able to understand the problems that have determined the scope and limits. By analyzing the problem that has been done, it is expected that the problem can be well understood. The analysis technique used with the following steps:

1. Stage identify are: identifying the problems occurred
2. Stage understand namely: to understand more about the problems that exist in a way to collecting the necessary data.



3. Analyze Phase, namely: look for the weaknesses of existing systems and collect information about needs further required by the user.

#### 3.1.2 Data Collection

The field research is intended to obtain information directly from the company and also the world of internet. The data collection techniques used are:

1. Observation, namely the collection of data and information that is made by observing directly to the object, and also analyzes the current system, as well as observe a geographic information system (GIS) that already exists in Google Maps.
2. Interviews, namely data collection by way of question and answer with the relevant parties, namely head of Smart Fast Educations Pekanbaru

#### 3.1.3 Input-Output Design of Geographic Information Systems (GIS) Web Based

At this stage of designing the input-output using PHP PHP Application Dreamwever Macromedia Version 8 and using MySQL Database using tools in the program.

#### 3.1.4 Design of Geographic Information Systems (GIS) Web Based

At this stage of designing a Geographic Information System (GIS) where Smart Fast Student Internship Education Pekanbaru using the programming language PHP, Macromedia Dreamwever Applications Version 8, Google Maps APIs and MySQL database.

#### 3.1.5 Implementation of Geographic Information Systems (GIS) Web Based

At this stage, the authors implement Geographic Information Systems (GIS) where student interns Fast Smart Web-based Education Pekanbaru.

#### 3.1.6 Conclusion

At this stage, the authors conducted research conclusions that have been made to design a Geographic Information System (GIS) The Internship Smart Fast Student Education Pekanbaru

### 3.2 Location research

The study was conducted at the Campus Smart Fast Education Pekanbaru Jl.Soebrantas No. 41 Pekanbaru and Environment Faculty of Computer Science University of Lancang Kuning. Type of data

#### 1. Primary Data

Primary data is data obtained from the original sources. The original source here interpreted as the first source from which the data was obtained.

#### 2. Secondary Data

is data obtained or collected from documents available literature. In this case the data gathered in the Lancang Kuning University.

#### 3.2.1 Data Collection Techniques

##### a. observation techniques

Researchers conducted direct observation to determine the localized research and witness firsthand the existing systems in the study.



b. Mechanical Study Library.

Researchers also conducted a literature study to mencari scientific theories which can support through literature-literature in the library or from other sources.

c. Laboratory Research

The research done by using a computer that is supported by hardware and software

**IV. ANALYSIS AND DESIGN SYSTEM**

4.1 Analysis System

Analysis of this system is the decomposition of a complete geographic information system into its component parts with a view to identify and evaluate the problems, opportunities, barriers that occur and needs of companies that are expected to be proposed improvement.

Systems analysis phase aims as the basis for designing or upgrading the old system. From the results of the analysis can be designed or improved into a system that is more effective and efficient

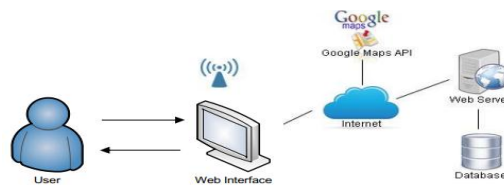
4.1.1. System planning

The design of the system is the logical step after the analysis of the system development cycle is defined from functional requirements and preparation for design implementation that illustrates how a system was formed, which may include drawing, designing, and manufacturing of sketches or arrangement of several separate elements into a single unit intact and functioning also involves the configuration of hardware components and software.

4.1.2 Overview of the Proposed System

Internet here as a means to build a network that connects all of the place. There are many services and applications on the internet will continue to grow in line with the development of information technology. In a web-based Geographic Information System, the Admin is the administrator of the part that has the permissions to perform system management such as looking at the data, delete, add, search, and edit data.

Users are teachers and students devoted by the college who had special access including access to search data and data information through the Internet, receive information legends of the data in the form of maps, and other information related to logging information in a Geographic Information System Points Internship Student Fast Smart Education Pekanbaru.



**Figure 4.1** System Architecture

While an overview of the software architecture of the Geographic Information System The Smart Student Internship Education Fast Pekanbaru are as follows:

**Table 4.1.** Software Architecture

User	Right	Assignment
Administrator	SIG Student Internships	<ul style="list-style-type: none"> <li>- View and delete user data.</li> <li>- View and delete data</li> <li>- Provide confirmation via the web on additional map data information maps, edit and update data</li> <li>- Manage map data, categories, map legend</li> </ul>
User		<ul style="list-style-type: none"> <li>- Students can see information presented system.</li> <li>- Students could more detail all data online geographic information is presented through the digital map tekoneksi to Google Map</li> </ul>

#### 4.1.3. Proposed Design Procedure

The design process is done in a system to facilitate the flow of data on the program. Making it easier for a person in making the system so that the system can be easily understood by those who use the system.

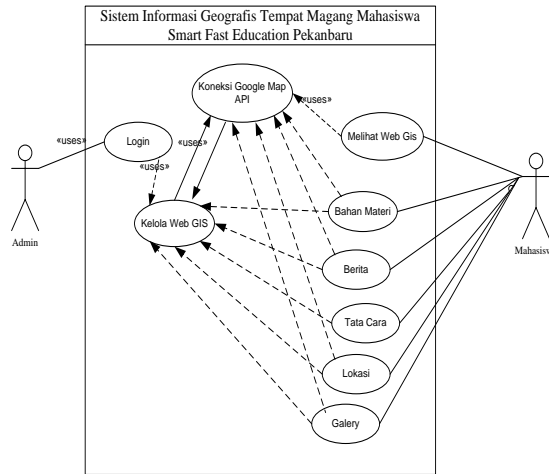
The difference between the old system with a new one with the new system is the process of presenting the information needed by the students can be served quickly, precisely, accurately so as to improve the effectiveness of Geographic Information Systems The Smart Student Internship Education Fast Pekanbaru. Admin to manage the system, and inform

#### 4.1.4 Procedure The proposed system

The data into a map in accordance with in accordance with the data berkembang, informing consumers about online digital map information, location data for apprenticeship, internship ordinances, practice guidance, assessment. Users or students accessing the site from a Geographic Information System The Smart Student Internship Education Fast Pekanbaru and can be viewed in

detail and illustrated in the map presentation informai of appropriate information systems on existing data field to the user / student in accordance with the desired information.

#### 4.1.5 Use Case Proposed



**Figure 4.2.** Use Case SIG The Student Internships

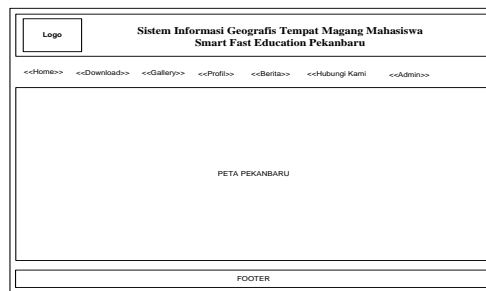
The system consists of two actors, namely the user and admin. Activities that can be done by the user is viewing the map area Pekanbaru area, news, ingredients and materials, the location of the internship, interns ordinances, photos, gallery. While the activities that can be done by admin is login and manage data Geographic Information Systems The Smart Student Internship Education Fast Pekanbaru.

#### 4.2. Draft Proposed System Specifications

##### 4.2.1. Forms Document Feedback

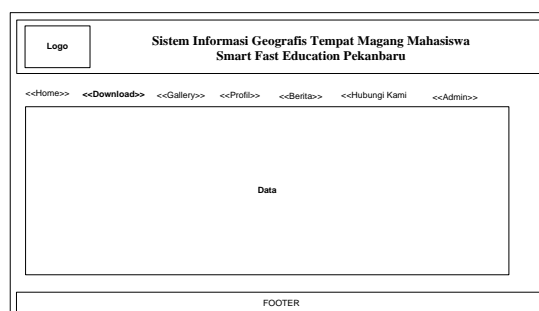
The design inputs contained in the system as follows:

##### 1. Design Home



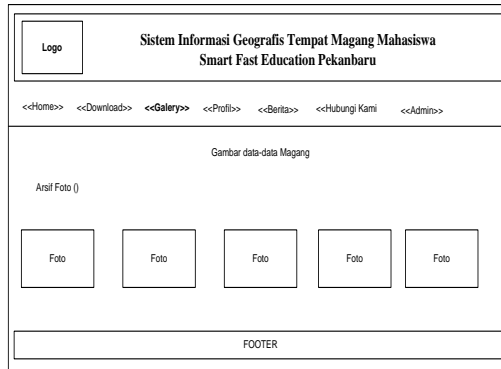
**Figure 4.3** Design Home

##### 2. Download Page Design



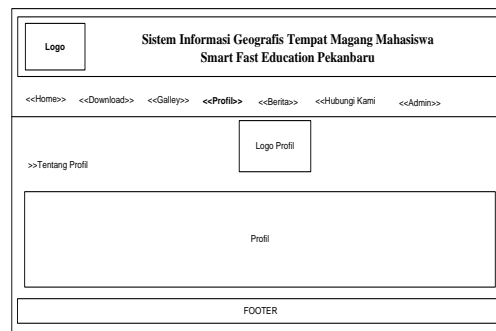
**Figure 4.4** Download Page Design

### 3. Galery Page Design



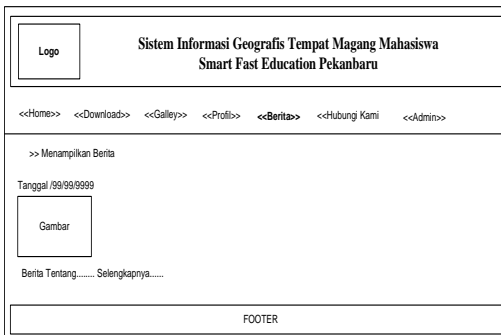
**Figure 4.5** Galery Page Design

### 4. Profil Page Design



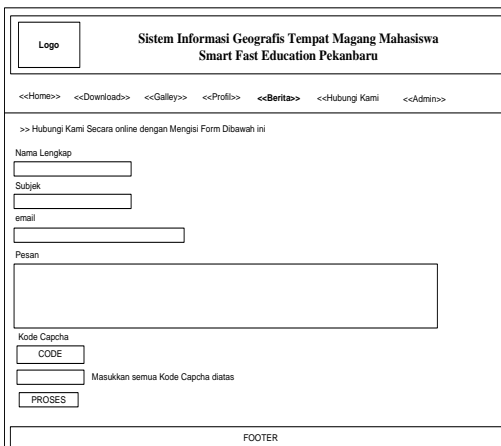
**Figure 4.6** Profil Page Design

### 5. News Page Design



**Figure 4.7** News Page Design

### 6. Home Contact Us Design



**Figure 4.8** Home Contact Us Design

## 7. Admin Login Page Design

**Figure 4.9** Admin Login page Design

## 8. Menu Page Admin Design

**Figure 4.10** Menu Page Admin Design

### 4.2.2 Specification File

The specification file is used to design the system because this file will determine the physical structure of the database and data types. the structure of the database file which is proposed as follows:

#### 1. Table User

Table Name : user

Database Name : magang.sql

Primay Key : password

**Table 4.2.** User files

No	Fileld Name	Type	Size	Dec
1	username	Varcha r	50	Nama User
2	password	Varcha r	50	Passwor d
3	nama_instansi	Varcha r	100	Nama Instansi
4	alamat	Varcha	225	Alamat

		r		
5	jabatan	Varcha r	15	Jabatan
6	email	Varcha r	100	Alamat email
7	no_telp	Varcha r	20	Nomor Telp
8	level	Varcha r	20	Level User
9	blokir	Enum		Blokir
10	Id_sessio n	Varcha r	100	Id Sesssion

## 2. Table Image

Table Name : gambar

Database Name : magang.sql

Primay Key : id

**Table 4.3.** Image files

No	Field Name	Type	Size	Dec
1	idf	int	3	id
2	ida	int	2	Id gambar
3	namaf	varchar	30	Kategori seo
4	ketf	text	100	keterangan
5	tgl	date		tanggal

## 3. Table Categories

Table Name : kategori

Database Name : magang.sql

Primay Key : id\_kategori

**Table 4.4.** file Categories

no	Fileld Name	Type	Siz e	Dec
1	id_kategori	Int	5	Id Kategori
2	nama_kate gori	Varcha r	50	Nama Kategori
3	kategori_se	Varcha	100	Kategori



	o	r		seo
4	jenis	Varcha	100	Jenis
		r		
5	aktif	Enum		aktif

#### 4. Tabel Menu

Name Tabel : menu

Database Name : magang.sql

Primay Key : id

**Tabel 4.5** File Menu

No	Name Name	Type	Size	Dec
1	Id	Tinyint	3	Id Menu
2	Parent_id	Tinyint	3	Parent id
3	judul	Varchar	100	Judul
4	url	Varchar	100	Alamat url
5	menu_order	Tinyint	3	Menu order

#### 5. Tabel Locations

Name Name : locations

Database Name : magang.Sql

Primay Key : id\_locations

**Tabel 4.6.** File Locations

No	Name Name	Type	Size	Dec
1	id_location	Int	10	Id lokasi
2	id_kategori	Int	5	Nama kategori
3	Username	Varchar	30	Alamat email
4	Judul	Varchar	100	Judul
5	Judul_seo	Varchar	100	Judul seo
6	description	Text		Tanggal
7	latitude	Double		Latitude
8	longitude	Double		Longitude
9	address	Varchar	145	Alamat di google map
10	nobangunan	Varcahr	12	Alamat bangunan
11	telepon	Varcahar	10	Nomor telepon
12	kodepos	Varchar	15	Kode Pos
13	hari	Varchar	20	Hari
14	tanggal	Date		Tanggal
15	jam	Time		Jam



16	gambar	Varchar	100	Gambar
17	gambar2	Varchar	100	Gambar 2
18	dibaca	Int	5	Dibaca

#### 6. Tabel Modul

Tabel Name : modul

Database Name : magang.sql

Primay Key : id\_modul

**Tabel 4.7.** File Modul

No	Field Name	Type	Size	Dec
1	Id_modul	Int	5	Id modul
2	nama_modul	Varchar	50	Nama modul
3	link	Varchar	100	Link
4	Static_content	Text		Konten statik
5	gambar	Varchar	100	Gambar
6	publish	Enum		Publikasi
7	status	Enum		Status
8	aktif	Enum		Aktifasi
9	urutan	Int	5	Urutan
10	Link_seo	Varchar	50	Link seo

#### 1. Tabel Sekilas Link

Tabel Name : sekilaslink

Database Name : magang.sql

Primay Key : No\_Telp

**Tabel 4.8.** File Kategori

No	Field Name	Type	Size	Dec
1	id_link	Int	5	Id link
2	nama_link	Varchar	100	Nama link
3	url	Varchar	100	Alamat url
4	tgl_posting	Date		Tanggal posting



## 8. Tabel Hubungi

Tabel Name : hubungi

Database Name : lahani.sql

Primay Key : id\_hubungi

**Tabel 4.9** File Hubungi

No	Field Name	Type	Size	Dec
1	Id_hubungi	Int	5	Id hubungi
2	Nama	Varchar	50	Nama
3	Email	Varchar	100	Email
4	Subjek	Varchar	100	Subjek
5	Pesan	Text		Pesan
6	tanggal	Date		Tanggal

## 4.3 Implementation Program

In the use of this program is the first step was to call the initial display of Geographic Information Systems The Smart Student Internship Education Fast Pekanbaru by typing `http://localhost/magangsmartfast` it will show the main page.

### 1. Home Web SIG Smart Fast Internship Education Pekanbaru



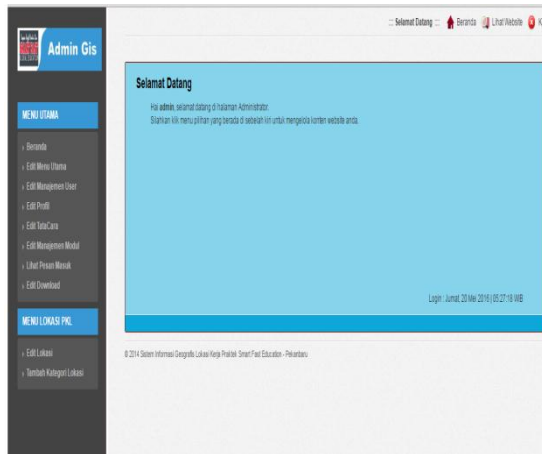
**Figure 5.11.** Home Web SIG Magang Smart Fast Education Pekanbaru

### 2. Login Admin Page



**Figure 4.12** Login Admin Page

### 3. Menu Admin Page



Gambar 4.13 Menu Admin Page

### 4. Input Data student Internship Page

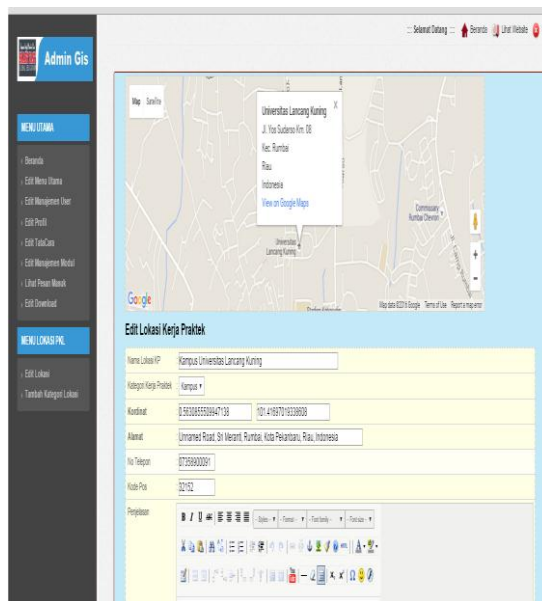


Figure 4.14 Input Data Student Internship Page

### 5. Halaman Download



Figure 4.15 Download Page



## V. CONCLUSIONS AND RECOMENDATIONS

Based on the implementation and explanation has been put forward previously by the authors, it can be concluded from the Geographic Information System (GIS) The Student Internship Smart Fast Pekanbaru Education are as follows:

1. With the geographic information system can monitor the progress of students practice an internship
2. Application of Geographic Information System is able to control the creativity of students such as attendance, grades, time willing to guide the module because it is web based.
3. With this system helps lecturers and students locate internships in detail

### 5.2. Sugestions

Some suggestions are intended for the material development of this system, as for suggestions include:

1. With the analysis and design is expected Smart Fast Pekanbaru where research can establish and implement a geographic information system in the control and assessment of student interns.
2. This study only analyzed the needs of the system and designed it so that it still required the development of a real system.
3. The system can be adapted to the conditions in the institution / company where the student internships

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EI-05-019

## THE EFFECTIVENESS OF SIX PRINCIPLES OF SOFT SKILLS INSTRUCTIONAL MODEL TOWARD SOFT SKILLS LEARNING OUTCOME OF STUDENTS MECHANICAL ENGINEERING VOCATIONAL SCHOOL

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**ABSTRACT:** *This research is one of part of the development research in testing effectiveness product. The research based on the low of competency soft skills graduates of Mechanical Engineering in Vocational School shown at work places. This is proven as cause of many problems at work places. The purpose of the research is determine the effectiveness instructional model of soft skills to the students of the mechanical engineering in vocational school. The instructional model was called a six principles of soft skills instructional model, or MP2S6P model. This is experimental research with a posttest only control group design. The population of the experiment are practice industry students of the Batam Vocational School I, which followed a work shadowing strategy. There were 30 students in the sample chosen by random sampling To collect data was developed a performance test. The data was analyzed with independence t-test. Based on the research The application of the soft skills instructional (MP2S6P) model result significantly better achievement than achievement using conventional instruction of students of Mechanical Engineering of the Vocational School. Based on these founding can be recommended that MP2S6P should be used in teaching soft skills necessary in Vocational Schools students.*

**Keywords:** *Soft Skills, MP2S6P (six principles of soft skills instructional model), Learning out come.*

### I. BACKGROUND

In work process, a person's ability is very crucial in determine performance. Effective and efficient Performance in the industry is not only determined by the hard skills but also soft skills give a big influence. *Research on predicting the future career success of students supports employers' opinions that some soft skills are a better predictor of a dult success (Salaries, graduation rates, home ownership) than technical skills (Pritchard, 2013).* Soft skills are very important competencies that must be owned by the workforce in the work world and career development. *"Appropriate soft skills play an important role in a successful career as well as during social interactions in the society. Also Reviews These skills are highly sought after by employers recruiting fresh graduates"* (Majid and Liming, 2012).

Vocational education is an education program that is held directly and related to the preparation of individuals in face work future, both of permanent payment or not, as an additional preparation individuals in career developing needed, beside bachelor or vocational graduated and equivalent level. (Calhoun and Finch.1982: 60). Vocational graduates should be ready to work, intelligent, have a competitive advantage, comparative and strong character as professional workers, so that soft skills mastery should be mastered well if want qualified graduates in face of competition in world of work. "Soft skills is a determine factor in recruitment process. A number of companies surveyed agreed that 80% of soft skills affect job, soft skills is an attitude or behavior that can not be achieved instantly, the ability to communicate, ability convey ideas, and self-motivation there are a small part of soft skills" (GaluhSetya . 2013). Lubis (2010), state that: *Vocational education is education for work. In order to*

reach this aim, instructional strategies used should be directed to all requirements needed in the work place. The students should learn the knowledge, skills, attitudes, and values the which are important in doing A Certain job in such a way as they apply them in the real work setting.

Based on the previous survey, conducted in companies inMukaKuning Industrial district, BatamBatamindo, in August 2013, there are indications caused by the lack of soft skills possessed by employees of vocational graduates. Some of the problems include: 1). Mastering soft skills of employees in a responsible, positive work ethic, work on time and ability to production achievement still low. 2). In certain parts of the company for exampleengineering technician, often unfocus or unconcentrate while doing the work,lack ofcritical thinking until conditions that machine more worst. 3). Lack of discipline rules or working hours regulations. 4). Lack of work spirit and motivation in productionprocess.

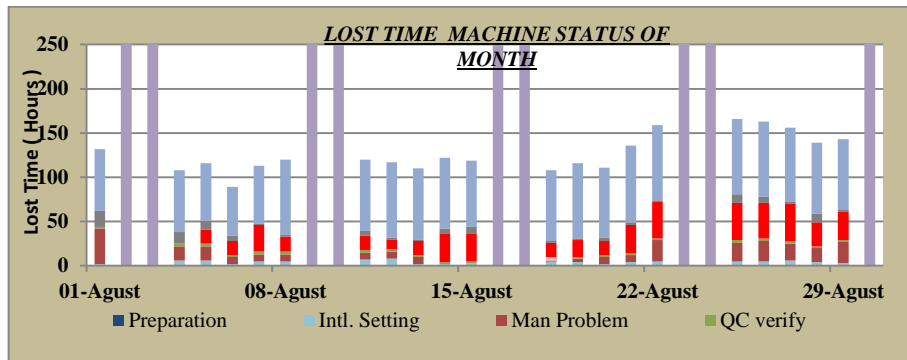


Figure 1. Lost time machine C and C(Source: PT. TVI)

Lack of skill indications can be demonstrated in Figure 1. In the graph above is explained that there are a lot of lost time, or the time wasted in machine process. This wasted time caused by several factors including: a) preparation, b) initial setting, c) .man problem, d) verify QC, e) tool problem, wait material, f) machine problem, g) engineer evaluation, h) no over time, i) holiday, j) others. 5). Workplace accidents often caused to human error, violation of the rules that have been apply as a standard safety rules. Examples of cases in Table 1

Table 1. Work Accident Categories PT. BSB in 2010-2014

No	Year	Slight	Small	Big	Amount
1	2010	31	37	1	69
2	2011	33	43	0	76
3	2012	16	20	2	38
4	2013	21	51	1	73
5	2014	37	17	1	55
TOTAL		138	168	5	311

6). Career level vocational graduates tend to be at the bottom level, and equally to graduated an equal, or equivalent with operator level in the industry, in fact the understanding of engineering owned vocational school graduates are the main assets of advantages compared with graduates equivalent,



which is illustrated by the concept KKNi (Kerangka Kualifikasi Nasional Indonesia) at the Presidential Regulation Number. 8 in 2012.

Based on the background problems above, it takes an action in the process of learning to teach soft skills to appropriate with the needs of the job. The purpose of this study was to determine the effectiveness of the application six principles of soft skills instructional model toward learning outcomes of soft skills in Mechanical Engineering Vocational School.

Achieve the goal of learning and prepare students to achieve competence, then the learning strategy should be done until that is relevant to the needs of the necessary expertise in the work world. Learners should be given knowledge skills, attitudes and values necessary in real work environment. The six principles of soft skills instructional model is one that support the learning model to teach students as ready job needs, because it is integrated school learning with the real work world learning.

The concept used in six principles of soft skills instructional model is different from some of the instructional model that has existed previously associated with instructional soft skills, among: 1). Soft Skills instructional Model Integrated with Vocational Students Skills Program Cullinary, SitiHamidah (2012). The model developed is still a hypothetical concept or model, which combines several studies related to soft skills in schools and industry, but does not do soft skills needs analysis study significantly in vocational culinary expertise to the needs soft skills in the field. The learning process is focus in process of school without involving learners in work or learning activities in the industry directly. The model has not been tested on the aspects of the validity of the effectiveness and practicalities. 2). Ahmad Esa. At all (2015), SosTem Model Development for Application of Soft Skills to Engineering students at Malaysian Polytechnics. This research was conducted for the students of polytechnics in Malaysia, based on the issue soft skills it is low on the work world. The purpose of this research is to find out a model or method that suitable to teach soft skills to polytechnic students. Based on the results of the study state that models or methods that proved appropriate to increase the soft skills, there are four methods, Ahmad Esa. At al (2015) "*Practical methods, demonstration methods, interactive methods and project methods used by the lecturer during the process of teaching and learning were effective in applying problem solving skills to students*". The four methods were developed to Soft Skills Teaching Methods Model (SoSTem). Based on the findings, soft skills are increase only limited to communicate and problem solving ability. Each study has benefits or advantages corresponding work areas. It also underlies that six principles of soft skill instructional model are different from other instructional models related to the instructional soft skills as mentioned previously.

Eggen (2012: 7) "instructional model, is a blueprint in teaching for a teacher". The blueprint give structure and guidance to teachers in the learning process, Eggen (2012) explains that the instructional model has specific characteristics: 1) The purpose: designed to help students develop critical thinking skills and understanding specifications material, 2) .Fase : includes a series of measures for helping students achieve specific learning goals. 3). Foundations: supported by theory



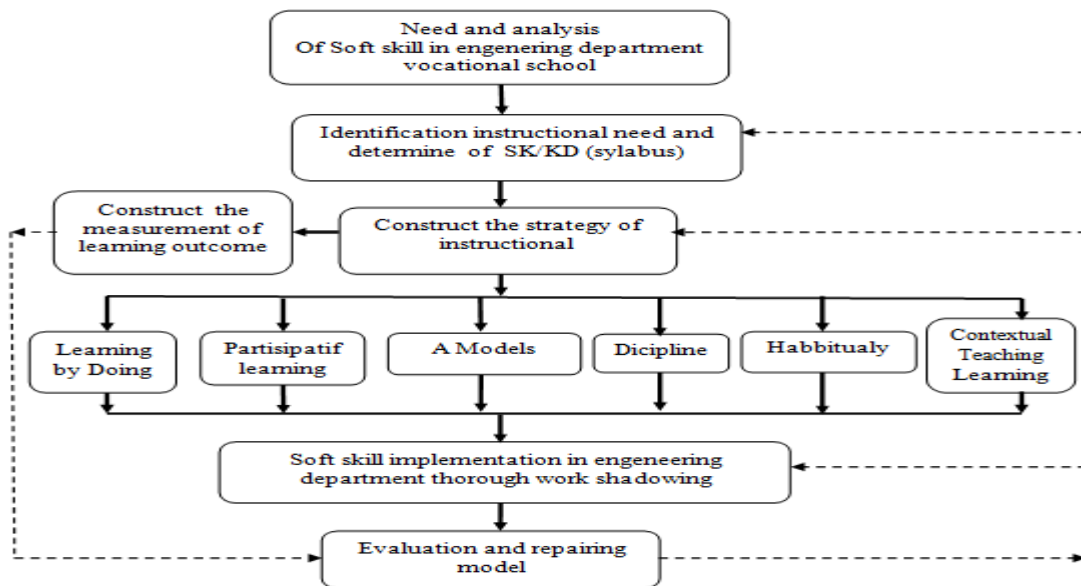
and research on learning and motivation. Joyce and Weil (2009), "instructional model is a plan or pattern that can be used to form the curriculum (learning plan long term), designing learning materials, and guiding learning in class or another". The instructional model should be like a drug used to treat a disease or in learning problem, applying the instructional model must be appropriate with the needs of the learning process, it means that not all instructional models can be suitable with the learning process, a teacher must be careful in determining and selecting the instructional model to order successful achievement of the learning objectives. There are several considerations in the selection of an instructional model, Rusman (2010: 133): 1). Consideration of goals to be achieved, 2). Considerations related to materials or learning materials, 3). Consideration of the learners' corner, 4). Another consideration is non-technical. The instructional model used in vocational education Mechanical Engineering, must be able to represent the needs of the competencies needed in business and industry, it is more familiarly called "effective work competencies". The instructional model should consider the suitability requirements with technological developments in machinery. One of the efforts is by involving students directly in activities or work in business and industry, it is the same as teaching work-integrated learning, Calway and Murphy. (2011). *"Work-integrated learning is a broad church of approaches, across many levels of education worldwide, that incorporates knowledge and skills acquisition with 'real-world' experience."*

Soft skills are the abilities of each individual, which cannot be seen, but has a big influence in someone's life, which will support the capability, career and work of someone. Wikipedia (2011). *Soft skills is a term often associated with a person's "EQ" (Emotional Intelligence Quotient), the cluster of personality traits, social graces, communication, language, personal habits, friendliness, and optimism that characterize relationships with other people.* Robles (2012). *"Soft skills are character traits, attitudes, and behaviors—rather than technical aptitude or knowledge. Soft skills are the intangible, nontechnical, personality-specific skills that determine one's strengths as a leader, facilitator, mediator, and negotiator."* Soft skills have a big influence in daily lives, especially in jobs and careers. For example, soft skills in the field of mechanical engineering that operate CNC machines. In operating the CNC machine, one needs hard skills and soft skills. Hard skills are a must-have among others, can operate the machine properly, with operational standards, fast to read pictures and can be applied to the production of CNC. While soft skills are a must-have is a fast in solving problems, full responsibility in operating the engine including abiding by the rules and behaving well in operating K3 (Safety and health in work place)

The Six Principles of soft skills Instructional Model (MP2S6P), is one of instructional models for soft skills that are integrated with the work world. Six principles of soft skills instructional model, was developed based on the needs of soft skills that are needed in the industry work or the work world, where there are 27 soft skills in appropriate with the needs analysis in the Department of Mechanical Engineering. Needs identified clearly used as a basis for preparing some of methods, approaches and strategies suitable for applying in soft skills of students learning the Mechanical Engineering Department

in Vocational School. MP2S6P compiled by systematically consider with competency needs of students and how the assessment or evaluation conducted to assess the soft skills. MP2S6P, equipped with instructional guide book for teachers, industry instructors and students, which is equipped with an interesting learning media.

Learning strategy applied to this model is a form of learning that is proper and very precise in improving soft skills competencies of students majoring in Mechanical Engineering. The concept used in work shadowing are a process to follow or shadowing someone who has been an expert in the areas of work by student (Instructor), Sousa (2011: 39) "*Recognized that intelligence and creativity are separate abilities that are not genetically fixed, and that both can be modified by the environment and schooling*". In work shadowing soft skills will improve significantly through six principle approaches: learning by doing, learning participative, a models (exemplary), disciplined, habituation and contextual teaching learning where it is obtained through a mentoring process with industry experts in accordance with the machining competence. Gordon and Parkes (1997). "*Work shadowing is not an end in itself but one approach, part of a portfolio, designed to allow people undergoing professional development to gain knowledge and understanding about the work of a colleague in a Similar (or very different position) in order to enable them Reviews their own to better understand the context, situation, position, tasks and mission*".



**Figure 2.**Six Principles of Soft Skills Instructional Model

Rational level of affective learning and teaching approaches used in the six principles of soft skills through work shadowing strategy outlined in table 2.

**Table 2.** Soft skills approach the six principles at the level of the affective domain.

NO	Domain afektif	Subcategories	
1	Receiving (penerimaan)	Awareness Willingness to receive	➤ Learning by doing



		<i>Controlled or selected attention</i>	
2.	<i>Responding</i> (menanggapi)	<i>Acquiescence in responding</i> <i>Willingness to respond</i> <i>Satisfaction in response</i>	➤ <i>Partisipatif learning</i> ➤ <i>Keteladanan</i>
3.	<i>Valuing</i> (penanaman nilai)	<i>Acceptance of a value</i> <i>Preference for a value</i> <i>Commitment</i>	➤ <i>Disiplin</i> ➤ <i>Pembiasaan</i>
4.	<i>Organization</i> (pengorganisasian)	<i>Conceptualization of value</i> <i>Organization of value system</i>	➤ <i>Contextual teaching and learning</i>

## II. RESEARCH METHOD

This research is an experimental research, using the draft Post test only control group design. This design was chosen because researchers can not control fully the variables that affected the results. Both groups in the experiment research can not be made in the same conditions. The research population was a class XI student of SMKNegeri 1 Batam. Samples were selected by using the technique of random cluster sampling are students of Mechanical Engineering Department in SMK(Vocational School)Negeri 1 Batam are implementing the practice of industrial work that was held on 8 September to 25 November 2015 in which a work practice that industry consists of 11 companies engaged in the field of machining inBatam. The total sample was 30, a class XI student of SMK Negeri 1 Batam at the Department of Mechanical Engineering. The number of 30 students, divided into two groups: the experimental group and the control group. The division randomly by analyze at the number of students practice industrial work in that place. Actions taken in the control group practicing students industrial work as normal conditions (conventional) without using the strategy work shadowing and six principles soft skills instructional. While the experimental group was given a different treatment that is apply industrial work practices by implementing six principles of soft skills instructional model (MP2S6P). Implementation of the industrial working practices to the experimental group to implement the strategy work shadowing. This strategy is apply as main reference in order to inculcate soft skills in the company of Mechanical Engineering Department with the implementation of six principles, namely: learning by doing, participatory learning, a model (exemplary), disciplined, habituation contextual teaching and learning. Six key principles in soft skills instructional model is applied to the work shadowing. Work shadowing is an integrated part of the learning model. The principle is the students shadowing or follow the work and conduct themselves as exemplified by the instructors in each machining work in the industry. Shadowing action leading to implementation soft skills in the Department of Mechanical Engineering has been specified. Before implementation the experimental research, has conducted socialization to the students, teachers and instructors industry about the learning process with the six principles soft skills instructional model. In

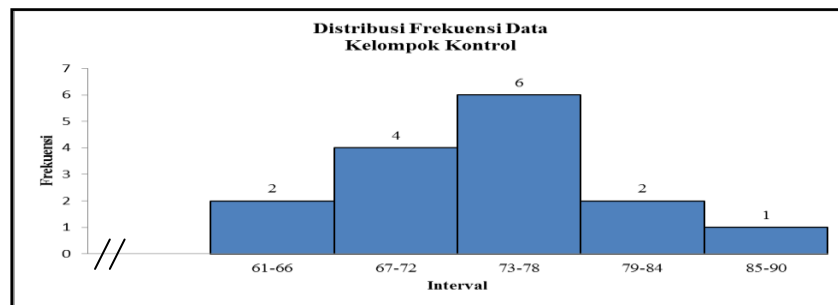
the process of socialization also given a guide book for the experimental group students, teachers and instructors industry. This guide book is intended as role that must be apply by each component in implementing of six principles soft skills instructional model of the Mechanical Engineering Department in Vocational School students.

### III. RESULT AND DISCUSSION

Assessment study result of the student taken through a process of observation by the instructor during the practice of industrial work that is apply by using the instrument action assessment. Competency assessment was also conducted in mid experimental process as the control process or repair if found things quite right, this can be called a formative evaluation. Competency assessment of learning soft skills by using various assessment rubric. Based on the analysis after the research process using model experiments with six principles of soft skills data obtained as follows:

**Table 3.** Data Description Control group Figure

<i>Sample</i>	15
<i>Mean</i>	74.40
<i>Median</i>	75.00
<i>Mode</i>	75 <sup>a</sup>
<i>Std. Deviation</i>	7.385
<i>Minimum</i>	61
<i>Maximum</i>	87
<i>Sum</i>	1116



**Figure 3.** The frequency distribution of the data control group

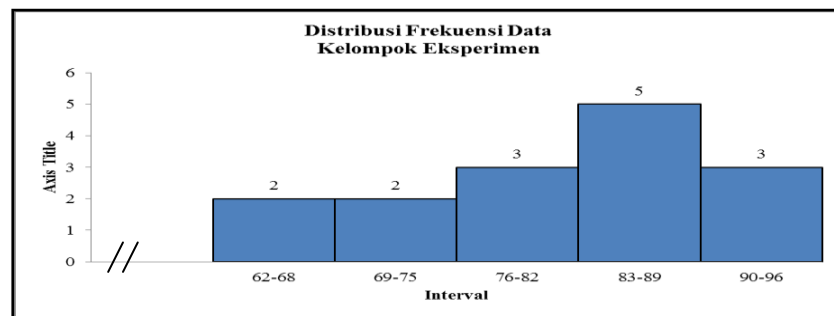
Based on data from Table 3, the distribution of data in the control group on the implementation of the industrial working practices with conventional measures, the value of students' soft skills competencies maximum value of 87 and a minimum value with the number 61, the average value is 74. The frequency distribution of the data can be seen in the control group in Figure 3.

**Table 4.** Distribution of Data Group Experiments

<i>Sample</i>	15
<i>Mean</i>	81.00
<i>Median</i>	85.00
<i>Mode</i>	89

<i>Std. Deviation</i>	9.979
<i>Minimum</i>	62
<i>Maximum</i>	93
<i>Sum</i>	1215

The results of the study in the experimental group are described in Table 4. Implementation of industry practice using six principles soft skills instructional model through work shadowing strategy, obtained the highest grades of student competence in 93 and a minimum value competence in 62, with the achievement of the average value of competence of 81. the frequency distribution of data experimental group described in Figure 4.



**Figure 4.** Distribution of allele frequency data experimental group

Before apply the hypotheses test needed prerequisites test, among, Test of normality and homogeneity test. Kolmogorov-Smirnov normality test with significance level is expressed by more than 0.05, the calculation results show the significance of the control group and the experimental group with 0.200 significance level of 0.155, then the data is state in normal distribution. Levene homogeneity test is based on statistical significance, homogeneous test base on Levene statistic significance is more than 0.05, calculations indicate significance at 0.114, then determined is homogeneous.

**Table 5.** Hypothesis Testing MP2S6P

	skor.kel.kontrol	skor.kel.eksp
<i>T</i>	39,017	31,439
<i>Df</i>	14	14
<i>Test Sig. (2-tailed)</i>	,000	,000
<i>Value Mean Difference</i>	74,400	81,000
<i>= 0 95% Confidence Lower</i>	70,31	75,47
<i>Interval of the Upper</i>	78,49	86,53
<i>Difference</i>		

Based on Table 5, got of number  $t_{\text{calculate}} = 39.017$  score for the control group students, mean while for  $t_{\text{calculate}}$  score the experimental group students is 31. 439 and the  $t_{\text{table}}$  price with  $df = 14$  at the 5% significance level is = 1.761. Decision. If the price of  $t_{\text{calculate}} > t_{\text{able}}$ ,  $(39. 017 > 1. 762$  and  $31. 439 >$



1.761), then  $H_0$  is rejected and  $H_a$  accepted (significant). Based on the tables mean difference control group of 74.400 and 81.000 for the experimental group, this case approve there is an increase in the achievement study result competency soft skills students between the control group and the experimental group in implementing the soft skills learning. Thus it can be stated there is an increase in the competence value between the result of student learning value in control group and experimental group students, the learning outcome showed that the average score of the experimental group was higher than outcome of student learning control group students. In result implementation of six principles soft skills instructional model stated effectively improving outcome of student learning soft skills of Mechanical Engineering in Vocational School.

Based on the results of the research hypothesis testing, implements six principles of soft skills instructional model can improve learning outcome of soft skills vocational students in mechanical engineering. Learning outcome means are conducted with soft skills competencies students of Mechanical Engineering Department in Vocational School 1 Batam. Soft skills learning competence outcome of students in the affective domain. Based on the results of experiments has been applied, the outcome of student learning showed the achievements of competence by looking at the outcome obtained by the students of control group and experimental group students. Control group students were the students practice in industrial work by normal conditions without used special treatment to apply soft skills. Furthermore for the experimental group students were students practice in industry by implementing the strategy work shadowing through instructors approach taken by the industry in the field of mechanical engineering. The final results showed that the average learning outcome for students experimental group was higher than the control group learning outcome.

The impact of the learning process is showed by the changes in each individual student. The changes are realized in Specific competence skills learned by students, the outcome of competencies achievement embodied in form student learning outcome. The results of student learning influenced by several factors, one of which is the accuracy of the learning model selection, careful selection of the learning model will increase the students' understanding and experience something they learned. MP2S6P provide learning experiences concrete according to the learning needs that relate the learning process in the school by learning directly into specialist work field for the Department of Mechanical Engineering, it can be called with the integrated learning with work, Martin and Hughes, (2009: 8), Prossers (1949) that learning is integrated with the work world, provide experience to students and conducted among school education and the professional world work, this model provides an opportunity to combine theoretical capability in education with direct application in the workplace. Experience of learning will support vocational student competence, because appropriate form the basic concepts in learning vocational schools.

Successful of the six principles of soft skills through instructional model is a effort to prepare individual learners have the skill in special work area, Evan and Herr (1978: 1), "... *education vocational education is that part of the which makes an individual more employable in one group of*



occupations than another". Lubis (2010), asserts that: Vocational education is education for work. In order to reach this aim, instructional strategies used should be directed to all requirements needed in the work place. The students should learn the knowledge, skills, attitudes, and values which are important in doing A Certain job in such a way as they apply them in the real work setting.

#### IV. CONCLUSION AND SUGGESTION

The results of the research with implemented six principles of soft skills instructional model or MP2S6P can improve soft skills learning outcome of students of Mechanical Engineering Department in Vocational School 1 Batam. Based on these results, in suggestion: 1. Vocational High School, especially the Department of Mechanical Engineering can apply Six Principles of Soft Skills Instructional Model in the implement learning of soft skills students in Mechanical Engineering. For implement this model, schools and industry are expected to synchronization in vision and mission for education in schools. Good cooperation between school and the work world / industry will give the students in industrial practice. School gives full trust to the company to be able help teach to students about condition of the working world, especially the soft skills needed in the working world, 2. In Six Principles of Soft Skills Instructional Model (MP2S6P), through strategy work shadowing industrial instructors, students and teachers should be understand the concept of learning through guide books.

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EI-05-020

## TECHNICAL AND ECONOMIC STUDY OF BLASTING USING MATERIALS OUTBREAKS AND HEAVY ANFO QUARRY MINING IN PT. CEMENT PADANG

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**ABSTRACT :** *PT. Semen Padang held the removal of limestone with blasting activity by using ANFO explosives. Regard to blasting geometry fragmentation condition, powder factor value which have been applied for ANFO explosives, it caused the fragmentation size isn't optimal, and inappropriate to crusher criteria which is < 80 cm. Thus, PT. Semen Padang will cooperate with PT. Dahana (Persero) to apply heavy ANFO. Heavy ANFO is a mixture of ANFO explosives and Emulsion with trademark called Dabex (Dahana Bulk Explosive). In order to measure the appropriate fragmentation with the crusher criteria which is < 80 cm, blasting geometry design was needed, and the efficient powder factor in heavy ANFO application. The aim of this research is to assess blasting activity by using ANFO explosives as technical and economic, provide recommend suggestion for the company in blasting activity with heavy ANFO explosives (Dabex) usage, so it can be seen the advantages and disadvantages of each explosives. The research methodology is to conduct the real experimental (trial and error) by making correlations between theory and field research. The author has designed three times suggestion made by using C.J Konya formula, I.CI Explosives, and R.L Ash for blasting geometry design in Heavy ANFO Dabex application. After had the study of technical and economic from blasting activity with the application of ANFO and Heavy ANFO (dabex) explosives, it can be found the advantages and disadvantages. While using ANFO the size of burden 3.5 – 4 m, 4 – 4.2 m space by using heavy ANFO pattern can be developed the size of burden from 4 – 5 m, 5.5 – 6 m space. The Heavy ANFO usage can save the number of blast hole that needed. Blasting geometry design of Heavy ANFO explosives with R.L Ash formula application is considered to be the most efficient and economic al to be applied in the future with 5 m burden size, 6 m space, 8,5 m blast hole depth, 0.15 Kg/Ton powder factor, the cost of explosives usage is 1805.82 Rp/Ton, and the result of holding boulder with > 80 cm size amount of 8.56%.*

**Keywords:** *ANFO, Heavy ANFO, Geometri, Fragmentasi.*

### I. INTRODUCTION

PT. Semen Padang is one company that is engaged in the cement industry. The company is located in Bukit Karang Putih, District Lubuk Kilangan, Padang. To produce cement, companies need limestone as the main raw material. Then the raw material is processed and processed at the plant owned by the company to produce cement.

Limestone mining activities carried out by the system known as an open pit mine or quarry hill slide system. This system is an open pit mining system applied to mine the rock located on the hillside or the shape of the hill.

Currently, PT. Semen Padang grow and develop, become a national pride, especially for the people of West Sumatra. This development marked by increasing production from year to year. Indarung II plant production capacity of 660,000 tons/year, Indarung III 660,000 tons/year, Indarung IV 1.62 million tons/year, Indarung V is 2.3 million tons/year, plant optimization and 760,000 tons/year, and a total production capacity of PT. Semen Padang 6,000,000 tons/year.



General Meeting Extraordinary Shareholders (EGM) of PT. Semen Padang on Monday November 12, 2012 resulted in an agreement for the construction of Indarung VI plant with a capacity of 4,500,000 tons/year. With the addition of the plant, PT. Semen Padang must increase the production of limestone.

To produce limestone, PT. Semen Padang carry out the demolition of limestone with blasting activities. The success demonstrated by the fragmentation process of blasting rock blasting results corresponding to the next process, ie loading and crushing. In the loading process, the fragmentation of rock plays a role in optimizing the rate excavator digging. Later that optimal crushing process, the size of the required fragmentation crusher also specified that is <80 cm. Therefore, the distribution of rock fragmentation blasting results sought must meet these criteria.

In carrying out the blasting activities, PT. Semen Padang has implemented ANFO explosives. ANFO is a mixture of explosives ammonium nitrate and fuel oil, with a density of 0.8 to 0.85 g / cc and detonation velocity 2500-4500 m / s. Explosives have poor resistance to water and a low detonation velocity. Under the conditions of blasting geometry, and the value of powder factor that has been applied for ANFO explosives in blasting activities before, causing fragmentation size are not optimal and does not meet the criteria crusher.

In the future, PT. Semen Padang will cooperate with PT. Dahana (Persero) in the use of heavy ANFO as the explosive. In the course book scribe sense heavy ANFO explosive is a mixture of ANFO with emulsions. As a manufacturer of emulsions, PT. Dahana (Persero) will mix ANFO with emulsions to produce heavy ANFO, known by the trademark DABEX (Dahana Bulk Explosive). With the condition of watering holes, heavy ANFO would be more effective to implement.

Currently there is no design geometry and blasting powder factor value using heavy ANFO explosives. By using formulation experts, will generate several design geometries and grades blasting powder factor that is able to be applied in the field. From some of the draft, is expected to produce a draft geometry and blasting powder factor values are efficient for use in the future.

By observing the results of geometry blasting conditions, the volume of which will be detonated, the amount of use of explosives, and the result of the fragmentation that has been applied for ANFO and heavy ANFO, it will show the advantages and disadvantages of using explosives.

## **II. RESEARCH METHODS**

This type of research is empirical research conducted by a real experimental, combining theory and field data. Based on the theory of some experts, researchers conducted direct experiment with trial and error each of these theories. So finally the data comparison will be obtained tangible results in the field. The data will be displayed in this research is quantitative data. The technique is done in data analysis is to combine theory with field data, resulting from both gained problem-solving approach.

The object of research is the use of explosives ANFO and heavy ANFO in front V mine quarry Bukit Karang Putih, PT. Semen Padang. To conduct a study on technical and economic blasting using explosives and heavy ANFO that suits your needs, by proposing blasting geometry that is used today.



At the beginning of data collection geometry and blasting powder factor for ANFO explosives. By using formulation kuzram and 3.1 desktop software split, it will be known the size distribution fragmentation blasting results. Then perform the proposed design and geometry blasting powder factor for heavy ANFO explosives. Furthermore, the formulation kuzram and 3.1 desktop software split, it will be known the size distribution fragmentation blasting results. Ultimately it will be seen the advantages and disadvantages of using explosive ANFO and heavy ANFO.

### III. RESULTS AND DISCUSSION

#### 1. Draft Analysis Geometry ANFO blasting PT. Semen Padang.

Table 1. Weighted Index Blastability

Parameter	Weighting
1. <i>Rock Mass Description</i> (RMD)	
a. <i>Powdery/Friable</i>	10
b. <i>Blocky</i>	<b>20</b>
c. <i>Total Massive</i>	50
2. <i>Joint Mass Description</i> (JPS)	
a. <i>Close</i> (Spasi < 0,1m)	10
b. <i>Intermediate</i> (Spasi 0,1-1m)	<b>20</b>
c. <i>Wide</i> (Spasi > 1m)	50
3. <i>Joint Plane Orizontal</i> (JPO)	
a. <i>Horizontal</i>	10
b. <i>Dip Out Of face</i>	20
c. <i>Strike Normal To Face</i>	30
d. <i>Dip Into Face</i>	<b>40</b>
4. <i>Specific gravity Influence</i> (SGI)	
SGI = 25 x SG-50	<b>16,25</b>
5. <i>Hardness</i> (H) Skala Mohs	<b>3,4</b>

Source: PT. Semen Padang (2015)

Blasting fragmentation size analysis using Kuzram formulation, the percentage of the rock mass with a size of 80 cm were detained July 25, 2015:

$$\begin{aligned}
 R &= e^{-\left(\frac{x}{xc}\right)^n} \times 100\% \\
 &= 2,71828^{-\left(\frac{80}{33,91}\right)^{0,987}} \times 100\% \\
 &= 9,70 \%.
 \end{aligned}$$

Persentase massa batuan dengan ukuran 80 cm yang lolos 26 Juli 2015:

$$\begin{aligned}
 R &= e^{-\left(\frac{x}{xc}\right)^n} \times 100\% \\
 &= 2,71828^{-\left(\frac{80}{40,21}\right)^{0,857}} \times 100\%
 \end{aligned}$$

= 16,48 %.

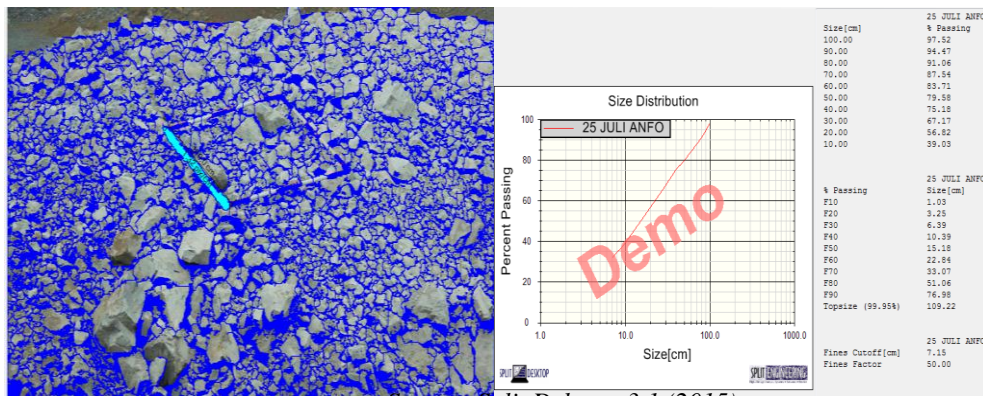
The percentage of rock masses with a size of 80 cm that passed July 26, 2015:

$$R = e^{-\left(\frac{x}{xc}\right)^n} \times 100\%$$

$$= 2,71828^{-\left(\frac{80}{40,29}\right)^{0,861}} \times 100\%$$

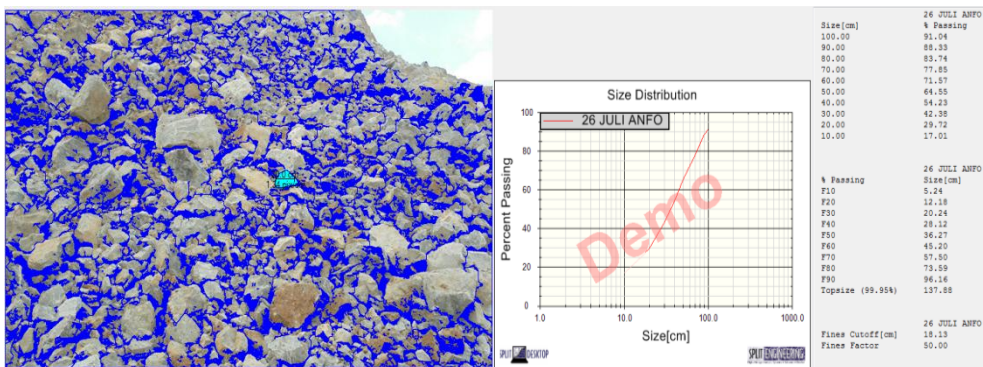
$$= 16,44 \%$$

Then do the blasting fragmentation size analysis using a Split Desktop with the result of fragmentation 25, 26, and July 27, 2015 as follows:



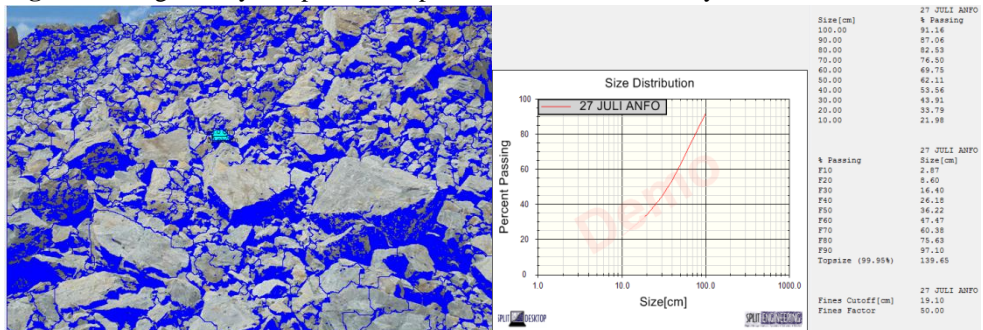
Source: Split Desktop 3.1 (2015)

**Figure 1.** Image Analysis Split Desktop and Size Distribution July 25, 2015



Source: Split Desktop 3.1 (2015)

**Figure 2.** Image Analysis Split Desktop and Size Distribution July 26, 2015



Source: Split Desktop 3.1 (2015)

**Figure 3.** Image Analysis Split Desktop and Size Distribution July 27, 2015

## 2. The design geometry Blasting For Heavy ANFO Using Formulation C.J Konya.

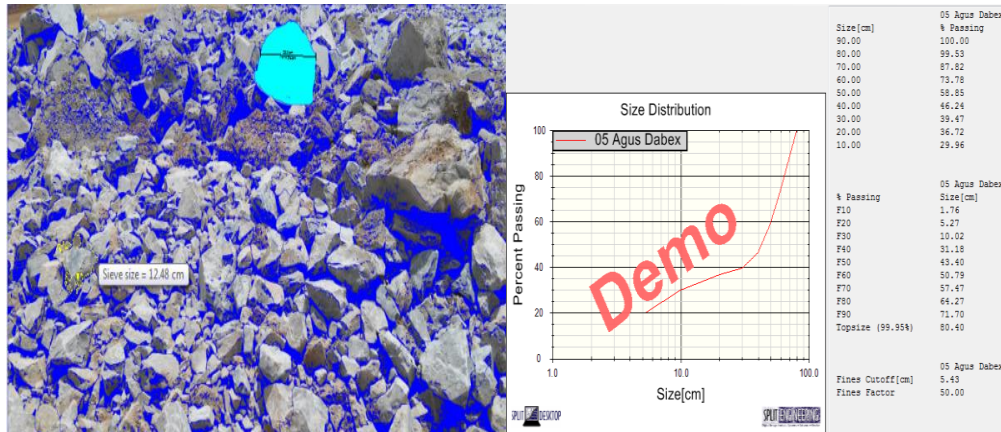
Proposed draft Kuz Ram analyzed using a formula to determine the size of the blast fragmentation with the percentage of rock masses with a size of 80 cm for:

$$R = e^{-\left(\frac{x}{xc}\right)^n} \times 100\%$$

$$= 2,71828^{-\left(\frac{80}{25,38}\right)^{1,352}} \times 100\%$$

$$= 0,89 \%$$

Then do the blasting fragmentation size analysis using a Split Desktop with the following results:



Source: Split Dekstop 3.1 (2015)

Figure 4. Image Analisis Split Desktop and Size Distribution Proposal I

### 3. Design Geometry Blasting For Heavy ANFO Explosive Using I.C.I formulation.

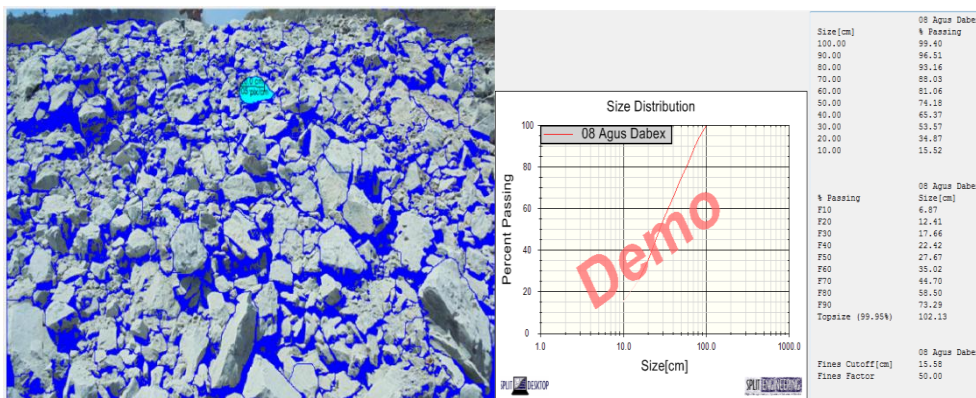
Proposed draft analyzed using rumusanKuzram to determine the size of the blast fragmentation with the percentage of rock masses with a size of 80 cm for:

$$R = e^{-\left(\frac{x}{xc}\right)^n} \times 100\%$$

$$= 2,71828^{-\left(\frac{80}{33,63}\right)^{1,099}} \times 100\%$$

$$= 7,50 \%$$

Then do the blasting fragmentation size analysis using a Split Desktop with the following results:



Source: Split Dekstop 3.1 (2015)

Figure 5. Image Analisis Split Desktop and Size Distribution Proposal II

### 4. Design Geometry Blasting For Heavy ANFO Using Formulation R.L Ash.

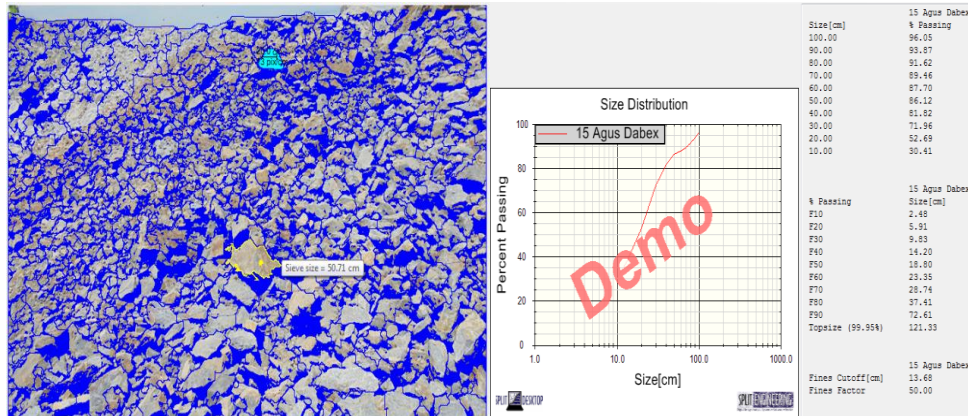
Proposed draft analyzed using rumusanKuzram to determine the size of the blast fragmentation with the percentage of rock masses with a size of 80 cm for:

$$R = e^{-\left(\frac{x}{xc}\right)^n} \times 100\%$$

$$= 2,71828^{-\left(\frac{80}{35,12}\right)^{1,092}} \times 100\%$$

$$= 8,56 \%$$

Then do the blasting fragmentation size analysis using a Split Desktop with the following results:



Source: Split Desktop 3.1 (2015)

Figure 6. Image Analysis Split Desktop and Size Distribution Proposal III

## 5. Discussion

By applying heavy ANFO (ANFO emulsion 30% + 70%) in blasting activities, PT. Semen Padang able to develop blasting geometry than at the time of applying ANFO. To burden can be enlarged from the 3.5 m-5 m and a space of 4 m 6 m.

Development blasting geometry also affect the amount of explosive required holes. With the burden distance and space are all the greater when using heavy ANFO, the number of holes required less explosive than when using ANFO.

Values powder factor used for ANFO explosives can not be said to be economical. Although explosive charges incurred cost, but the volume of rock to be blasted and fragmentation results should also be considered. As for the heavy ANFO explosives are still required trial and error in the future, in order to avoid wastage of explosives even though the volume that will be generated and fragmentation is optimal.

When using ANFO percentage boulder that stuck with size > 80 cm by 8-17%. After using heavy ANFO percentage boulder that stuck with size > 80 cm was reduced to 0.8 to 8%. After doing some proposals and implementation in the field, blasting geometry design using the proposed formula III R.L Ash is more efficient to implement. Geometry burden blasting with 5 cm and 6 cm space on the third proposal resulted in the volume of rock to be blasted at 19477.5 Ton, powder factor of 0.15 Kg / ton, the cost of the use of explosives at 1805.82 USD / Ton, and the percentage retained boulder with size > 80 cm of ± 8%. The advantages and disadvantages of both explosive can be seen in the following table.

**Table 2.** Summary of Blasting ANFO

No	Parameter analysis of ANFO	Geometry ANFO		
		ANFO I	ANFO II	ANFO III
1	Burden (m)	3.5	3.5	3.5
2	Space (m)	4	4	4.2
3	Number of Holes Burst (n)	57	66	53
4	The Volume will be blown up (Ton)	19032.3	23751.42	17755.68
5	Powder Factor (Kg/Ton)	0.17	0.15	0.14
6	Fragmentation Kuzram (> 80 cm)	9.70 %	16.48 %	16.44 %
7	Fragmentation Split Dekstop 3.1 (> 80 cm)	8.94 %	16.26 %	17.47 %
8	Cost Explosive (Rp/Ton)	1501.98	1307.43	1249.97
9	Making Explosives	Could		
10	Charging Explosives	Risky		

**Table 3.** Summary of Proposed Blasting DABEX

No	Parameter analysis of Heavy ANFO	Geometry Heavy ANFO		
		Proposed I	Proposed II	Proposed III
1	Burden (m)	4	5	5
2	Space (m)	5.5	5.5	6
3	Number of Holes Burst (n)	63	70	35
4	The Volume will be blown up (Ton)	44407.48	43360.62	19477.5
5	Powder Factor (Kg/Ton)	0.24	0.17	0.15
6	Fragmentasi Kuzram (> 80 cm)	0.89 %	7.50 %	8.56 %
7	Fragmentasi Split Dekstop 3.1 (> 80 cm)	0.47 %	6.84 %	8.38 %
8	Cost Explosive (Rp/Ton)	2785.56	1966.22	1805.82
9	Making Explosives	Long		
10	Charging Explosives	Not Using Plastic		

#### IV. CONCLUSIONS AND RECOMMENDATIONS

##### 1. Conclusions

- a. Geometry blasting powder factor and the value applied by PT. Semen Padang on July 25, s/d July 27, 2015 respectively with the burden (3.5 m, 3.5 m, 3.5 m), space (4 m, 4 m, 4.2 m), stemming (4.7 m, 5.5 m, 5 m), depth (9.5 m, 10 m, 9 m), powder factor (0:17 Kg/ ton, 0:15 Kg / ton, 0:14 Kg / ton), boulder > 80 cm by 8-17%.
- b. The design geometry blasting applied using a formula C. J Konya for the first proposal with the burden 4 m, 5.5 m space, a depth of 13 m, powder factor 0:24 kg / Ton. ICI Explosive burden for the proposed II with 5 m, 5.5 m space, depth 9.5 m, powder factor of 0.17 Kg / Ton. R.L Ash's proposal III with a burden of 5 m, space 6 m, depth 8.5 m, powder factor 0:15 kg / Ton.



The third proposal resulted in fragmentation in accordance with the criteria crusher, but there are difficult to develop in the future.

- c. The design geometry blasting the proper and efficient use of formula RL Ash with a burden of 5 m, space 6 m, the average depth of the hole explosive 8.5 m, stemming 4 m, and the value of powder factor of 0.15 Kg / Ton, with boulder > 80 cm by 8% ,
- d. Advantages heavy ANFO visible pattern on the burden of development and space, so that the number of holes required less explosive, powder factor value is already at the optimal conditions to produce the desired volume and fragmentation. Do not use plastic in use (condoms) and requires fewer personnel.

## 2. Suggestion

- a. To prevent some fly rock, when filling stemming really thoroughly and in a solid condition.
- b. Control the fragmentation of rock blasting results using Kuzram or Split Desktop Software.
- c. The design geometry peledakan and powder factor value with the right mix ANFO explosives + DABEX more efficient, when compared to using ANFO alone.

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**EI-05-021**

## **AN ASSESSMENT OF ELECTRICITY CONSTRUCTION SERVICE INDUSTRIAL NEEDS-BASED ELECTRICAL INSTALLER**

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**ABSTRACT** : *The aims of this research were produces an assessment of electricity construction service industrial needs-based electrical installer (AILIS). The research was developed through three stages, namely: the design, the limited as well as expanded testing and trials. The design consists of: pre-survey, studies on the research findings, problem analysis and analysis of electric installer performance. The limited as well as testing trials stage included: validation of the AILIS through expert judgment and the user, analysis and revision. The expanded as well as testing trials stage included: data collecting, analysis, revision, and dissemination. The research instruments consisting of a questionnaire and observation sheets were distributed to capture the data needed for the analysis. The subjects for the implementation were 210 respondents as the managers of electricity construction service industrial companies in West Sumatra Province. The CFA was data analysis techniques to verify that the resulting model fit the AILIS. The finding an AILIS fitting with the value of chi-square  $< 2 df$  ( $206.06 < 356.0$ ),  $P$ -value = 0.07350 ( $> 0.05$ ), and RMSEA = 0.026 ( $< 0.05$ ). The AILIS is excellent at assessing electrical installer performance in the electricity construction service industry.*

**Keywords:** *assessment, confirmatory factor analysis, electrical installer*

### **I. INTRODUCTION**

The efforts of developing an electrical system in Indonesia recently was in the stage of improvement and increase toward the easiness in terms of accessing new telephone network. Devan (2013, p.64) stated, "In Indonesia in 2011 the utility PT. PLN (Persero) set up a call center enabling customers to request a new electricity connection by phone. It further simplified the application process by eliminating the requirement to bring in a copy of a neighbor's bill to help determine the exact address of the new customer's business". The simplicity of application process in attaining a new network line also demanded well-qualified electrician performance. The well-qualified electrician performance might be attained by means of systematic, regular and objective performance assessment according to the governing standard and criteria.

Obisi (2011, p.92) stated that the employees' performance effectiveness and efficiency would be attained if the individuals or the employees were evaluated continuously. "Organizational performance and its resultant efficiency and effectiveness can only be achieved when individuals are continuously appraised and evaluated." Mardapi (2008, p.5) explained, "Evaluation or assessment include all of the techniques implemented for evaluating the individual performance (focus to individual)." The inability to implement the strategy of effective and efficient performance assessment would impede the company's capability to achieve the competitive edge.

Wynne (2008, p.1) stated, "Assessment is the practice of collecting information about persons progress." Assessment was a practive of collecting information regarding the progress of a person or an individual. Barbara (2010, p.3) elaborated, "assessment is composed of three steps (1) goals (may also be called outcome or objectives), (2) information (may be called measures or evidence), and



action (using the information may be called closing the loop).” Her definition implied that the assessment might be implemented in three stages namely deciding the results attained in the assessment activities, the evidence of the assessment activities and the follow-up of the assessment activities.

Berry (2011, p.32) explained, “Assessment is one of the most emotive words in the education lexicon. It has a variety of connotations for different people anxiety, competition, success, feedback, to mention but a few depending on the nature of their participation in the assessment process.” Assessment had multiple connotations; some of the connotations were regarded as pressure, competition, success, feedback, standard and boredom. The situation depended on the characteristic and the participation of such connotations within an assessment.

Elaine (2004, p.18) proposes, “The research revealed that competence, assessment and development affected employee performance to a moderate extent as indicated by 56.9% of the respondents. There were also a number of statements on competence, assessment and development that enhanced employee performance as indicated by the respondents.” The comprehensive assessment toward the the employee performance provided by the experienced practitioners found that such assessment was more convincing and tended to be more credible for the communication with the needs of organizational development. The advantages of using rank source were different because the assessors frequently had different views on the employees’ performance. The reports on the employee performance might become a good source of information for learning the type of employee performance information.

The assessment activities toward the electricians performed by the technical officials and the director of electricity service industry continuously might assure the availability of well-qualified electric power. The reason was that the assessment was able to improve the electrician’s performance quality. Ahmed (2010, p.62), Obisi (2011, p.92), Messah (2011, p.16), Idemobi (2011), Leila (2011, p.1761), Lee (2000, p.420), Lynn (2005, p.23) and David (2006) had investigated the performance assessment of employer. The results of these researches stated that the implementation of the performance of employer which had been performed continuously in the company was able to improve the employees’ and the companies’ performance. The overall results of these researches stated that the implementation of performance assessment performed in a company or in an industry positively improved the employee performance and had a direct impact to the customer satisfaction as well as to the performance improvement and the industrial or company development.

Marsudi (2012, p.5) explained that “An electrical system that serves to provide the electricity for the electricity-user communities in general consists of generator installation, channel installation and distribution installation that runs to the electricity customers.” In order that the electricity might be benefitted for the users, there should be a an electrical construction according to the standards determined by the electrical installer. Antoni (1995, p.229) explained that the term electrical installer was derived from the term “installation,” in which the meaning was an act of installing something, and





the term “electrical,” in which the meaning was to use the electrical power. In other words, electrical installation was an act of installing, binding, constructing and arranging an electrical system. Then, an electrical system was a person who worked or who had been an expert in the installation of electrical equipment in the customers’ houses.

Staatskoerant (2009, p.3) explained that “Installation electrician is a person who has been registered as an installation electrician in terms of regulation for the verification and certification of the construction, testing and inspection of any electrical installation, excluding specialist electrical installations.” An electrical installer (electrician) was a person who had been registered and who had been certified of electrical installation and he or she had focused himself or herself in the work of electrical cables for buildings, electrical cables for stationery machines and electrical cables for related tools. An electrician worked as a supervisor of electrical installation, including the specialized one. The job of electrical installation consisted of: (a) modification or repairment of electrical installation; (b) machine connection in the terminal of machine supply itself; and (c) inspection, testing and verification of electrical installation according to the governing standards.

Occinfo (2009, p.1) explained that “Electricians install, alter, repair and maintain electrical systems that are designed to provide heat, light, power, control, signals or fire alarms for all types of buildings, structures and premises.” The opinion had also been supported by another opinion from IET (2012, p.5), which stated that “Electrical installation work-the design, construction, maintenance, verification and inspection and testing of one or more of the work categories a separate and self-contained premises constructed or adapted to use for residential purposes and forming part of a building from some other part of which it is divided horizontally.” An electrician was a person who had been given a task to install, to change, to repair and to maintain an electrical system that was designed to provide heat, light, electrical power, control, signal or fire alarm for all types of buildings, structures and places.

Scaddan(2005, p.11), Seip (2000, p.667), and (Marsudi, 2012, p.5) explained that “Planning a building control system is extremely challenging, since it requires experienced planners with expertise in electrical engineering, heating, ventilation, air conditioner and communications technology.” In order to implement the jobs of electrical installation, a company should have competent electricians, the one who had gone through the stages of standardized and qualified performance assessment. Murti (2009, p.33), Chani (2000, p.273), Subagyo (2009, p.1), KONSUIL (2010, p.15), AKLI (2009, p.2), LPJKN (2008, p.2), and Satriya (2012, p.12) suggested that the electrical installation should be reliable toward the planning, the equipment quality and the component of electrical installation and the construction should be done by a competent electrician; in addition, the inspection, the operation and the maintenance of electrical installation should be in accordance with the governing standards.

The factors that designed AILIS consisted of: (1) the design of electrical installation; (2) the construction of electrical installation; (3) the commissioning of electrical installation; (4) the operation of electrical installation; and (5) the maintenance of electrical installation. Theoretically, the factors



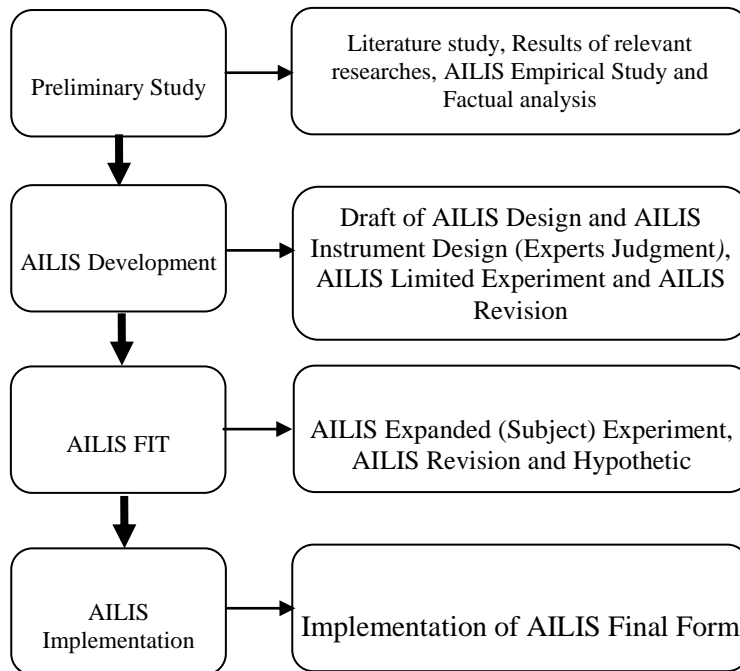
might be approached by means of Donald's explanation (2010, p.364) in which in order to confirm or to inspect a relationship between several sets of measuring variable established several smaller sets of factors, the researchers might implement the confirmatory factor analysis (CFA) model. Confirmatory factor analysis (CFA) model is used to examine the relationships between a set of measured variables and a smaller set of factors that might account for them.

The research problem was how was the electricity construction service industrial needs-based electrician performance assessment? The objective of the research was to generate an electricity construction service industrial needs-based electrician performance assessment implemented by the Technical Caretakers (Penanggung Jawab Teknis) and the directors of the company as the information users or the assessors. The results of AILIS research were useful for the development of assessment science, the improvement of learning process in the vocational education and the training of electricians in the educational institutions and the certification institutions of electricity profession. As the basis of the policy of electrician coaching and development in the industry of electrical construction service, the performance assessment was of utmost importance.

## **II. RESEARCH METHOD**

The research was a research and development one, which aimed to generate a product in the form of Electricity Construction Service Industrial-Based Electrician Performance Assessment. The research and development of AILIS was the one implemented for solving practical and technical problems in the electricity construction service industry. The research and development of AILIS was started by a preliminary study, a development, an analysis of AILIS fit and implementation. The complete sequences of AILIS research and development would be presented in the following Figure 1

A research of AILIS was done in the Province of West Sumatera from August to December 2014 and the research subjects were the technical officials and the director of industry or of electricity construction service company. In the sequence of design, there would be validations from 7 experts in the domain of electro, evaluation or assessment, employment and language. The sequence of validity and reliability assessment involved 7 person who were the experts in their respective fields and 35 respondents from the user-companies namely CEO, related managers and heads of electricity department (the ones who were in charge of technical matters in the electricity construction service company). The research subjects for the expanded experiment consisted of 210 respondents from the technical caretakers and the directors of electricity construction service company. The validator instrument of the AILIS experts and the AILIS research users was implemented according to the governing criteria. Barus (2011, p.35) and Mardapi (2012, p.86) explained the aspect of content quality for the instrument. The instrument of expanded experiment included the aspects of construction variables, construction, commission, operation and maintenance of 21 electrical installation along with 20 indicators and 55 question items.



**Figure 1.** Sequences of AILIS Research

The data analysis technique of AILIS implemented the descriptive qualitative and the descriptive quantitative analysis. The qualitative analysis included the data on the results of content validity in the form of the experts validator. For the analysis of expanded experiment data the researchers implemented the approach of confirmatory factor analysis (CFA). The analysis of quantitative data was done by the assistance of LISREL 8.80 for Windows.

### III. RESULTS AND DISCUSSIONS

The content validation of the Electricity Construction Service Industrial-Based Electrician Performance Assessment (*Asesmen Instalatur Listrik Berbasis Industri Usaha Jasa Konstruksi Ketenagalistrikan (AILIS)*) instrument was done by submitting the experts' validation assessment sheet to the 7 validators. The content validation assessment employed the Likert scale which had 5 interval option of answer namely: 1 = very bad; 2 = bad; 3 = moderate; 4 = good; and 5 = very good. The results of quality validation for the content of the instrument (the expert validation) was written in Table 1. The validity of quality aspect for the content of AILIS instrument by the seven expert validators was between the score of mean interval > 3.4 to 4.2 (classification = good) and the score of mean interval > 4.2 to 5.0 (classification = very good).

**Table 1.** The Data of Expert Validation toward the Quality of AILIS Instrument Content (done by 7 expert validators)

No.	Aspect of Instrument Content Quality	Number	Score Mean	Classification
1.	Clarity in the instrument's direction.	34	4,9	Very Good
2.	Width of the instrument's construct aspect	34	4,9	Very Good
3.	Clarity of indicators for each aspect	28	4,0	Good
4.	Clarity of item formulation	33	4,0	Good

5.	Fitness between the indicators and the items.	28	4,0	Good
6.	Proportion and sufficiency of the item numbers.	29	4.2	Good
7.	Simplicity of item formulation.	28	4,0	Good
8.	Easiness in reasoning/understanding the item.	28	4,0	Good
9.	Readability/eligibility in the reading process.	35	5,0	Very Good
10.	Standard of notation/letter and layout.	28	4,0	Good
11.	Easiness in completing the instrument.	28	4,0	Good
12.	Efficiency of time/effort in the working process.	35	5,0	Very Good
13.	Implementation of standardized <i>bahasa Indonesia</i> .	28	4,0	Good
14.	Avoidance of respondents from the direction in-disguise, pressure and shame in answer provision.	35	4,1	Good
15.	Creativity in arranging the instrument in order to attain the objectivity of the respondents' answers for avoiding the bias and for motivating the respondents to completing the instrument.	29	4,1	Good
<b>Total Mean Score</b>			<b>4,3</b>	<b>Very Good</b>

The results of quality validation to the 35 (thirty five) validators to the instrument content of the Electricity Construction Service Industrial-Based Electrician Performance Assessment (*Asesmen Instalatur Listrik Berbasis Industri Usaha Jasa Konstruksi Ketenagalistrikan (AILIS)*) were written in Table 2. Each of the aspects in the content quality of AILIS research instrument was evaluated by thirty five respondents (the users). The content of the third column (the number) in Table 14 was the total assessment from the seven validators (the respondents or the users). The fourth column was the mean score of each of the quality aspect for the instrument content from the seven validators (the respondents or the users) and the fifth column was the classification of the score mean. The “very worse” qualitative classification was the range in the interval (1.0 to 1.8) , the “worse” qualitative classification was the range in the interval (> 1.8 to 2.6), the “moderate” qualitative classification was the range in the interval (> 2.6 to 3.4), the “good” qualitative classification was the range in the interval (> 3.4 to 4.2) and the “very good” qualitative classification was the range in the interval (> 4.2 to 5.0).

**Table 2.** The Data of User Validation toward the Quality of AILIS Instrument Content (done by 35 user validators)

No.	Aspect of Instrument Content Quality	Number	Score Mean	Classification
1.	Clarity in the instrument's direction.	173	4,0	Good
2.	Width of the instrument's construct aspect	172	4,9	Very Good
3.	Clarity of indicators for each aspect	140	4,0	Good
4.	Clarity of item formulation	140	4,7	Very Good
5.	Fitness between the indicators and the items.	140	4,0	Good
6.	Proportion and sufficiency of the item numbers.	146	4,1	Good
7.	Simplicity of item formulation.	140	4,0	Good
8.	Easiness in reasoning/understanding the item.	140	4,0	Good
9.	Readability/eligibility in the reading process.	175	5,0	Very Good
10.	Standard of notation/letter and layout.	140	4,0	Good
11.	Easiness in completing the instrument.	141	4,0	Good
12.	Efficiency of time/effort in the working process.	175	5,0	Very Good
13.	Implementation of standardized <i>bahasa Indonesia</i> .	141	4,0	Good
14.	Avoidance of respondents from the direction in-disguise, pressure and shame in answer provision.	144	5,0	Very Good
15.	Creativity in arranging the instrument in order to attain the objectivity of the respondents' answers for avoiding the bias and for motivating the respondents to completing the instrument.	142	4,1	Good
<b>Total Mean Score</b>			<b>4,3</b>	<b>Very Good</b>

The results of analysis to the research instrument validity by using Aiken's V expert content validity coefficient Aiken's V user content validity coefficient was presented in Table 3. The coefficient of Aiken's V expert and Aiken's V user was 0.929 and 0.976; these figures showed that the research instrument of AILIS had been valid. From the results of research instrument reliability analysis by using inter-rater (ICC) technique reliability, the research found that the expert's ICC coefficient of reliability was 0.811. Then, the researchers also found the the user's ICC coefficient of reliability was 0.847. Both findings showed that the inter-rate agreement consistency was high. In other words, the research instrument of AILIS had been reliable for the implementation done by the technical officials and the directors of electricity construction service industry. The suggestion was that the position of modification indices in the path diagram, that were analyzed by means of CFA with the assistance of LISREL 8.80 software, found an unfit assessment (Figure 2 and 3). The unfit might be seen in the following results: 1) Chi-Square < 2 df (206,06 < 356,0) in which degree of

freedom (df = 178,00); 2) P-value = 0,07350 > 0,05; and 3) Root Mean Square Error of Approximation (RMSEA) = 0,026 < 0,0.

The results of experiment toward the instrument of Electricity Construction Service Industrial-Based Electrician Performance Assessment in overall showed that the latent variables that were directed to indicators of each of the variable manifest had fulfilled the criteria of goodness of fit models. These results showed that the instrument of Electricity Construction Service Industrial-Based Electrician Performance Assessment in overall had five latent variables namely design of electricity construction, construction of electrical installation, commissioning of electrical installation, operation of electrical installation and maintenance of electrical installation.

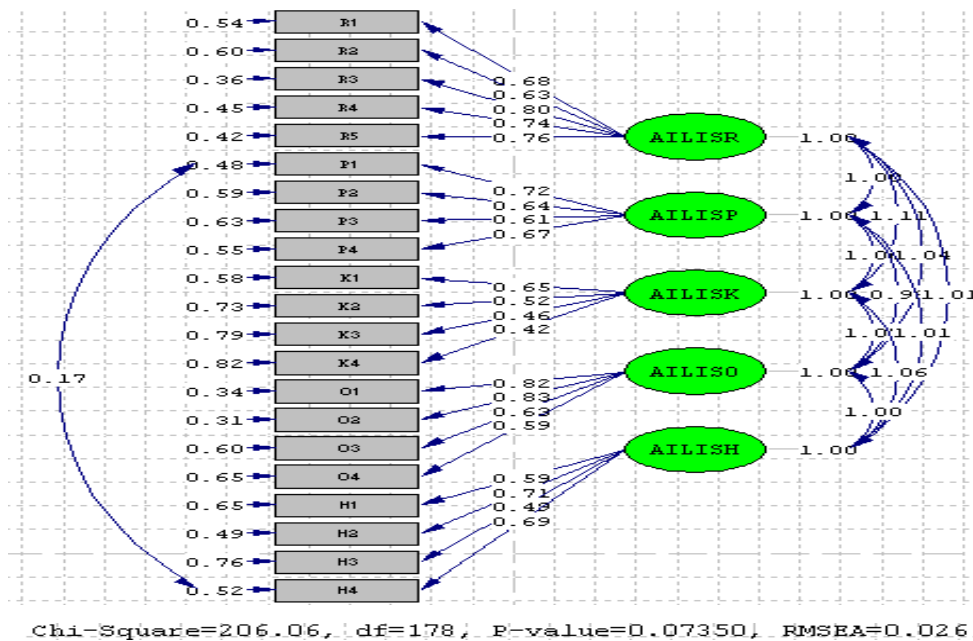


Figure 2. The Results of AILIS Experiment (Standardized Position)

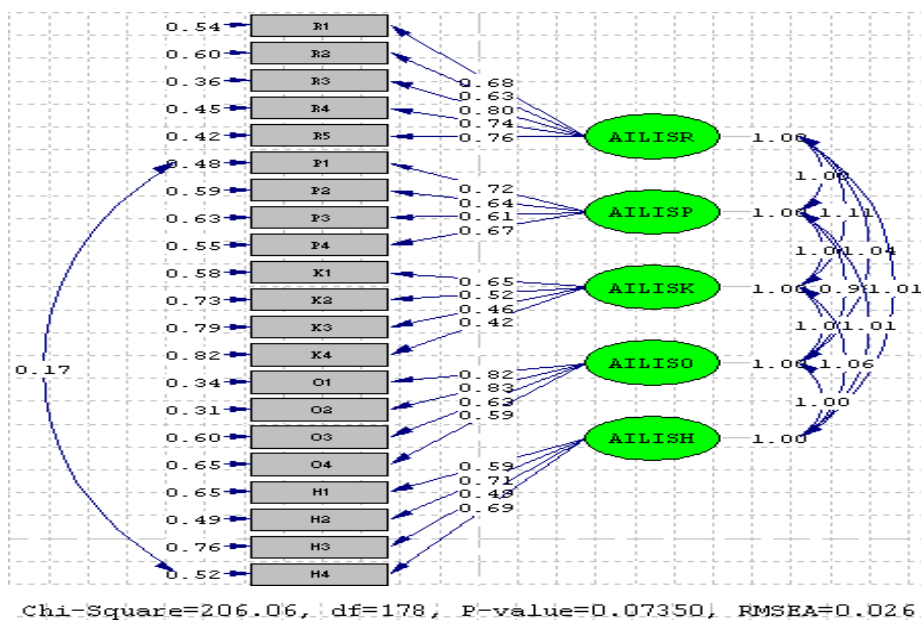


Figure 3. The Results of AILIS Experiment (T-Values Position)

The latent variables of the construction of electrical installation ( $\xi_1$ ) were correlated to the manifest of its measuring variables namely designing the three-phase high and low power electrical system device ( $R_1$ ), modifying the system and tools of electrical installation wiring ( $R_2$ ), designing the electrical installation and lighting system ( $R_2$ ), designing the system of electrical protection ( $R_2$ ) and designing the electrical installation for dangerous site and renewable resources ( $R_5$ ).

The latent variables of electrical installation constructing ( $\xi_2$ ) were correlated to the manifest of its measuring variables namely implementing the job preparation in the job site ( $P_1$ ), implementing the technical maintenance in the job site ( $P_2$ ), installing the electrical and electronic device ( $P_3$ ) and installing the electrical installation of dangerous site ( $P_4$ ). The latent variables of electrical commissioning ( $\xi_3$ ) were correlated to the manifest of its measuring variables namely the commissioning of functional tools and basic circuit ( $K_1$ ), the commissioning of complex circuit and electrical installation tools ( $K_2$ ), the commissioning of potentially-explosive electrical installation ( $K_3$ ) and the commissioning of electrical installation for the renewable resources ( $K_4$ ).

The latent variables of electrical installation operation ( $\xi_4$ ) were correlated to the manifest of its measuring variables namely operating the electrical-transfer device according to the voltage ( $O_1$ ), operating the generator set ( $O_2$ ), operating the production machines ( $O_3$ ) and operating the heater and the cooler unit ( $O_4$ ). The latent variables of the electrical installation maintenance ( $\xi_5$ ) were correlated to the manifest of its measuring variables namely the maintenance of household electrical device ( $H_1$ ), the maintenance of electrical panel and protecting device ( $H_2$ ), the maintenance of lighting and circuit installation sets ( $H_3$ ) and the maintenance of electrical machines and safety tools ( $H_4$ ).

#### IV. DISCUSSION

Based on the Table 1, 2 and 3, the researchers still found the validity of content quality aspect in the instrument of Electricity Construction Service Industrial-Based Electrician Performance Assessment with the mean score of interval  $> 3.4$  to  $4.2$  (“good” classification). The results implied that not all of the fifteen aspects of content quality in the instrument of the Electricity Construction Service Industrial-Based Electrician Performance Assessment had the interval of validity mean score  $> 4.2$  to  $5.0$  (“very good” classification). Therefore, there should be revisions in the aspects of content quality so that the instrument of AILIS would turn from the “good” classification into the “very good” classification based on the suggestions provided by the expert validators and the user validators; as a result, the revisions might be continued to the limited experiment.

The fitness value of the Electricity Construction Service Industrial-Based Electrician Performance Assessment was as follows: 1) Chi-Square  $< 2$  df ( $206,06 < 356,00$ ) in which the degree of freedom ( $df = 178,00$ ); 2) P-value =  $0,0735 > 0,05$ ; and 3) Root Mean Square Error of Approximation (RMSEA) =  $0,026 < 0,05$ . The results of the analysis showed that based on the expanded experiment toward the 21 instrument indicators of the Electricity Construction Service Industrial-Based Electrician Performance Assessment, 55 instrument item in the Electricity



Construction Service Industrial-Based Electrician Performance Assessment had fulfilled the criteria of goodness of fit models.

## V. CONCLUSION

The Electricity Construction Service Industrial-Based Electrician Performance Assessment was developed by means of three phases, namely: initial experiment, limited experiment and expanded experiment. Based on the results of data analysis, the research of the Electricity Construction Service Industrial-Based Electrician Performance Assessment might be concluded. First, based on the results of experts and practitioners evaluation, the instrument guidelines and the assessment rubric in the Electricity Construction Service Industrial-Based Electrician Performance Assessment were clear, simple, very easily understood, communicative, efficient and easily implemented. Second, based on the results of the experts and the users as well as the statistical test, the developed instruments in the research of the Electricity Construction Service Industrial-Based Electrician Performance Assessment was the one that had been able to provide more valid and reliable measurement results. Third, the AILIS had been regarded as a very good assessment for accessing the performance of electrician in the industry of electrical construction service because there had been fitness between the Electricity Construction Service Industrial-Based Electrician Performance Assessment and the field data, with the value of Chi-Square  $< 2 df$  or  $(206,06 < 356)$ ,  $(df = 178)$  P-value =  $0,073 > 0,05$  and RMSEA =  $0,026 < 0,05$ ; as a result, these figure showed that the AILIS had been fit.

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## MANAGEMENT INSTITUTIONAL ALIGNMENT SMK COMPETENCE TO INDUSTRY

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**ABSTRACT :** *One of the instruments of the low quality of vocational education that will have an impact on the level of absorption of graduates is productive competency gap, therefore, the strengthening of institutional capacity in the management of the planned alignment of competency, comprehensive and integrated absolutely necessary. This study aims to analysis reinforcement strengthening institutional capacity provided in harmonization productive machining vocational competence with industry competence. The method used in this study is the concurrent triangulation. This research method is a combination of research methods (mixed methods) that combines qualitative and quantitative research. Subjects in the study include: vocational education agency, industry partners and the professional association. While the source of the data in this study is the principal, task force, chairman of the group expertise, middle education head of education department, school inspectors, industrial partners and professional associations. The results showed that: 1) has not been the overall competency of graduates according to the needs of the expected competencies industry; 2) there is still a lack of industry role in the implementation of alignment with vocational competence; 3) the level of absorption of graduates in the industry indicate a trend that continues to decline; 4) cooperation undertaken SMK is absolutely improved; and 5) evaluation is not solely for the evaluation of learning but more emphasis competency evaluation results synchronization. Expected outcomes of this research is the analysis of institutional capacity management productive machining vocational competency alignment with industry competence.*

**Keywords:** *institutional capacity, alignment, productive competence, machining.*

### I. INTRODUCTION

Vocational education is an education that prepares students to work in a particular field. The basic concept of vocational education has different characteristics with general education in terms of educational criteria, the substance of learning, and graduates. According to Finch & Crunkilton (1984), the criteria that must be owned by the vocational education include: 1) orientation on the performance of individuals in the world of work; 2) justification on the real needs on the ground; 3) curriculum focus on aspects of the psychomotor, affective, and cognitive; 4) the benchmark is not only limited success in school; 5) sensitivity to the development of the world of work; 6) require adequate practice facilities; and 7) the support of the community. Nolker and Shoenfeldt (1983), also revealed that vocational education lesson in choosing the substance must always follow the development of knowledge and technology, community needs, the needs of individuals, and employment. Simon, C. and Maggie, M. (2015), They argue that for effective teaching there must be: 1) student involvement in learning (motivation); 2) an improvement in the teaching/learning climate; 3) reflective teaching (transformative reflection ); and 4) teachers improving their teaching.

The challenges of globalization requires the readiness of workers who have different qualifications to the previous state. With a large labor force, expected to actually be able to adjust in order to have a competitive advantage. But in fact, graduates of vocational schools recognized only by



itself and still lack the confidence of the business and industrial world. SMK still preoccupied with the methods and the development of learning that may have implications on the quality of graduates who have not been able to answer the challenges of the industry, if it is continuously carried out by the school, the school will be left behind and the distance (Waugh, 2004). The same thing as disclosed Slamet (2013: 15-16) that the condition of the current vocational show things as follows: first, most vocational currently only prepare students to work on specific areas of expertise as a worker/employee. Second, vocational less responsive to the demands of economic development locally, nationally, regionally, and internationally.

One of the efforts undertaken to address gaps vocational competence to perform alignment with industry competence. Management of alignment needs to be managed through the establishment of institutions in a planned, comprehensive and sustainable by involving stakeholders. Slamet (2013) revealed that the alignment of competence particularly productive competence between the vocational and the world of work in the dimension of quantity, quality, location, and time, has not formally organized. Although it has been published Indonesian Presidential Regulation Number 8 Year 2012 on Indonesian National Qualifications Framework (KKNI), but the formal container that bridges the world of vocational schools and the world of work yet. In 1994 there was a container that bridges the world of vocational schools and the world of work, namely the National Vocational Education Council (MPKN). MPKN formed through the Joint Decree of the Ministry of Education and Culture and the Chamber of Commerce and Industry of Indonesia on the establishment of the Vocational Education Council No. 0217/U/1994 and 044/SKEP/KU/VIII/94, but now the institute is not active. Whereas the decree also has not been revoked. According Yudiono (2011), one indicator of success in the implementation of productive vocational competency alignment with industry is strengthening the institutional role. Departing from the problems mentioned above, this study focuses on the analysis of institutional strengthening alignment between vocational competence with industry.

## **II. RESEARCH METHODS**

The method used in this research is the Concurrent Triangulation. This research method is a combination of research methods (mixed methods) that combines qualitative and quantitative research. According to Creswell (2009), concurrent research methods triangulation is a popular method among the methods of other combinations, as to these two methods are used at the same time so that more efficient in terms of time. The subjects used in this study include: vocational, education authorities, industry partners and professional associations. While the source of research data is the principal, task force, head of the expertise, the head of the field of secondary education, the school superintendent, industry partners and professional associations. While the research outcomes are expected to be an analysis of institutional capacity management productive machining vocational competency alignment with industry competence

## **III. RESEARCH RESULT**



There are two groups of competencies that are important from the productive groups of subjects, namely: 1) Basic Vocational Competence; and 2) Vocational Competence. Vocational Competence contains core Competence. The Core Competence dimension combines the attributes that define the importance of measuring the process in terms of competence, skills, learning, knowledge and leadership (Carlos A. Costa, *et al.*, 2010). The structure of these competencies do not meet the needs of the industry, this is caused by factors such as: 1) the learning laboratorium at school is oriented training; 2) industry is less open about the competencies required information; 3) aligning competency validation is performed only vocational competencies; and 4) the competence of subject teachers have not been able to optimize the productive competence of learners. The crucial factor is the alignment of productive vocational competence with the required competencies industry.

Difficulties faced by the school to realize the required competencies as the industry include: 1) not all industries are becoming a willing partner institutions put through the alignment of competence; 2) the lack of an industry that has a training center and educational work with schools; 3) still a few industries which receive vocational graduates working who has done industry practice in the enterprise; 4) mentor/instructor industry practice lacks insight into science education and 5) the amount of costs to be borne by the school to conduct competency alignment.

The role of industry in the alignment of competence productive machining showed that of the overall industry being only 3.80% SMK partners who are willing to perform the validation of competence productive machining, 3.80% industrial partners act as assessors in Skills Competency Test and industry to work together in labor recruitment by 9.54%. The participation of industry in the alignment of competence productive machining show that: 100% of the industry as a place for Industrial Work Practices and amounted to 30.60% of the industry is doing particularly MoU Industrial Work Practices. While the industry's role in assessing the relevance of productive machining competence as assessor Skills Competency Test average of 3.80%.

Inventory of industrial competence is based on competence acquired productive machining learners through the Industrial Employment Practices shows that not all of the existing competence in the industry do learners during the Industrial Employment Practices. Competence industry often do learners include: 1) conventional lathe (89.58%); 2) milling (72.92%); 3) sney (56.25%); 4) sawing (50.00%); 5) drill (52.08%); 6) grind (54.17%); 7) electric welding work (58.33%); and 8) welding jobs (64.58%). While the subject teachers who have followed the productive machining industry internships and as assessors as follows: 1) industrial internship in the form of On the Job Training as much as 54.05%; and 2) as an assessor Skills Competency Test as much as 22.14%.

Skills Competency Test results for the academic year 2010/2011 amounted to 85.30 increased by 5.26% compared to the academic year 2011/2012 amounted to 89.80. The results of the academic year 2011/2012 amounted to 89.80 increased by 1.79% compared to the academic year 2012/2013 amounted to 91.41. The results of the academic year 2012/2013 amounted to 91.41 decreased by 2.24% compared to the academic year 2013/2014 amounted to 89.36. While the level of expertise of



machining program graduates working industry can be explained as follows: academic year 2010 / 2011 amounted to 82.00% decreased by 10.43% compared to the academic year 2011/2012 amounted to 73.45% . In the academic year 2011/2012 amounted to 73.45% decreased by 2.71% compared to the academic year 2012/2013 amounted to 71.46%. While the academic year 2012/2013 amounted to 71.46% decrease of 7.17% compared to the academic year 2013/2014 amounted to 66.34%.

#### **IV. DISCUSSION**

From the research that has been done to optimize institutional management so far has shown that: 1) yet the overall competency of graduates according to the needs of the industry expected competencies; 2) still lack the role of industries in the alignment with the vocational competence; 3) graduates who work in the industry showed a trend that continues to decline; 4) the cooperation between SMK is absolutely improved; and 5) evaluation is not solely for the evaluation of learning but rather emphasizes the alignment of competency evaluation results. The alignment concepts have been used to modify the evaluation model, standards, indicators, criteria, and alignment index (Pattaraporn, *et. al.* 2015). From the results of these studies show the need for strengthening institutional capacity to draw up a framework aligning competencies.

Krishnamoorthy (2005) reveals the alignment as a process of linking the events and actions of an organization so that the situation occurs at the same time in a predetermined order. Organizations align competencies within the framework of a more dynamic and remain competitive in a global environment so as to get maximum results by synergizing our entire organization. Goldstein (2007) describes the process of alignment as a job "outside in" by also considering the elements outside the organization to see how it is necessary to synchronize and then form an internal organization to serve the needs beyond.

The concept of the development of institutional capacity building framework aligning competencies must consider three main components, namely the demand side, the supply side and the alignment mechanism. In formulating the program is comprehensive alignment takes a picture ahead of some relevant dimensions. Projected needs ahead of the competencies required of the industry and the amount in each industry is indispensable and should refer to the specific characteristics and potential of the industry, for the development plan required information as the basis for forecasting future.

Demand model that is designed to be capable of generating information manpower needs and business opportunities in the labor market and also to provide an overview of functions and the role it should have from the industry. This information can be a reference to the provider of education in planning and adopting the curriculum and other education policies. Education development policies such as: the provision of pre facilities, improving the competence of teachers in educating learners and learning system or the applicable curriculum should be based on the needs competence alignment with industry. Mean while, the supply model must also describe the interaction between the activity of input-process-output desired the functions and roles of the stakeholders are on the supply side.



An alignment mechanism can be designed so as to guarantee the implementation of programs compiled alignment. Alignment mechanism includes three main aspects: (1) the mechanisms associated with the exploration of a number of activities and programs that need to be done so that the information needs of the demand side can be obtained accurately and sustainable; (2) the mechanisms associated with exploration activities and programs necessary for the availability of graduates/work force are ready to enter the workforce and generate employment (entrepreneurship) and (3) a mechanism which ensures the information communication needs of the demand side to the supply side/education.

The formulation of programs related to the management of productive competence alignment should involve all stakeholders. Given this alignment program is a shared responsibility, it is to be more effective and efficient is necessary to determine the functions and roles of each stakeholders. On the supply side, government institutions vocational education and training providers will be responsible for defining the activities and programs related to education. Parties are a lot of plays on the supply side is the Department of Education, for special purpose needs to conduct this type of education or vocational training that is specific to a certain scope. While the demand side which is an important source of information about the needs of the workforce, should ensure the availability of such information. Some instruments need to be designed as a tool for providing information.

## **V. CONCLUSIONS**

Some things that can be concluded from the study in relation to the strengthening of institutional capacity management competency harmonization productive machining expertise vocational programs with industry competence include:

1. Strengthening the institutional capacity for the management alignment is still facing problems as follows: a) lack of competency of graduates according to the needs of the industry expected competencies; b) still lack the role of industries in the harmonization with vocational competence; c) graduates who work in the industry showed a trend that continues to decline; d) the cooperation between SMK is absolutely improved; and e) evaluation is not solely for the evaluation of learning but rather emphasizes harmonization competency evaluation results.
2. Institutional capacity strengthening is needed to improve the performance of productive machining harmonization vocational competence with industry competence to frame the institutional management with advanced aspects of competence alignment, optimization of industry and stakeholders, empowerment resources, curriculum integration and alignment of learning and performance evaluation.

While some things can be recommended from this study include:

1. Establishment of organizations dealing with the alignment of competencies need to be realized as a vocational with industry and stakeholders.
2. It needs policy support from stakeholders to strengthen the management capacity of the institutional alignment of competency



3. financing support from stakeholders for the implementation of alignment competence as application of the free schools, especially in secondary education.

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**EI-05-023**

## **SAFETY EVALUATION OF CONSTRUCTION WORK ON BLASTING (CASE STUDY :KELOK 9 BRIDGE PROJECT, WEST SUMATRA)**

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*ABSTRACT : Research was conducted on one of the bridges that are high-tech in West Sumatra namely Bridge Construction Kelok 9 Project. This project included a complex job because in terms of the condition of the natural topography of West Sumatra in the area of Bukit Barisan with disaster-prone geological aspects. The purpose of this study was to evaluate the safety of construction in blasting work and evaluate the implementation of the project if the contractor can do the appropriate design and implement construction safety at each stage of blasting. Analysis of the results obtained Blasting construction safety at work is 70% with the details: dimension of 67% of workers, 64% of the environmental dimension, the public dimension of 70% and property safety dimension of the project is 82%. Bridge Design Kelok 9 project do not apply the experience and knowledge of the construction in terms of construction safety. This can be proved with the requirements listed in the contract documents are not everything can be applied in the field. Construction safety barriers or obstacles found on the Kelok 9 bridge project is a lack of awareness for running safety in the field. Because of the need for intensive supervision and independently on each project work items.*

*Keywords: Blasting, Safety, Construction, Project*

### **I. INTRODUCTION**

One of the high-tech bridge located in West Sumatra is Kelok 9 bridge. Project includes a bridge project in terms of the complex due to the natural topography of West Sumatra is located in Bukit Barisan with the geological aspects ( type of soil binds relatively low cohesion ) are prone . Moreover, being in the region of West Sumatra Fault Semangko which will be prone to tectonic earthquakes . If the terms of an existing road right now, conditions are narrow and steep curves . The complexity of this project can also be seen from the bridge structure type to be created differently for each exposition that is the Box- girder RC , PC Box - Girder , PCI - Girder and Arch Bridge

The project is part of the activities Improvement roads Payakumbuh - Riau (KM 130 + 000-148 + 000). One goal Kelok 9 Bridge construction is to improve accessibility to the West Sumatra province of Riau province and vice versa, during which these people complaining about the frequent congestion and the limited carrying capacity of vehicles that pass through the region of the Kelok 9, while the alternative does not exist. Friday afternoon and Monday morning is the peak volume (peek period) and traffic flow Bukittinggi-Pekan Baru reaching 8000-11000 vehicles everyday

Due to the above conditions, the safety factor is required in the construction of Kelok 9the Bridge Project's, which from the beginning of the project to completion required a team of experts in the field of construction safety so that at each construction process has been expensive in terms of construction safety. Dimensions of construction safety must be considered such as: 1. the safety of workers, because work on Kelok 9 Bridge Project is included with the high level of danger, Blasting activities on the high cliffs that can interfere with the comfort and safety of people passing around the



project, 2. safety property, property projects should also be maintained as the project equipment, while building the project (site layout), building projects, and the property of other parties involved in the project, 3. environment, the forests that surround Kelok 9 Bridge project is a protected forest where government to protect the forest and the animals that exist, because it is in the implementation of Kelok 9 Bridge Project must pay attention to the actions taken in order not to interfere with the safety of the environment, especially the safety of the ecosystem.

One of the success rate of a construction project can be reviewed in terms of the safety of the construction that is if no accident occurs construction (zero accident) in the implementation of the project or at least minimize the occurrence of accidents in the construction process. The occurrence of accidents in the construction process will affect the duration of the project, the cost of implementation of the project and of course the quality of the project itself. Source of accidents on the construction process not only from human factors, but also derived from technical project management and implementation in the field.

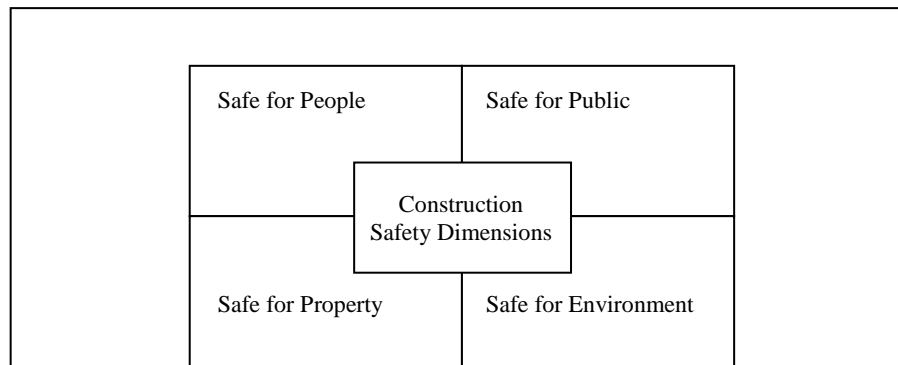
The objectives of the study are: to evaluate the implementation of the bridge construction Kelok 9 project whether the contractor can do the appropriate design and implement construction safety at every stage of the project on the Blasting. While limitation problem is: the evaluation process emphasized on the bridge finished with establishment that bridge VI that uses PC Girder and III bridge that uses the RC Box Girder. Construction phases that will be studied is the stage Blasting, which is a high-risk job not only for the workers as well as for the surrounding environment (Lucca, F, 2003).

Suraji (2002) discusses the theories of construction accidents based on (a) the paradigm of engineering which focuses a review of the technical aspects of a system, (b) the paradigm of individual network focused review of the issue of personality and motivation, (c) organizational paradigm that focuses a review of the decision-making management and safety management, such as safety culture, participation, competence, communication and control, (d) the cognitive paradigm that focuses on decision-making skills in the limited information processing system.

Various study conception of construction safety above show that there are still many construction safety simplified to occupational safety and health with a focus on safety in the workplace (occupational safety) for workers. In addition, the policy related to occupational safety and health issued by the government also has not provided a definition or work safety and occupational health as a whole. Even the Minister of Manpower and Transmigration No. 01 / MEN / 1980 does not contain any explicit what is meant by occupational safety and health in the construction of buildings in a comprehensive and clear. In this ministerial regulation, the definition of building construction activity is associated with all the phases are carried out in the workplace.

Based on the recent development of construction safety research , the concept of construction safety both at the policy level and implementation is needed . In this case, the safety of the construction should be seen not only occupational safety but the safety of the total system of

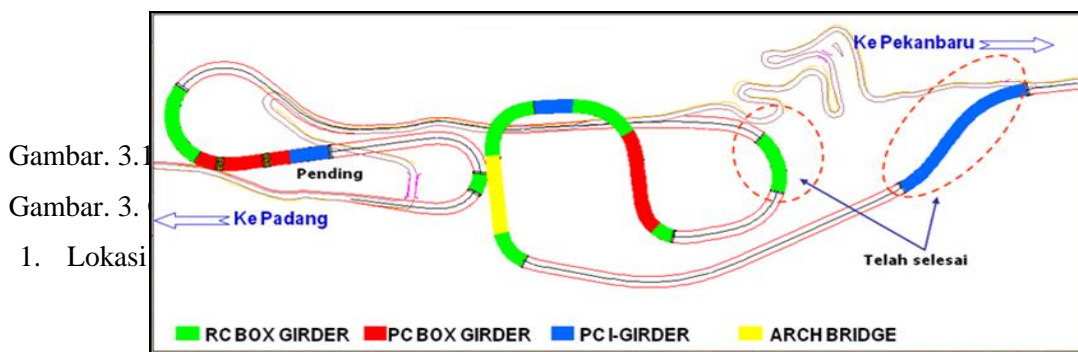
construction ( total safety of construction systems ). Thus , the safety of the construction will have dimensions of ( i ) the safety of persons or persons related to the implementation of construction (safe for people ), ( ii ) safe for the public , ( iii ) the safety of property including buildings property for construction or operation of (safe for the property ), and ( iv ) safe for the environment. Safety for people to understand , including safety from danger ( hazard ) which can lead to accidents and occupational diseases ( ill -health ). In addition, construction safety should be viewed as a whole throughout the life cycle of the building woke up ( built assets), starting from conception, planning, design, procurement, implementation, operation and maintenance, deconstruction and reconstruction . The dimensions of the construction safety can be described as the following figure:



**Figure1.** Construction Safety Dimension  
Source :Suraji and Widayatin (2010)

**II. RESEARCH METHODS**

This research was conducted specifically on the Bridge III and Bridge VI. The Bridge III used the RC Box Girder and the Bridge VI use the PC-I Girder on building thereon.



**Figure 2.** The location and type of bridge

The method used in this research is descriptive method. According Lufri (2005) definition of descriptive research is research that describes a symptom, facts, events or events that are or have occurred. In other words, this descriptive study reveals it as is or without manipulation. This study will describe the construction safety in Kelok 9 Bridge Project West Sumatera with a case study on work Blasting.

Methods for Data Analysis, performed with several stages:



- a) Text Analysis performed for all project documents such as contract documents, K3 reports, K3 & Environmental Management reports, Quarterly Reports, monthly reports and photos. Analysis of these data include the safety requirements for workers, the environment and surrounding communities
- b) Do cross-case analysis (theory Burke Johnson), that the results obtained from the analysis of documents do cross check at the time of the interview. Interviews were conducted to the parties involved in such a project owner, contractors and consultants.

The evaluation documents and interviews will be rated:

- 1: if the result is less (0% - 25%)
  - 2: if the result is enough (26% - 50%)
  - 3: if the result is good (51% - 75%)
  - 4: if the result is excellent (76-100%)
- c) The evaluation results analyzed according to the rules in force after it is done so that the discussion is the conclusion and recommendations as an input to the project.

### III. SAFETY EVALUATION OF RESEARCH CONSTRUCTION WORK ON BLASTING

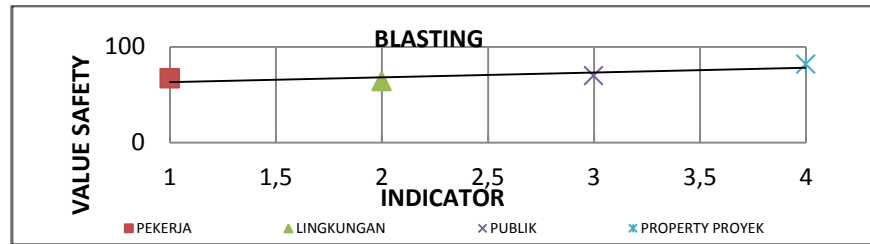
After processing data from various sources, obtained the results of evaluation of construction safety at work Blasting:

**Table 1. Results**

DIMENSIONS SAFETY	INDICATOR (IND)	PERCENTAGE
A. Worker safety	1: Use of PPE and shelter	73%
	2: Fence protector, neck strap and a safety net	67%
	3: SAFETY signs	73%
	4: First Aid	72%
	5: Fire	49%
B. Environmental safety	1: Ecosystem Disturbance	59%
	2: Disorders / Traffic congestion	87%
	3: Decrease in air quality and noise Increased	43%
	4: Mitigation of	64%

	landslide after blasting	
	5: Decrease of surface water quality	68%
C. Public safety		
D.Safety property	1: evacuation blasting area	84%
	2: Setting pedestrians and traffic / movement of vehicles	78%
	3: The security fence and the entrance / exit project	48%
	4: Vibration due to blasting	48%
	5: Security for visitors	90%
	1: Placement Warehouse	86%
	2: Placement of material	90%
	3: Placement of equipment	90%
	4: Skills operator	86%
	5: Placement site	57%

Analysis of the results obtained from the four dimensions of safety at the stage Blasting work, it can be concluded: the stage Blasting, construction safety is good at 70%, which is still a little flaws. Conclusion analysis on blasting work can be seen in the graph below:



**Figure 3.** Conclusions Results Analysis Construction Safety At Work Blasting

#### IV. DISCUSSION

From some of the weaknesses found of the authors providing input at this stage Blasting work:

Blasting may cause damage to vegetation and plant communities under contained new roads for the project site is in the region Forest Nature Reserve and Tourism (Hsaw) Air Putih. The authors therefore suggest before implementation Blasting work must have made the Environmental Impact Assessment Study (EIA) where the document was discussed about the forecast and evaluation of the impact that will arise as a result of the work Blasting.

Possible risks in the field of cleaning job is rare trees such as the disruption of Andalas existing trees at the project site and workers exposed to falling trees and chain saw that can cause death . If the area to be blasting around rare plants , the plants should be moved to a safe area to maintain its sustainability , while the workers are advised to wear PPE such as gloves, masks, helmets and safety shoes. Installation of signs ban on entering the area and warning signs is very necessary in the location logging, as well as the duty officer .

In the drilling work is the possibility of the risk occurring air pollution and noise occurs because the drilling is done mechanically using drilling equipment drigs . For team officials blasting the risk of drilling machine, drilling residual dust and damage to hearing that can cause death, disability, and shortness of breath. So it is suggested perpendicular drilling process, where the influence of rock fragments ( a flying rock ) is not too far away, for officers to wear hearing protection PPE also ( ear plugs ) and safety shoes . Signs posted around the area of the drilling ban on entering the area and warning signs along the next drilling location prohibits unauthorized persons entered the drilling area .

At this stage of explosive material filling the possible risks that can happen is that workers breathe dust powder explosives that caused the death , disability , respiratory illness and poisoning . If the composition is not right will cause black smoke ( fumes ) which can cause respiratory problems. It is recommended at the time of charging must be the exact composition of the mixture so that when blasting will produce white smoke, for workers to be careful in entering the explosive material and labor required to wear PPE . After charging the explosives at the hole should be installed signs to mark him . for the public prohibition signs posted around the entrance area and warning signs along the blasting location further prohibits unauthorized persons entering the blasting area .

Possible risks that occur when checking detonators that have been associated with explosive engine failure is the presence of explosive ( missfire ) . Missfire that failure caused the explosion explosive interpreter errors, damage or denator axis and less fitting explosives with environmental



conditions. Damage due to exposure by a series of rock fragments from the blast hole too fast before because delay can also lead to missfire . Therefore, before blasting should be checked with the tester missfire .

Traffic is stopped temporarily when the blasting , the possibility of the risk occurring is the onset of congestion. Because it's for traffic safety closure of the road at the entrance of Padang and Pekanbaru distance of 500-1000 m, to keep from occurring traffic jams when the door is opened. Traffic signs must be adequately supplied and used to regulate traffic and police Flagman

At the disposal proceeds blasting work to disposal , the possibility of the risk occurring is air pollution and dirty streets if the material is taken not covered by tarpaulin . It is recommended before entering the road, wheel dump trucks transporting material doused with water and if there is a material scattered in the direct path cleared . Loading dump trucks with a minimum charge because of the road quite steep . While the disposal area must be reviewed for feasibility to environmental influences, material outcomes blasting large diameter must be broken down before discharged into a disposal for the benefit of the surrounding community .

## **V. CONCLUSION**

From the research that has been done, it can be concluded:

Evaluation of construction safety in Kelok 9 Bridge Project where the terms of the results obtained in the analysis was 70% Blasting work, included in good categories. Construction safety barriers or obstacles found on the Kelok 9 bridge project is a lack of awareness for running safety in the field. Because of the need for intensive supervision and independent.

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EI-05-024

## THE EFFECT OF ONLINE TRAVEL AGENCY CUSTOMER PERCEIVED VALUE TO SATISFACTION AND LOYALTY (A Case study at VALADOO.COM)

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**ABSTRACT :** *This study confirms and clarifies that customers loyalty comes from their satisfaction and perceive value especially in an online travel agency. This study also proves the theory on causal relationships among customer perceive value, satisfaction and loyalty. During the research, a total of 206 respondents completed a survey conducted with the purchased customers in Valadoo.com. Yet, the results reveal that most customers are loyal to the company not only because they are satisfied by the services provided, but they may also become loyal because they got what they have sacrificed to get the services at Valadoo.com which is also well known as customer perceive value. Sampling technique used in this research is non probability sampling called purposive sampling to 317 customers. The method of analysis is path analysis by using SEM. The findings of this study can be utilized by the management of Valadoo.com to aid in establishing effective strategies to attract and retain customers to purchase the travel services through this online travel agency.*

**Keyword:** Customers perceived value, satisfaction, loyalty.

### I. INTRODUCTION

Today the internet is part of many people's daily lives in many different ways. Almost 32.7% of the world population has access to the Internet and the penetration rate in Asia is almost 4.8%, in Europe it is almost 22.1% and in North America it is almost 12%. The largest number of Internet users can be found in Asia followed by Europe and North America (Internet World Stats.com, 2011). People use the Internet to communicate, get information, buy products, consume the products, voice opinions, etc. The number of web sites increases by the minute, and the magnitude of services and information offered on the Internet is almost as hard to grasp as the size of the universe. This development and growth imply that businesses and customers perceive that the Internet provides them with some kind of value.

There has been a dramatic change in the way consumers have altered their way of shopping. Although consumers continue to purchase from a physical store, consumers feel very convenient to shop online since it frees the customer from personally visiting the store. Internet shopping has its own advantages and it reduces the effort of travelling to a physical store. Decisions can be made from home at ease looking at various choices and prices can be easily compared with the competitor's products to arrive at a decision.

Regarding this, travel and tourism have for a long time been one of the top categories of websites visited by Internet users. In Europe for instance, half of the online population visited a travel web site in March 2007. In the U.S. 79% of those planning to travel within 3 months said they would be using the Internet to plan their upcoming personal travel (ETC New Media, 2007). Internet users choose to visit travel and tourism websites to search for information or to buy travel and tourism





products such as airline tickets, accommodation, event tickets, packaged tours, activities, etc. Also, recent developments have shown that on many websites user-generated contents are important sources of information and by some companies used as a marketing strategy to increase trust and customer value.

The internet has now clearly established itself as the world's favorite place to book travel, this year's World Travel Monitor also showed. Online bookings now account for nearly half of bookings, while (besides direct bookings with hotels or airlines) travel agents meanwhile trail at not even one-third of bookings. (ITB World Travel Trends Report, 2011)

In recent years, increasing numbers and types of organizations have recognized the importance of customer loyalty as companies strive to improve quality and achieve high levels of buyer satisfaction. Indeed, customer loyalty might be characterized as one of the new "holy grails" of organizations, as increased buyer loyalty has been cited as one of most important predictors of long-term profitability (McCalsin & Martin, 2001)

This is in line with what described by Fitzsimmons & Fitzsimmons, 2011:

*"The service profit chain proposes a relationship that links profitability, customer loyalty, and service value to employee satisfaction, capability, and productivity. Loyal customers, in turn, result from satisfaction that is influenced by the perceived value of the service. Satisfied, committed, capable, and productive employees create service value. Satisfied and loyal employees begin with selection and training, but require investment in information technology and other workplace support that allow decision-making latitude to serve customers".*

Discussing about productivity and growth, one of phenomenal online travel agency in Jakarta, Valadoo.com which established in 2010, shows a significant growth in terms of sales and numbers of customer or membership.

The rapid growth of online transactions in the service industry raises interesting research questions about the the effect of customer perceive value towards satisfaction and loyalty in the online environment. Previous studies have indicated satisfaction as a crucial factor related to perceived value and customer behavior. Some studies have suggested that *"high levels of perceived value results in similar level of customer satisfaction and purchases"* (Bojanic,1997). This is supported by an empirical study, which studied by Anuwichanont and Mechinda (2009), where they found that three out of five dimensions of perceived value have an effect on customer satisfaction. Quality dimension of customer perceive value becomes the most important followed by reputation, emotional value and monetary price respectively.

Refer to the above data and phenomena, researcher curious to find what makes Valadoo.com results a phenomenal revenue growth and profitability, whether it is caused by customer satisfaction and loyalty which influenced by customer perceived value or is there any other factors? Therefore, this study is trying to confirm and clarify whether those customers keep searching and purchasing services through Valadoo.com because of their loyalty? And whether their loyalty arouses because their

perceive value in searching and purchasing the services are satisfied by the online travel agent? This research will be conducted in Valadoo.com, focuses on the raise of customer's loyalty.

## II. RESEARCH METODOLOGY

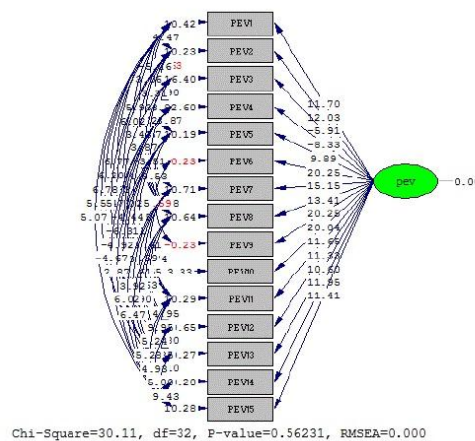
The objective of this study is to clarify and confirm whether Valadoo.com customers have a high level of loyalty because their perceived value is satisfied by this online travel agency. To prove the confirmation, this study is conducted through a quantitative study using a questionnaire being sent to the respondent. In accordance with the recommendation Hair *et al.* (2010), the number of respondents used adjusted by the number of parameters. This research model is planned to have observed variables (indicators), the minimum sample required is  $5 \times 24 = 120$  respondents. Samples obtained at random, by giving questionnaires to purchased customers of Valadoo.com. This study population is customers of Valadoo.com.

Data Analysis Methods in this study, used Structural Equation Modeling (SEM) procedures in the development and testing of models and data processing research. In this study used LISREL 8.80 software. Structural Equation Modeling procedures are widely used in social and behavioral sciences in addressing the basic problems facing the problem of measurement of latent variables and the problem of simultaneous causal relationships among latent variables. This research conducted on May until July 2013 at PT Valadoo Indonesia, Jakarta.

## III. RESULTS AND DISCUSSIONS

### 1. Confirmatory Factor Analysis

#### a. Confirmatory Factor Analysis for Perceive Value Variable

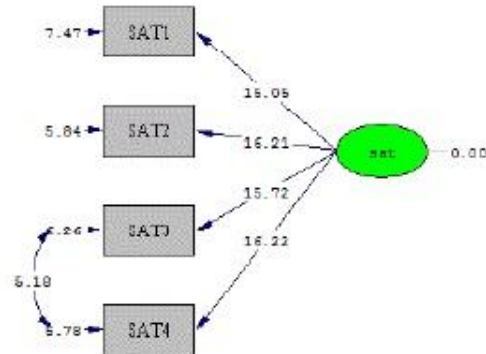


**Figure 1** Confirmatory Factor Analysis of Perceive Value – T Value

The results of data processing analysis shows that the construct is used to establish a research model, the confirmatory factor analysis process meets the criteria of goodness of fit has been determined. Probability value of goodness of fit test showed the value of 0.56231 ( $> 0.05$ ), and RMSEA 0.000 ( $< 0.08$ ). The model fit the results of other tests such as CFI, GFI, AGFI, RFI also shows the value of  $> 0.90$  was declared fit to the model. Where each of these values is; CFI

(Comparative Fit Index) = 1:00, GFI (Goodness of Fit Index) = 0.98, AGFI (Adjusted Goodness of Fit Index) = 0.93, and RFI (Relative Fit Index) = 0.99.

**b. Confirmatory Factor Analysis for Satisfaction Variable**

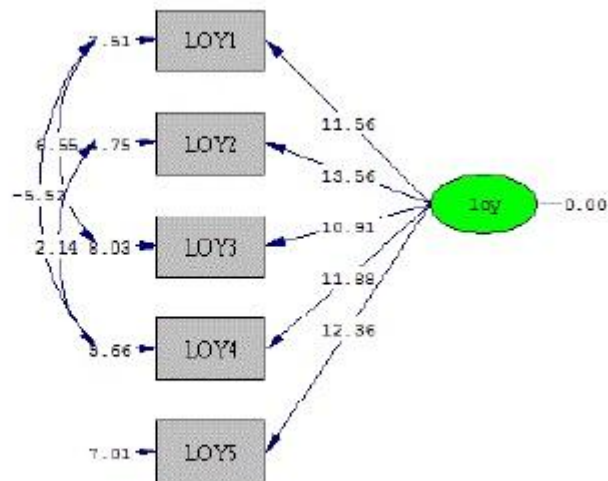


Chi-Square=0.23, df=1, P-value=0.63116, RMSEA=0.000

**Figure 2** Confirmatory Factor Analysis of Satisfaction – T Value

The results of data processing analysis shows that the construct is used to establish a research model, the confirmatory factor analysis process meets the criteria of goodness of fit has been determined. Probability value of goodness of fit test showed the value of 0.63116 (> 0.05), and RMSEA 0.000 (<0.08). The model fit the results of other tests such as CFI, GFI, AGFI, RFI also shows the value of > 0.90 was declared fit to the model. Where each of these values is; CFI (Comparative Fit Index) = 1:00, GFI (Goodness of Fit Index) = 1:00, AGFI (Adjusted Goodness of Fit Index) = 0.99, and RFI (Relative Fit Index) = 1:00.

**c. Confirmatory Factor Analysis for Loyalty Variable**



Chi-Square=8.16, df=2, P-value=0.01695, RMSEA=0.123

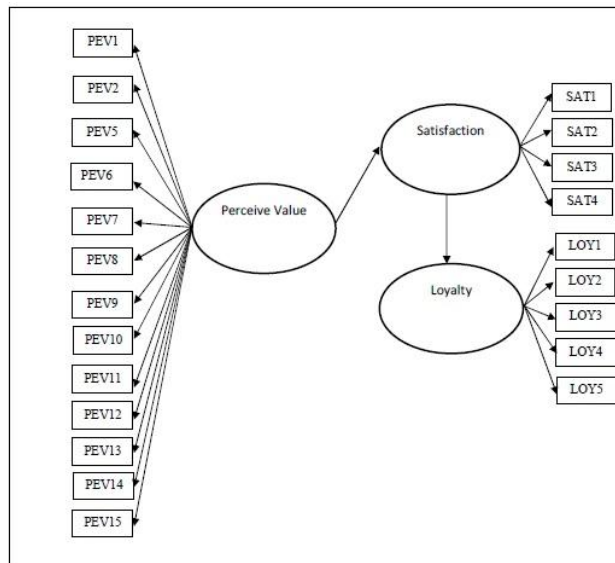
**Figure 3** Confirmatory Factor Analysis of Loyalty – T Value

The results of data processing analysis shows that the construct is used to establish a research model, the confirmatory factor analysis process meets the criteria of goodness of fit has been determined. Probability value of goodness of fit test showed the value of 0.01695 (<0.05), and

RMSEA 0123 ( $<0.08$ ). The model fit the results of other tests such as CFI, GFI, AGFI, RFI also shows the value of  $> 0.90$  was declared fit to the model. Where each of these values is; CFI (Comparative Fit Index) = 0.99, GFI (Goodness of Fit Index) = 0.98, AGFI (Adjusted Goodness of Fit Index) = 0.88, and RFI (Relative Fit Index) = 0.95.

**d. Testing the Structural Model**

Furthermore, structural equation model testing was conducted to determine the suitability (goodness of fit) of the research model (Figure 6), which will be used to analyze the data and test the null hypothesis that there is no difference between the covariance matrix of the sample data with the estimated population covariance matrix. The number of respondents who obtained 206, it is possible for researchers to use these studies as a model of the structural model (as the ratio of observed variables and the number of respondents is 1: 5). This is done by taking into account the results of test validity and reliability of each latent variable (to determine the variables that measure will be used). Values of the variables used in measuring the structural model derived from the calculation of the value of the latent variables (latent variable score). For latent variable that has only one variable measuring the value of the specified variable gauge has a zero error rate measurement is considered (not available).



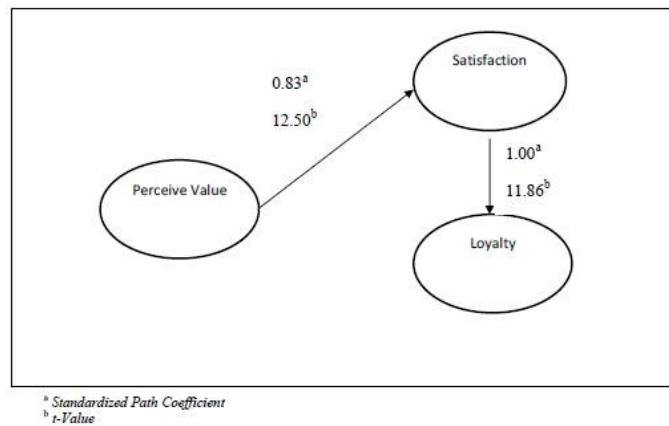
The following table is a summary of the results of hypotheses testing.

**Table 1** Result of Hypothesis Test

Hypothesis	Path	Estimation	t-value	Significancy	Summary
1	Customer Perceived Value → Satisfaction	0.83	12.50	Significant	Data supports Hypothesis 1
2	Satisfaction → Loyalty	1.00	11.86	Significant	Data supports Hypothesis 2

Table 1 shows that both of two hypothesis which proposed in this research, this two hypothesis supported by data makes H1 and H2 are accepted. These two hypothesis supported by the data are the effect of customer perceive value to satisfaction and satisfaction toward loyalty.

No modifications to the structural model of this study, only removes a few indicators that are considered not to have a mutual relationship on the model and after eliminated structural model shows a good model fit, and fit theoretically. Results of the path analysis model of the overall structural hypothesis suggest that structural models match better measurement of 206 respondents. From the results of the structural equation analysis, the second hypothesis of the study had a positive influence direction. And at the end of the model shows that the second hypothesis of the study have significant value. Final model study can be seen in Figure 5:



**Figure 5** Structural models Standardized Path Coefficient and t-Value

**e. Discussion of Analysis Results Hypothesis 1**

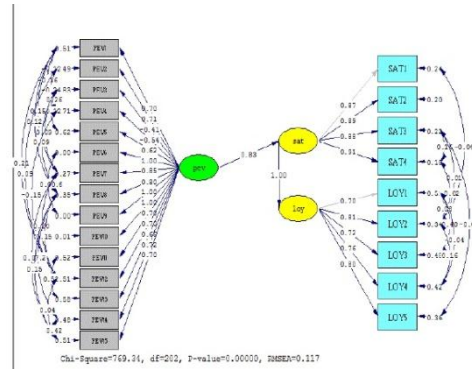
H1 stated that there are significant value of customer perceive value towards satisfaction. The calculations show that there is a positive influence among customers perceive value towards satisfaction with standardized coefficient of 0.83 and the t-value of 12.50. It can be argued that the higher customers perceive value will cause the value of customer satisfaction on in Valadoo.com.

It supports the previous studies which have indicated satisfaction as a crucial factor related to perceived value and customer behavior. Some studies have suggested that “*high levels of perceived value result in similar levels of customer satisfaction and purchases*” (Bojanic, 1996; Parasuraman, Zeithaml, & Berry, 1985). Customer value is also believed to contribute to loyalty through affecting satisfaction positively (Cronin, Brady and Hult, 2000).

**Hypothesis 2**

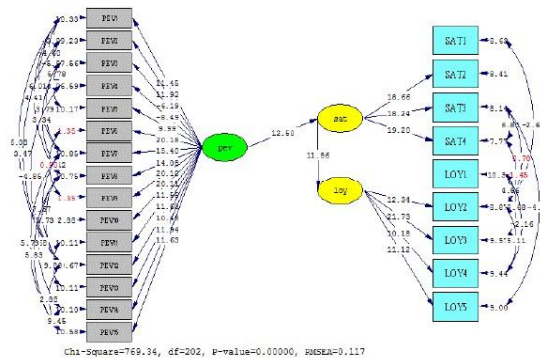
H2 expressed satisfaction has a positive effect on customer loyalty in Valadoo.com. This study shows that the hypothesis proved significantly with t-value of 11.86 and the standardized coefficient value 1.00. This means that the stronger the satisfaction will result in customer loyalty. It supported by the research which held by Oliver, 1999: “*the major determinant of customer loyalty is satisfaction*”. In particular, research evidence also supports that satisfaction is a precursor of trust, retention and repeat purchase intention (Olsen, 2002). If they are satisfied, they will be more likely to continue to

purchase. Similarly, if they are dissatisfied, they will be more likely to switch to another alternative (Oliver and Swan, 1989).



**Final Model of Study Result**

Figure 6 shows the final model results after going through several processes and reduce some of the indicators contained in the endogenous latent variable Satisfaction (Y1) which originally had four (4) indicators into three (3) indicators and Loyalty endogenous latent variable (Y2) which originally had 5 (five) indicators into four (4) indicators given by the significant influence of exogenous latent variables Perceive Value (X).



**Complete Structural Model – T Value**

In figure 7 shows that there are some coefficient that gives not significantly effect in red color, which is the latent exogenous variables (X) Perceive Value on Emotional indicators (PEV6), (PEV9). And the endogenous latent variables (X1) Satisfaction in the indicator feeling satisfy with the service (SAT1), endogenous latent variables (X2) Loyalty to the indicators intend to purchase in the future (LOY1). This is because the values did not meet the critical value of the t-test. Although these values are not very significant impact, but if it is removed from the model will result in changes in the structure of the model and the constructed value and the suitability models will change drastically and overall this model is considered as fit.

**IV. SUMMARY AND CONCLUSSIONS**



Previous studies have indicated satisfaction as a crucial factor related to perceived value and customer behavior. Some studies have suggested that “*high levels of perceived value result in similar levels of customer satisfaction and purchases*” (Bojanic, 1996; Parasuraman, Zeithaml, & Berry, 1985). Based on this study results, there is an influence from customer perceive value to satisfaction (H1) as significant with standardized coefficient value as 0.86 and *t-value* as 12.50.

This study shows that customer value also contributes to loyalty through affecting satisfaction positively (Cronin, Brady and Hult, 2000). Its shown by the study results, there is also an influence from satisfaction to loyalty (H2) as significant as *t-value* 11.86 and *standardized coefficient* 1.00.

These above value shows that customers become loyal because their satisfaction are met and satisfied by the customer perceive value. In conclusion, this study confirms that the two hypotheses assumed before are proved.

### SUGGESTIONS

1. For future research, conduct other research on more online travel agency from all parts of Indonesia. Even though some of the respondents for this study are big companies representing their fostered business partners from different parts of Indonesia there would be more accurate analysis if there is another research conducted to more online travel agency from different parts of Indonesia, other research may measure other variables with visitors as the respondents which are classified by the income level, frequency to travel in a year, reason for holiday. Besides, other researcher may also measure commitment and trust factors that were not measured in this study. Furthermore, other researcher may also measure the degree of loyalty of the customers in details, more deeply and intensively for the sake of the knowledge.
2. For Managerial Implications , improving the standard and quality of services to retain customer and to prevent customers seeking alternatives, giving special attention to price arrangement, because customers may compare with another online travel agency. Price sensitivity becomes one of most crucial thing in online business, in terms of social value, enterprise need to seek the way how to make customers feel proud when they purchased the travel services through this online travel agency, Need to improve the level of satisfaction, so customers would not compare with another competitor, distribute the customer feedback form to assure all the purchased customer willing to inform the services they get are equal with what they have sacrifice.

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**EI-05-025**

**PERFORMANCE MULTI BLADE WINDMILL PLANITER TRANSMISSION SYSTEM  
USING DIFFERENTIAL FOR ELECTRICAL ENERGY CONVERSION**

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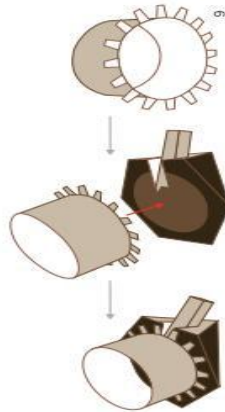
**ABSTRACT :** *Exploiting the potential of wind energy as a free energy in coastal areas through the development multiblade windmill gear transmission system using differential planiter thereby increasing the revolutionary energy. With the completion of energy storage and inverter equipment on a model windmill gear transmission differential planiter developed, it is able to generate electricity for the needs of the home industry. The draft through a combination of exploratory and design approach to engineering and energy development through the windmill to the area that has the potential of wind energy (coastal or V notch / slit hills). Multi-blade windmills were developed with planiter differential gear transmission system produces a good performance with the performance of the electric power generated estimated 1500 watts. This condition can be achieved at an average wind speed of 2.35 m / sec so as to drive a generator/alternator electricity. Round generator / alternator average of 201.3 rpm and allows the electrical energy and is supplied to the charging / battery with an average of 3 to 5 volts. Continue battery will drain the electrical energy converted from electric voltage 12 Volt to 220 Volt through an inverter. So this voltage can be used to overcome the electrical energy needs for one day. The condition of the battery / battery at 11.5 Volt position continues to receive a continuous supply of electrical energy during the wheel spin. In the coastal areas which have the potential of wind energy can sufficiently so that the application of these windmills can meet the needs of electrical energy that is both simple and applicable.*

**Keywords:** *Windmills , Transmission Planiter , wind energy , energy revolutionary*

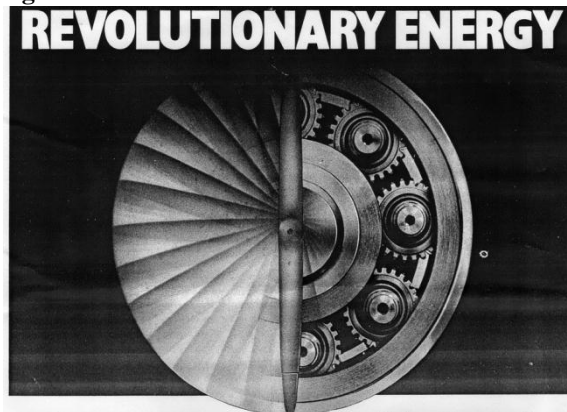
## **I. INTRODUCTION**

Demand for electricity in Indonesia is increasing and is an integral part of society needs at this time everyday. Media Indonesia (2007) International Energy Outlook released the report issued by the US Energy Information Agency said world energy demand will reach twice the current needs, along with advances in technology and information. The coastal area as the area of alternative energy sources (reservoir of energy) has not been touched by many to be developed, such as building and creating fields of wind energy (wind field) through the utilization of which comes from wind energy. Based on data from LIPI, the wind potential on the west coast of the island of Sumatra (including West Sumatra) that are in the range of 2.5 to 4.0 m / sec with a power capacity of up to 10 kW. While the reserve capacity, wind power in Indonesia was 9,290 MW and its production is 1.1 MW (Kompas 2012). Only in this case the development required a transmission system and additional equipment to make it as energy generating units of small scale wind power a more optimal. For that, we need a solution through the development of power generation systems that are affordability by the community. In this case the dimasud is on the technical aspects of construction and development, so that people can learn to be independent and make facilities understated power generation systems and efficient. The use of transmission gears planiter to gain and improve the revolutionary energy as well as the addition of a storage container (energy storage) and to raise the voltage inverter technology is one solution to consider. Utilization planetary gear train system has not found its application for the conversion of wind energy in Indonesia. Though this transmission system can increase the speed ratio is higher than the other circuits. The most important point in its development is situated on the

production technology of the blades of the windmill and the problems of the transmission system or the conversion of energy from the motion of the wind into mechanical energy. Yet found a satisfactory transmission system, the wind turbine industry were mostly firm and mindmill in various European countries such as Britain and Denmark continued to conduct studies in the development of wind power technology. Figures 1 and 2 show the prospects for progress transmissi round forms in question, where the series is a kind of transmission gears planiter are quite popular, efficient and effective.

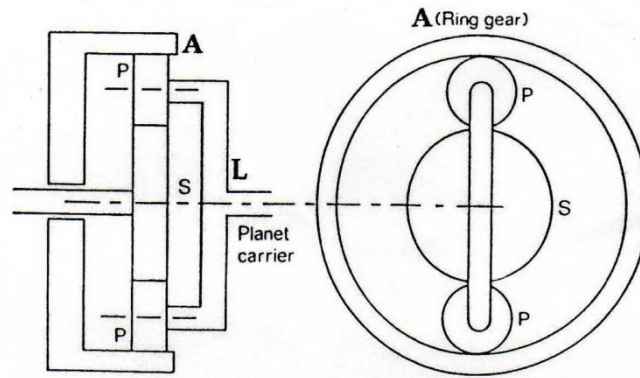


**Figure 1.** Transmission rounds on traditional windmill



**Figure 2.** Transmission Round on Windmills (Modern wind turbines)

Relation to the development of wind power technology planiter circuit system (Figure 3) , can have a number of types / forms the basis of the circuit , such as planetary ring gear train . If a model like this circuit was designed and chosen as part of the gearboxes system, it can be determined number of rounds and the purpose of installation increase or decrease the rotation of the input shaft or output .



**Figure 3.** System schematic Planetary

The wind was blowing will bring some energy , which depends on speed and wide frontal field trajectory. Most modern wind power installations are currently used to generate electricity by converting the energy revolution ( revolutionary energy) into electrical energy by means of a generator . As for the energy that can be converted into electrical energy can be determined by the formula , ( ME 417 ) :

$$P = \frac{1}{2} \rho A V^3 \eta \quad (1)$$

Theoretically , according Guorieres (1982 ) of the energy or kinetic energy of the wind can be harnessed intercession mill can also be determined by the formula :

$$P = 0,15 D^2 V^3 \quad (2)$$

Based on the report of Creative Science & Research (2004 ) with the use of accumulator 12 volt DC voltage into AC voltage can be increased 115 volts , through the inverter equipment , thus providing frequency and voltage ( 115 volts AC x 60 hz ) and ready to be used for various purposes . The electric power is generated depends on the choice of power inverter equipment capacity desired , but theoretically can be calculated by the formula:

$$P = E . I \quad \text{watt} \quad (3)$$

## II. METHODS

In general, the approach taken in this research is the investigation and survey, conducted covering aspects: engineering design and engineering in the development and manufacture of windmill simple inverter completeness. Keberwujudan windmill design system generator, includes a windmill (windmil), axle and transmission system model of epicyclic train, tail steering, the body of the mill, along with the installation of transmission components other energy, such as the alternator, regulator, accumulator, power inverter, instrumentation and panels the completeness of the system. In addition to the aspects relating to the size of the diameter of the rotor wheel, transmission shaft, power capacity is raised, and the transmission shaft rotation ratio needed rounds. Assembly and installation on the simple tower-purpose windmill performance test performance. Testing the performance of windmills is a circuit in order to determine the performance of power systems. Performance and the performance of windmills are built has great potential in addressing the problem of shortage of electricity by utilizing wind potential.

Geographically the development of windmills that will be applied, restricted to the placement generating plant, namely coastal areas or other areas with large wind potential. The election of the coastal areas due to the coastal area has the potential of wind potential and high wind speeds. Measurement of variable magnitude of electric power generated by the windmill shaft rotation, and the voltage is raised. Observations on a periodic basis is a control against the possibility of change in the plant construction, such as windmill blades, tail steering, tower construction, and so on. These changes occurred primarily because of the influence of climatology (wind and weather deteriorated)

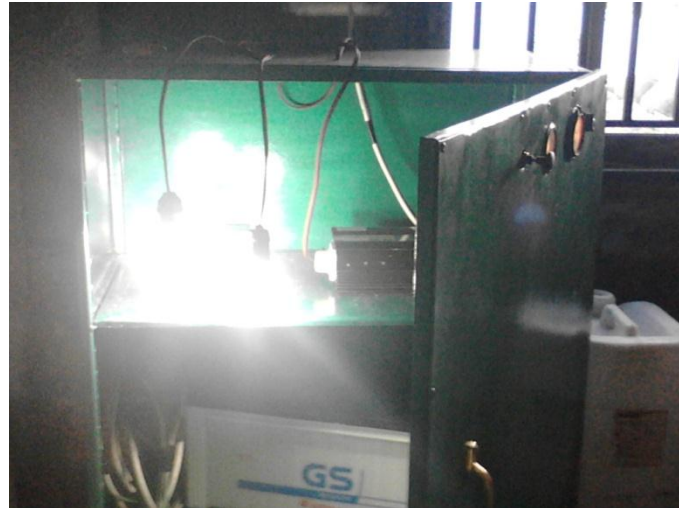
## II. RESULTS AND DISCUSSION

In the performance test wind turbine has been completed engineered obtained some information. The windmill (Figure 4) as a development model windmill has wind energy conversion system that can give out put the outcome in the form of electrical energy generated from the generator through the transmission system planiter gear differential. In an effort to improve the energy changes by utilizing the potential of wind power to become permanent.

Performance windmill which drives a generator is obtained from the gusts of wind that moves with an average speed of 2.35 m / sec measured using the anemometer. While the generator shaft rotation at an average of 201.3 rpm. Generator at low rotation condition < 300 Rpm still allowing energy-generating electricity and supplied for charging the battery / battery with an average of 3 to 5 volts. Thus the batteries will continuously drain the electrical energy to be converted from electrical voltage 12 Volt to 220 Volt to the inverter. Electrical system input and output built in a panel for easy control. So that this voltage can be used to address the needs of electrical energy. In this case attempted to revive some of the lamps (60 watt and 40 watt) with duration of use for 1 hour and the condition of the battery / battery is still at 11.5 Volt position (Figure 5). In tabulating the performance measurement output performance windmills as shown in Table 1. Figure 6 shows a graph of measurement results show the performance of the windmill.



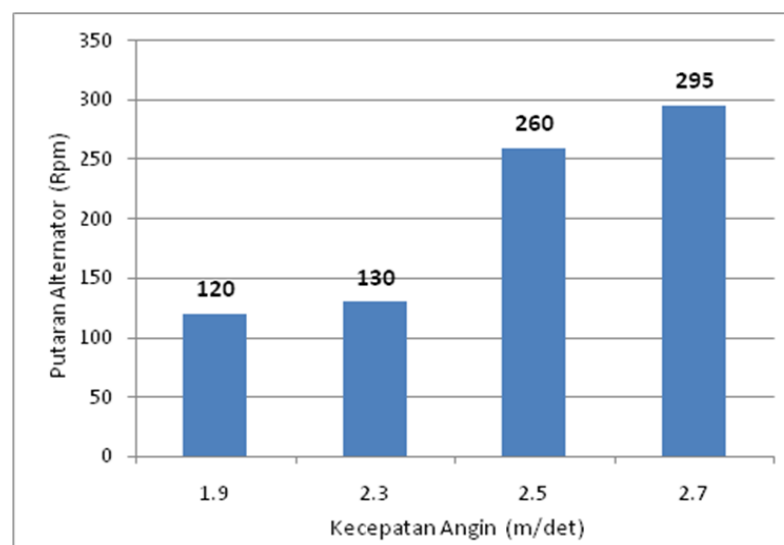
**Figure 4.** Windmills are generated and applied in one of the areas around the coast



**Figure 5.**Outcomes Performance Test Electric Current

**Table 1.**Output performance measurement results show Windmills

Measurement Data Collection	Wind velocity (m/detik)	Round Generator (Rpm)	Shaft Generator output (Volt)
1	1,9	120	3,2
2	2,3	130	3,7
3	2,5	260	4,1
4	2,7	295	4,8
<b>Average</b>	<b>2,35</b>	<b>201,3</b>	<b>3,95</b>



**Figure 6.** Wind speed chart with a development round Alternator

### III. CONCLUSION



From this study we can conclude that while the round wheel is able to drive a generator to produce electricity. The wind energy can move the windmill with differential transmission system. It can be seen that the wheel has the ability to perform well when used as a source of energy using wind energy. The average wind speed of 2.35 m / sec measured using the anemometer is able to drive a generator to produce electrical energy. Where the generator lap average of 201.3 rpm and still allow the electrical energy and supplied for charging the battery / battery with an average of 3 to 5 volts. The battery will drain kontiue electrical energy converted from electric voltage 12 Volt to 220 Volt via inverter. So that this voltage can be used to address the needs of electrical energy and can turn on a few pieces of incandescent bulbs (60 watt and 40 watt) with duration of use for 1 hour. The condition of the battery / battery at 11.5 Volt position continues to receive a continuous supply of electrical energy during the spinning wheel. Advanced workmanship of this research is still very much to be done is to see the extent to which the potential for coastal areas that could be developed as a source of energy generation.

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EI-05-026

**SAFETY SYSTEM DESIGN AS A SAFETY TRANSFORMER  
DIFFERENTIAL RELAY LABORATORY SYSTEM POWER  
ELECTRICAL ENGINEERING DEPARTMENT  
UNIVERSITY OF BUNG HATTA**

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**ABSTRACT :** *This research aims to design a security system as a safety transformer differential relays in laboratory electric power systems Electrical Engineering Department of the University of Bung Hatta. The result of this design can be utilized for students majoring in electrical engineering laboratory protection system in the seventh semester Electrical Engineering Program Bung Hatta University. Aspects that could be expected to support the design, namely (1) the materials used are easy to obtain, (2) the costs involved are relatively inexpensive, (3) is useful to be implemented on a practical system of protection, and (4) the efficiency of expenses laboratory. Design aspects were developed through practical Electric Power System Protection organized by the structure of the activity consists of three stages, namely the modeling, design, and implementation. The success of such a safety system design is evaluated through testing and using instruments scoring sheet test results. The results of the research will be used if the level of keandalanan in securing work significantly in the event of disruption.*

**Keywords:** *Fault, transformers, design diffrensial relay*

## **I. INTRODUCTION**

An electrical system will be said to be good if the system has good continuity of service. This means that if an interruption in the system, then the system must be able to resolve it as quickly as possible[1]. In this case the relay should have a selectivity, sensitivity, sensitivity (reliability), as well as high-speed response to disturbances and relays can sense a disturbance in the equipment secured by measuring or comparing the quantities received.

### **Background**

Protection against disruption of power transformers is absolutely necessary. In consideration of the transformer is a very big investment. Permanent interruption may cause damage to the system equipment to enlarge expenses and lead to continuity of supply is interrupted, therefore we need a so-called relay safety protection, to overcome the interference in the power system as small as possible[2]. To secure the transformer used differential relay.

In laboratory protection systems, lab rare applied is practical by using relays differential. This is because the price is relatively expensive differential relay[3], while students need to know and melakukan testing laboratory trersebut protection system. To solve it is necessary to design a security system transformer with the same working principle as the relay differential which compares the primary current to secondary current.

### **Formulation of the problem**

Based on the above, it is necessary to relay differential designed to be applied to practical protection system. D. Celeita, modeling on the smart grid automation and simulation in the laboratory[4], a. Conde, presents the distance relays operation and its application to education[5].

The author did the design tool safety system as a replacement transformer releai differential, after it conducted tests on the tool to obtain desired results.

### Research purposes

Based on the literature review it is necessary to design a security system as a safety transformer relay diffrensal laboratory electric power systems Electrical Engineering Department of the University of Bung Hatta.

The result of this design can be utilized for students majoring in electrical engineering lab protection system in the seventh semester Electrical Engineering Program Bung Hatta University. Aspects that could be expected to support the design, namely (1) the materials used are easy to obtain, (2) the costs involved are relatively inexpensive, (3) is useful to be implemented on a practical system of protection, and (4) the efficiency of expenses laboratory , Design aspects were developed through practical Electric Power System Protection organized by the structure of the activity consists of three stages, namely the modeling, design, and implementation.

The success of such a safety system design is evaluated through testing and using instruments scoring sheet test results. The results of the research will be used if the level of keandalanan in securing work significantly in the event of disruption.

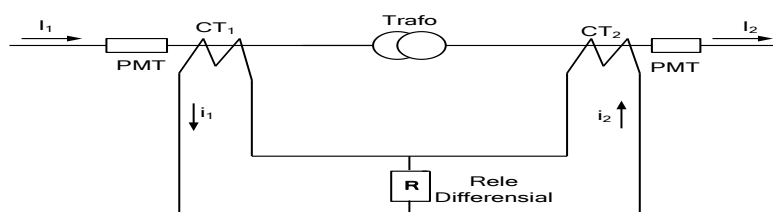
### Theory

In order for the safety of differential working properly and stable, then there are several requirements that must be considered include:

1. Current transformer CT1 and CT2 must have a ratio such that the same secondary flows.
2. Characteristics of CT1 and CT2 (saturation) should be the same
3. Connection and the polarity of the current transformer CT1 and CT2 must be the same.

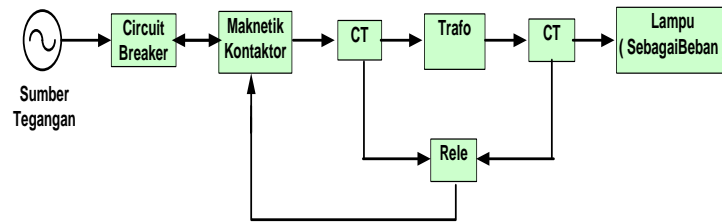
Differential relay is a safety system unit, namely safety has absolute selectivity, which means it can only work if the disorder is inside the safety area. As for the disturbances that occur outside the safety area, the differential relay should not be working. Differential relay should remain stable against the external interference. Therefore, the differential relay can not be used as a safety backup to the next area. Figure 1 is a single line diagram diffrensal relay.

To further facilitate the design of this tool, then made modeling system consisting of physical design and block diagram design tool. In this system of currents that will supply no more than the setting, when exceeding the setting then the relay will work. Image block diagram of the design of the differential relay can be seen in Fig.2.





**Fig. 1.** Single line diagram differential relay



**Fig. 2.** Block diagram of the design of the differential relays

To calculate the nominal current of the power transformer on either the primary voltage and the secondary voltage side[3], use the equation:

a. primary voltage

$$I_1 = \frac{VA}{V_1} \quad (1)$$

b. secondary voltage

$$I_2 = \frac{VA}{V_2} \quad (2)$$

**Where:**

$I_1, I_2$  = Current transformer nominal

$VA$  = nominal power transformer

$V_1$  = voltage primary side of the transformer

$V_2$  = voltage secondary side of the transformer

### 1. Determine the Secondary Flow CT (Transformer Circuits)

Output of the CD obtained are:

a. Current transformer 1 (CT1)

$$i_1 = \frac{I_1}{nCT_1} \quad (3)$$

b. Current transformer 2 (CT2)

$$i_2 = \frac{I_2}{nCT_2} \quad (4)$$

Where:

$i_1, i_2$  = Arus sekunder CT

$nCT_1$  = ratio CT1

$nCT_2$  = ratio CT2

Based on calculations using the equations (3) and (4), then the current value will be an imbalance in the normal conditions in the differential relay[6]. This imbalance flow represents the difference between the results of the calculation of the equation (3) and (4), namely:

$$i_d = i_1 - i_2 \quad (5)$$

## 2. Percentage Setting Rele

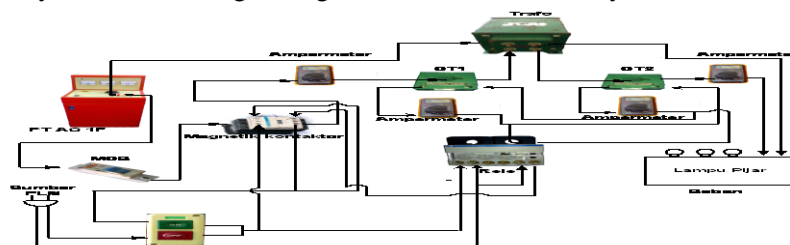
Percentage relay setting a value to be reckoned with, where the value is the magnitude of the differential current toleransidari which may occur in normal conditions in the differential relay itself. Persentase equation that shows the setting of the relay is as follows:

$$\Delta = \frac{i_d}{i_2 + 0,5I_d} \times 100\% \quad (6)$$

If in the calculation, the current price differential is greater than the specified setting, the relay will work, otherwise if obtained current price obtained is smaller than setting relay, the relay will not work.

## 3. Model System Design

To further facilitate the design of this tool, then made modeling system consisting of physical design tools. In this system of currents that will supply no more than the setting, when the setting exceeds the relay will work. Image design of the differential relay can be seen in Figure 3.



**Fig. 3.** Model construction of differential relays

#### **4. Components of The System Design Differential Relay**

The devices used in the design of the system is as follows:

##### **4.1. Rele Flow**

Relay is an electronic device which when energized will cause the magnetic field in the coils to pull the switch (switch) to connect. And when not energized to release the switch back. This current relay usually work if the flow through of the current exceeds the normal or rele this will work if the excess of the value of the current setting of the relay, or the relay will detect if an interruption occurs when an overcurrent exceeding the specified setting [8]. The current noise can be caused by excessive loading, unbalanced load, short circuit

##### **4.2. Magnetic Contactors**

Magnetic switch contactor is driven by magnetic force. A contactor must be resilient and able to drain and disconnect from the current under normal working conditions. Normal operating current is the current flowing during disconnection does not occur. In the magnetic core of a contactor are short circuited ring pliers serves to maintain the continuous flow of magnetism, so that the contactor can work normally. Magnetic contactor will work normally when the voltage reaches 85 / of the working voltage. In the event of a voltage drop in the contactor will vibrate. The size of the contactor is determined by the voltage and current limits. Capacity use this magnetic contactor relay depends on the capacity used.

Components-components that are contained in the magnetic contactors are:

- The core magnetic form of plates made of iron—serves as a liaison between the control contacts normally open (NO) and normally closed contacts controls (NC).
- Coil, serves as a coil terminal.
- Anchor in the form of per-contained within the coil.—

The working principle of the contactor is when the coil running positive (+) A1 or coil negative (-) A2 of the contactor is connected to an AC voltage source, the current will flow back - back so that the contactor is connected (Contact), where the plates that serve as contact normal controls open (NO) into the control contact normally closed (NC) and vice versa normally closed contacts (NC) to control contact normally open (NO).

Magnetic Contactors (breaker) function releases the system is loaded. Bekerjanya contactor in this case is because the order of the relay. Rele will work if the current flowing to the relay exceeds the current setting, then the magnetic contactor will open / cut off the channels until normal flow back.

##### **4.3. Transformator Flow (CT)**



Current transformers are used to lower the load current of a circuit. The next CT secondary current for measurement at protection system. By knowing the ratio of transformation and ampere meter reading ( $I_2$ ), the load current  $I_1$  can be calculated.

When the transformer is considered ideal, the current load:

$$I_1 = \frac{N_2}{N_1} \times I_2 \quad (7)$$

#### **4.4. Ampermeter**

As an indicator that there is current flowing in the phase and in the relay, then to find out how the fault current flowing in the circuit and how the amount of interference given to the relay.

#### **4.5. Miniature Circuit breaker**

Components used as a power breaker switch or circuit breaker electrical equipment on the electric power system, which is able to open and close electrical circuits in all conditions, including short circuit current, that is, when the other safeguards do not work according to its rating[7]. Also at normal voltage conditions are normal or not.

#### **4.6. Push Button**

Push button is a component that works by pressure it receives. If the push button is in a state without getting pressure then push button is in a state of zero or no voltage, otherwise push button given the pressure it will be in a state voltage.

In the design of this relay is used to activate the push button switch / push button on the command so that the signal generated in the form of voltage that will drive the contactor magnetik. If the system is in a state of abnormal or receive interference, then automatically relays that will drive the contactor to open the circuit until normal conditions return. To turn off / turn off the system can do this by pressing the off button so that the signal voltage will be disconnected.

### **Hypothesis**

#### **1. Theoretical Analysis.**

In relation to the laboratory conditions will be left behind when the unmet need for practical protection system, while in the field or the world of work in the field of electrical engineering is necessary especially in the field of electric power systems. It needs a anticipation by finding or creating an alternative relay device differensial

#### **2. Mindset.**

Motivation to learn to be the only foundation and the foundation for the future of students. Which meant the motivation to learn here is the passion for studying and improving learning achievement in higher education, which should be owned and used by a student driver.

This study emphasized the need for efforts to solve the problems faced in conducting laboratory practicum proteski system, by creating an alternative sistempengam transformer.



## **II. RESEARCH METHODS**

In the design and assembly of the differential relay from the beginning to the end to go through the stages or steps so the job done more efficiently. The design is done in the lab of electrical engineering in May 2016. The steps are:

1. Determine the load capacity will serve.
2. Determine the appropriate components to serve the load capacity.
3. Obtain the datasheet for each component that will be used in the design.
4. Design a circuit model.
5. Designing lay out on a board / box and installation.
6. The assembly or installation of the components on board experiments and checks.
7. Installation of cables on each component.
8. Testing Equipment by using transformers and incandescent lamp load
9. Retrieving data
10. Analysis and thesis writing.

Broadly speaking, the design of differential relays to a safety relay system is comprised of a stream that flows relay for phase disturbance to ground and short circuit that will work as expected.

## **III. RESULTS AND DISCUSSION**

From the result of design, in which equipment needed lots sold in electronics stores, the cost is relatively cheap.

Tests conducted to determine the working principle and the expected results on the series that has been designed to get the relay performance as expected. Tests performed include:

1. This experiment is testing the relay using the source PLN single phase and single phase loads incandescent lamp, relay may not function properly.
2. Testing the overall circuit using a voltage source (PTAC), which describes the operation is test all equipment in the design. Testing by providing more load on the transformer, the test results in which the relay can secure the transformer from overload and short circuit.



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EI-05-027

## STRUT-AND-TIE METHOD – ANALYSIS AND ITS APPLICATION IN DESIGNING OF REINFORCED CONCRETE STRUCTURE

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**ABSTRACT :** *Strut-and-tie method (STM) has been developed based on simple truss model. STM is applicable to analyze and design of a reinforced concrete member experiences three effects; shear, flexural and axial effect. The original strut-and-tie models have been developed as a lower bound solution of plastic theory where equilibrium of system is considered together with yield criterion. The principle concept of STM describes stress distribution and load path in a structure. The strut-and-tie method describes the development for the design of shear in reinforced concrete and the analyses of the strut-and-tie theory of reinforced concrete element. To date, strut-and-tie method has been included as an alternative design method in North America. The main feature of STM as a design method is illustrated in design examples. To compare and contrast the approach to STM by ACI procedure and FIP Recommendations are adopted as the basic for discussion. The results of design examples of simply and supported deep beam based on Appendix A, ACI 318-02 and FIP Recommendations included in this paper.*

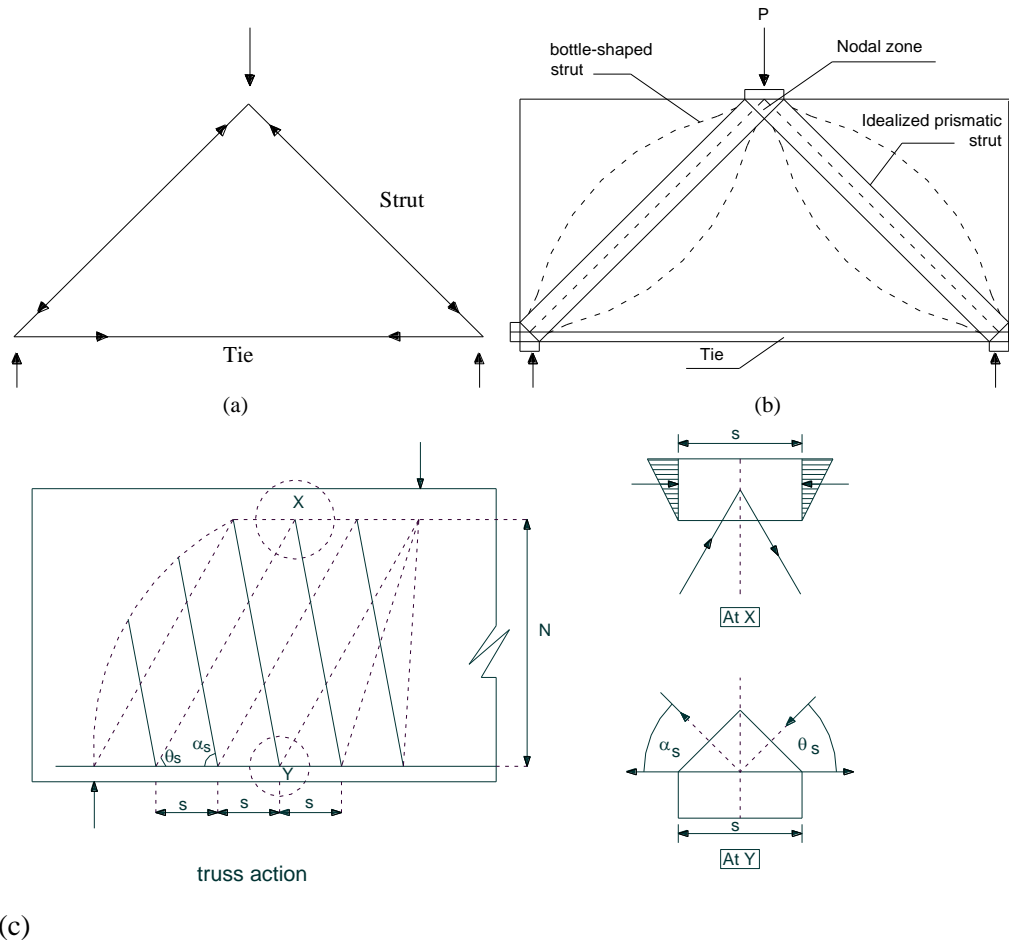
**Keywords:** strut, tie, reinforced concrete, shear strength

### I. INTRODUCTION

Strut-and-tie is a system of forces' distribution in the form of "load-path" connectivity from the applied load point to the support point. Alternatively, strut-and-tie is a graphical representation of flow of forces from the applied regions (points) to the support. The idea of the strut-and-tie concept came from the truss analogy method introduced intuitively by Ritter and Morsch approximately 100 years ago for the shear analysis. The truss analogy, or truss model, was used to idealize the flow of forces in cracked concrete beams [Hsu, 1996, Tjhin, 2002]. In parallel with the increasing availability of experimental results and the development of limit analysis in the plasticity theory, the truss analogy method has validated and improved considerably [Hsu, 1996, Collins, 1985, and Marti, 1986].

The strut and tie method has been modified to take into consideration the relevant theory. The analogy of a pin-jointed truss simulates the action of a reinforced concrete beam subjected to shear and bending. The longitudinal component of shear in tension zone is analogous to a tension chord, Fig. 1(a) and (b). The shear reinforcement (vertical or inclined) is the tension ties, and the concrete between diagonal cracks and in the compression zone acts as compressive struts, see Fig. 1(c).

A rational design of reinforced-concrete structures requires the understanding of mechanical properties of the materials. Concrete is high strength in compression but very low in tension. When concrete is used in structure to carry loads, the tensile regions are expected to crack and therefore, it must be reinforced by materials of high tensile strength, such as steel. The concept of utilizing concrete struts to resist compression, and reinforcing ties to carry tension forces, gave rise to the term "strut-and-tie model". In this model, the concrete compression struts and steel tension ties from a truss that is capable of resisting applied loads.



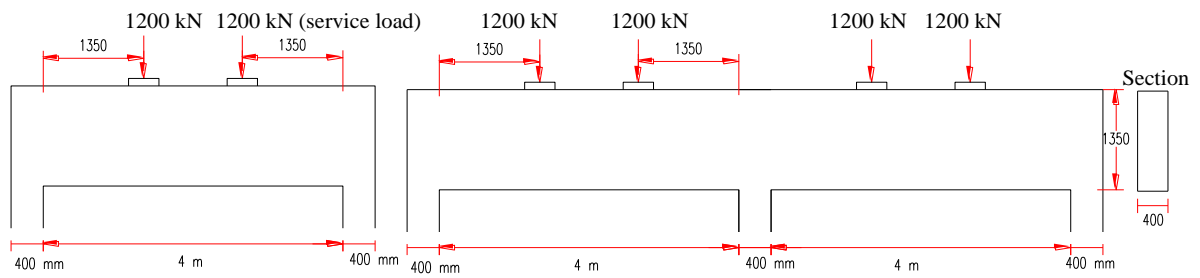
**Fig. 1** (a) The simple pin jointed truss model, (b) Truss analogy to distribution of forces in deep beam, (c) Truss model of reinforced concrete element

The scope of this study covers the development of the strut-and-tie method both as a theory and a design procedure. This study will compare analysis and design of the strut-and-tie method based on Appendix A, ACI 318-02 and FIP Recommendations on the simply and continuous deep beams. In the following discussion, the method as found in FIP Recommendations will be known as traditional strut-and-tie. Otherwise it is referred to simplified strut-and-tie method by ACI 318-02.

## II. METHODOLOGY (THE STRUT-AND-TIE METHOD)

A simply and continuous deep beam, supporting concentrated loads at the top, was designed in accordance with the Appendix A of the ACI 318-2002 and FIP Recommendations. The structure designed based on the ACI 318-2002 has two models which are based on truss analogy. The two model approaches are simply truss and homogeneous truss. The structure and loading under consideration, basically are the same respect to material, geometry and loads for simple deep beams, but for the continuous deep beams structure, additional supports are included. Trusses in continuous deep beam will be analyzed as indeterminate trusses by using the computer program, SAP 2000.

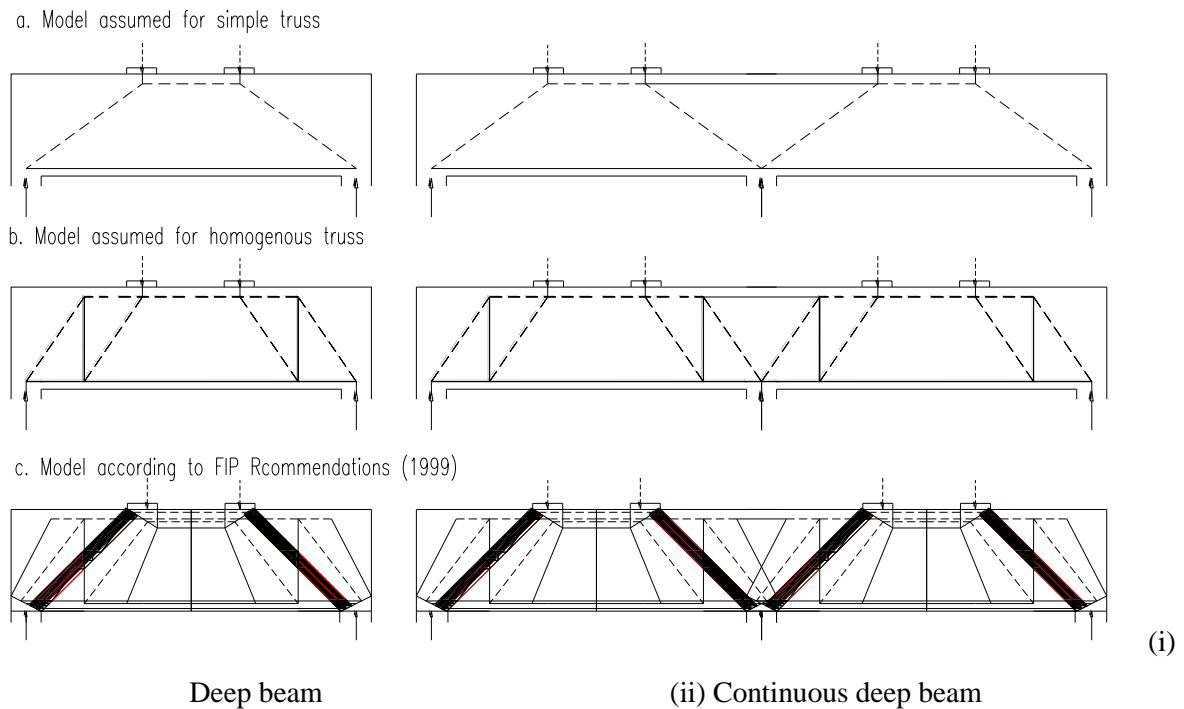




$P = 1200 \text{ kN}$   
 $b = 400 \text{ mm}$   
 $h = 1.35 \text{ m}$

$f_c' = 30 \text{ MPa}$   
 $f_y = 500 \text{ MPa}$

**Fig. 2** Structure and loading



**Fig. 3** Different Model for design examples in deep beam

### III. RESULTS AND DISCUSSION

#### The Development of the Theory for the Design of Shear in Reinforced Concrete Structures

Truss models have been made the basis for shear design in reinforced concrete structures. Truss models are used to evaluate the equilibrium between the loads, the reactions, and the internal forces in concrete and in the reinforcement. Statically admissible stress fields are developed by replacing the truss members by struts and ties, fans, and arches with finite dimensions. The plasticity model and modified compression field theory are the improved truss models. What follows is a qualitative discussion adapted from Schlaich et al (1987) and consistent with what was presented earlier that it adds further insight into the shear behavior of beams.



Great progress has been achieved since Morsch's 45° truss, particularly in the last 25 years. The solution of shear problems in beams (B-regions) has achieved a remarkable level of rationality. D-regions, strut-and-tie models provide the designs more are rational and consistent with B-regions [ASCE-ACI Committee 445 on Shear and Torsion, 1998]

### **The Uniqueness of Application of Strut-and-Tie Method**

The theory plasticity was applied to the design of members under shear and torsion, especially by Nielsen (1984). This also formed the basis for strut-and-tie models after the works of Schlaich et al. (1987). Strut-and-tie models are a valuable design tool used since the beginning of the use of truss models for the shear design e. g. by Ritter (1899) Morsch (1909). At present, truss model considered by researchers and practitioners to be the rational and appropriate basis for the design of cracked reinforced concrete beams loaded in bending, shear and torsion. However, a design based on the traditional truss model only covers certain parts of a structure. At statical or geometrical discontinuities such as point loads or frame corners, corbels, holes and other opening, the theory is not applicable.

The strut-and-tie method has the potential to provide a consistent, well-founded, and widely applicable design methodology for D-regions. The concept also incorporate the major elements of what is today called "detailing," and replaces empirical procedures, rules of thumb and guess work by a rational design method. Strut-and-tie models could lead to a clearer understanding of the behavior of structural concrete and codes based on such an approach would lead to improved structures. This is a significant achievement, as typical design practice for D-regions in structural concrete consists of inadequate empirical design provisions, traditional code provisions and detailing practices

All this poses the question regarding the uniqueness of strut-and-tie models for given loads and geometry of a D-region, which leads back to the basis for using strut-and-tie models (STM) in design. When applying STM, the following two conditions must be fulfilled: equilibrium and strength limits for the elements of strut-and-tie models. These two conditions comply with the static solution of the theory of plasticity, i.e. equilibrium and yield conditions are fulfilled, and this leads to lower bound of the collapse load. Thereby compatibility is not fulfilled, i.e. a mechanism is not necessarily found with a static solution. The different solutions lead to different ultimate loads, and only the maximum value of the collapse loads corresponds to a mechanism. The exact or right solution will comply with the lower bound of all the possible kinematic solutions.

The fact that different strut-and-tie models can be found it is therefore an imminent condition in the application of the method to rely on the static solution of the theory of plasticity. A unique solution can only be expected if compatibility is fulfilled. Any consideration of compatibility requires the calculation of strains and deformation which requires assumptions for the constitutive laws for elements of STM, and this leads to a non-linear analysis of the model. In order to avoid this complication, Schlaich et al. (1987) recommended to orientate the model in accordance with the stress fields of a linear elastic analysis. This firstly has the advantage that the changes in the flow of forces

within D-region are small from the elastic state of stresses to the cracked state of the member until the ultimate load is reached at the assumed model. Therefore, not much redistribution of the internal forces takes place which would require a large amount of ductility. Secondly, the model can also be used for checking the serviceability limit state, i.e. crack widths and deformations.

In view of this enormous variety in designing structures, it should be accepted that also in structural concrete design many solutions are possible, and thus different strut-and-tie models may be favored by different engineers leading to different reinforcement schemes. All the models will provide the required capacity of the member when tested, if the ductility is provided. The required ductility may be expected to be provided if the structural behavior near the ultimate load of the member or the D-region is governed by yielding of the steel and of the nodes and especially the anchorages are properly designed. Less ductility can be expected if struts and compressive stresses govern the design, which should not be the case in well selected design.

### **The comparison of the application of strut-and-tie method based on ACI 318-2002 and FIP Recommendations**

The following explanations are the principles different of two design models according to Appendix A of the ACI 318-2002 and one design models of FIP Recommendations for both simply and continuous deep beams.

- a) The first model of ACI (Fig. 3(a)) is the simplest model than the other two models. It does not show a vertical tie. Even though there is no vertical tie, but it still needs stirrups, which will be added following the rules for minimum reinforcement. Besides, the force in the bottom tie of this model is constant from support to support. So, the anchorage at the support has to be designed for 100% of the force at midspan. In comparison, the model of Fig. 3(c) is more effective than the model of Fig. 3(a). The model of Fig. 3(a) is lack of an explicit transverse tie. It required a minimum transverse reinforcement in order to carry some load. But in the model of Fig. 3(c), the capacity of the transverse tie representing the minimum reinforcement is always the same and does not depend on the distance of the load from support axis.
- b) The model of Fig. 3(b) presents homogenous truss. It is on the safe side for the design of the transverse reinforcement, because the force of the vertical tie is equal to the applied load. The force in the bottom chord is staggered and the anchorage at the support has to be designed for a smaller force (i.e. 50 %) than that of the mid span.
- c) The last model is the combination of the previous two models. It is internally of statistically indeterminate. The FIP recommendation gives an empirically derived rule to determine which part of the applied load should be assigned to the vertical tie; this depends on the distance of the load from the support axis. The model gives a consistent transition for the design of a deep beam with loads near the support to a slender beam, where the total applied load has to be transferred by means of a truss with no direct load transfer to the support by an inclined strut.

## Selection of Truss (Strut-and-Tie) Layout to Analyse the Problem

Strut-and-tie model was developed from “the truss analogy model” which considering cracked pattern which happened in reinforced concrete beam that caused by applied load. Proper selection and modifying the truss geometry if necessary to get an optimum truss will be the best solution in the design. In selection layout of strut-and-tie may use three approaches:

### a. Based on Elastic Stress Distribution

From an elastic analysis, such as a finite element analysis, it is possible to derive the stress trajectories in uncracked B- and D-regions, for a deep beam. Principal compression stresses act parallel to the dashed lines, which are known as compressive stress trajectories. Principal tensile stress act parallel to the solid lines, which are called stress trajectories.

### b. Based on Observed Test Specimen

From the observed test specimens, the crack pattern may assist one in selecting the best strut-and-tie model. If there is a compression strut crosses a zone of cracking in the test specimen, which suggests that this is not correct location for a compression struts.

### c. Based on Load Path

The first step in the load path method, is to ensure that the outer equilibrium of the D-region is satisfied by determining all the forces and reactions (support forces) acting on the region. The next step is to subdivide the stress diagram so that loads find their way from one side of the structure to the other.

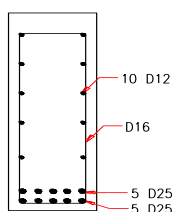
## Results of the design using strut-and-tie method based of ACI 318-2002 and FIP Recommendations

The design examples based on ACI-318-02 Appendix A and FIP Recommendations applied to a simply and continuous deep beam. Strut-and-tie models use to determine the size, the location, the distribution, and the anchorage of the main reinforcement. The next is the results of the amounts of required reinforcements in one section  $b d$  (400 x 1350) mm structure.

Case I: Simple Deep Beam Problem

### a) Simple truss by ACI

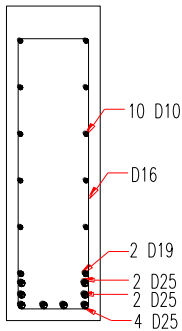
This strut-and-tie model resulted in the use of 2 layers of 5#25 mm bars for the main tie. Particular attention was given to the anchorage of this main tie to ensure that it can carry the required force without having anchorage failure. The anchorage requirements were satisfied by the use of standard 90° hooks [Reineck, K. H].



The amounts of required reinforcements in one section  $b d$  (400 x 1350) mm per one length are:

$$\text{As } 2 \text{ layers } 5D25 + 10D12 = 6039 \text{ mm}^2$$

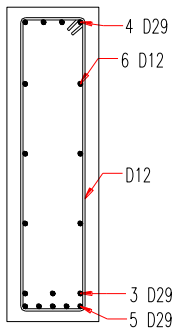
b) Homogenous/Complex truss by ACI



This strut-and-tie model resulted in the use of 8D25 mm and 2D19 mm bars for the main tie. Standard 90o hooks use as anchorage. The entire design shear is essentially carried by the concrete strut, with the addition of minimum specified amount of horizontal steel to control cracking in the bottle-shaped struts 3 & 4.

$$As \ 8D25 + 10D10 = 4712 \text{ mm}^2$$

c) The results of FIP Recommendations

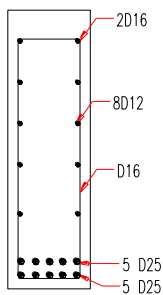


FIP Recommendations 1999 use of 8D29 mm bars for the main tie and 4D25 inside the top corners continuous along the tension area of the beam

$$As \ 8D29 + 6D12 + 4D29 = 8604.8 \text{ mm}^2$$

Case II: Continuous Deep Beam Problem

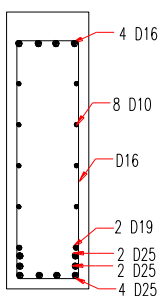
a) Simple truss by ACI



This strut-and-tie model resulted in the use of 2 layers of 5D25 mm bars for the main tie and use 2D16 inside the top corners continuous along the tension area of the beam. Standard 90o hooks use for the anchorage.

$$As \ 2 \text{ layers } 5D25 + 8D12 + 2D16 = 4968 \text{ mm}^2$$

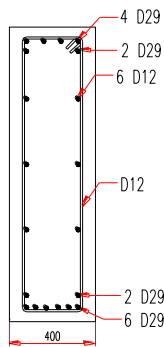
b) Homogenous/Complex truss by ACI



This strut-and-tie model resulted in the use of 8D25 mm and 2D19 mm bars for the main tie and 4D16 inside the top corners continuous along the tension area of the beam.

$$As \ 8D25 + 8D10 + 4D16 = 5360 \text{ mm}^2$$

c) The results of FIP Recommendations



This strut and tie with FIP Recommendations 1999 method resulted in the use of 8D29 mm bars for the main tie and 4D25 and 2D29 inside the top corners continuous along the tension area of the beam

$$\text{As } 8D29 + 6D12 + 6D29 = 9925.8 \text{ mm}^2$$

#### IV. CONCLUSION

Based on the above discussion, the strut and tie method has been improved to take into consideration the relevant theory. Strut and tie models are conceptual tools of pin-jointed-truss system used to investigate the equilibrium between the loads, the reactions, and the internal forces in concrete and reinforcement. Strut and tie models are discrete representations of the actual stress fields resulting from applied load and support condition and provide static lower bound conditions. There are many version of strut-and-tie method. One is traditional method is found in FIP Recommendation. The latest and simplified method of STM is found in ACI 318-02. These methods actually represent the load carrying mechanism of a structural member by approximating the flow of internal forces by means of struts representing the flow of compressive stresses and ties representing the flow of tensile stresses. The design examples based on ACI-318-02 Appendix A and FIP Recommendations demonstrate the key features of a strut-and-tie model as applied to a simply and continuous deep beam. The use of strut-and-tie models to determine the amount and distribution of reinforcement in concrete members requires a departure from the traditional approach to design.

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EI-05-028

## LEARNING INNOVATION PATTERN DESIGN SYSTEM FASHION COURSES UNIVERSITY STATE OF SURABAYA IN PREPARING VOCATIONAL TEACHERS

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**ABSTRACT :** Higher Education Policy in Higher Education Long Term Strategy (HELTS) mandated to improve the quality and relevance of higher education. Improving the quality of learning innovations can be made by aligning the material relevance of the study material with the world of industry. Learning innovation pattern construction can be done by adding a study on the pattern maker PDS .. Competence includes construction patterns can make clothing using a flat pattern and pattern draping. Construction pattern is manually done in boutique while for the manufacture of patterns in industry refers Pattern design system. Making patterns with this system using a computer. Making patterns by a computer system can be made to the basic pattern, pattern modification, and grading patterns. This competence is needed by vocational teachers to provide competence in conformity with the world of industry. The surplus is able to create patterns quickly, can be archived in the long term. The purpose of learning innovations profesionalisme PDS for the development of a master pattern.

**Key Words:** learning innovation, PDS, vocational teacher,

### I. INTRODUCTION

Cargo industry in preparing professional teachers are things that need attention. Each subject material in learning refers to the needs of industries. Clothing fashion industry evolved, in many ways. The development can be seen from textile technology, textile manipulate, pattern making, sewing clothing to the clothing mnghias creativity. Pattern making in the manufacture of clothing there are two types of pattern making with a system of construction patterns and pattern making with the draping technique. It could also be combined with these two techniques. Making patterns in the fashion garment generally uses pattern construction. In the manufacture of construction patterns, there are several system-making depends on the source referenced. Sources can be obtained from a book or a pattern that exists in the industry. Construction pattern making is twofold done manually, using hand and pattern construction is done with computer more familiar with the pattern design system. Pattern design system is the process of making a pattern using software programmed through a variety of ways specified. There is a miraculous software used to create computerized patterns, among others Richpeace .. Construction is a clothing pattern or picture form component parts of clothing based on a predetermined size. The charge in the construction pattern of straight-line and curved lines and signs patterns, and signs buttons, kupnat, pleated, cloth fiber direction, and others. Basically the computer is applied pattern pattern construction which is created manually, to make patterns in the computer must first understand the components or anything whatever is in the process of manually loading pattern

Saving, which need a special place to store patterns to avoid damage. While construction pool created computer has advantages 1) the time required to make the pattern more quickly 2) can create patterns in large quantities at a time, because the pattern can be copied paste. 3) Make burst pattern





does not require any other materials such as paper and glue, 4) can zoom out and zoom in with ease because there is a menu grading that can be operated in accordance etunjuk available 5) Size pattern more precisely 6) in making lay out the arrangement faster, and material requirements can be known.

Whereas the weakness of computer pattern 1) software relaif expensive, make not many people can make the computer pattern. The software is widely used by the garment industry 2) Patterns are created using a standard size so that the pattern is not a pattern made up of individuals 3) form a pattern of curved lines less flexible, stiffens the arch. The process of making computer patterns made in accordance with the toolbar menu facility that has been provided in accordance with the instructions that have been determined.

In applying the learning Pattern Design System needs the application of learning innovation. Learning Innovation, according to Thompson and Eveland (1967) defines together with the technology, the design used for instrumental action in order to reduce the irregularity of a causal relationship to achieve a certain goal. Thus, innovation is an attempt to achieve certain goals. Rogers and Shoemaker (1971) defines innovation as new ideas, new practices, or objects that can be perceived as something new by an individual or community goals. Thus, innovation can be defined as an idea, product, information technology, institutional, behavior, values, or new practices are not yet widely known and used / implemented by the majority of citizens who can foster change for the better , Learning, a translation of learning, which means learning or learning. So, learning innovation is learning to use ideas or techniques / methods new to study measures, so as to obtain the desired progress of learning outcomes. Learning innovations Pattern Design System is learning fashion pattern construction is done with the pattern design system by using the ideas or techniques / methods new to study measures, so as to obtain the desired progress of learning outcomes.

The purpose of learning innovations Pattern Design System is setting up a vocational teacher, so really can convey a message of learning as expected by the school and the world of work. Vocational education is a merger between theory and practice in a balanced manner with the orientation on the job readiness of graduates. The curriculum in vocational education, concentrated on skill learning system (apprenticeship of learning) on vocational-special vocational (specific trades). The advantages of this vocational education, among other things, direct learners can develop expertise adapted to the needs of the field or fields of the task to be faced. To make vocational education which provide quality results, then the teacher must have high competence and professional work. Professional teachers in teaching keeping the central position in the implementation process of education and teaching. Realizing that professional vocational teachers to do with improving the professionalism of teachers in pattern-making competence in the industry. Vocational is the ability to explore the issues of education and employment, an assessment of the ability of self that is associated with the problem of work, planning work problems, decision-making in the selection of work. "Teachers of vocational is the teacher who underwent profession as a calling (calling) so do their jobs with full of enthusiasm, passion, commitment, and continue to develop themselves and the profession. "in the process of teaching and

learning increase high-level thinking skills students develop skills in the field of technology and improve the effectiveness, efficiency and attractiveness of the learning process

## II. METHOD

The method in this paper is to design innovative use of PDS PDS material with pattern making, Pattern. Implementation of the study include: Introduction to Tools Bar, Manufacture basic patterns, Imitation pattern, Grading, Layout. In the process media pembejaran using e-learning, multimedia, e-journals, and e-library. Methods of data collection using observation, performance tests and questionnaires. Data taken include the use of PDS activities in pattern making, pattern making PDS Tests include precision of a pattern with size; size, and signs of a pattern, and the response of students in using learning resources. Data analysis using quantitative descriptive analysis.

## III. RESULT AND DISCUSSION

### a. Student Activity

Activity of students in making patterns by using either e-learning, e-journal and e-book. From the observation showed that the activity of the students using instructional media e learning, e-journals, and e-book average value of 4.9 - 5 meaning "very good". The results of these observations are shown in Figure1.

Fig . 1 Bar Chart Obtaining average value of Student Activities

Overall the value obtained from the three aspects of the use of learning resources that include e learning, e-journals, and e-book is to obtain an average value of 4.9 - 5 means the activity of students in using learning resources are "very good"

### b. Construction Competence Test Pattern Making with PDS

The test results of students in manufacturing patterns in making construction patterns by Pattern Design System obtain test scores over 75 as much as 82% of the number of students and received grades below 75 as much as 18% of the number of students. For more details of the acquisition value is presented in the form of a diagram shown in Figure 2.

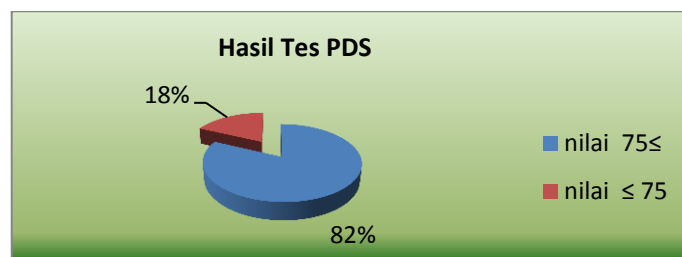
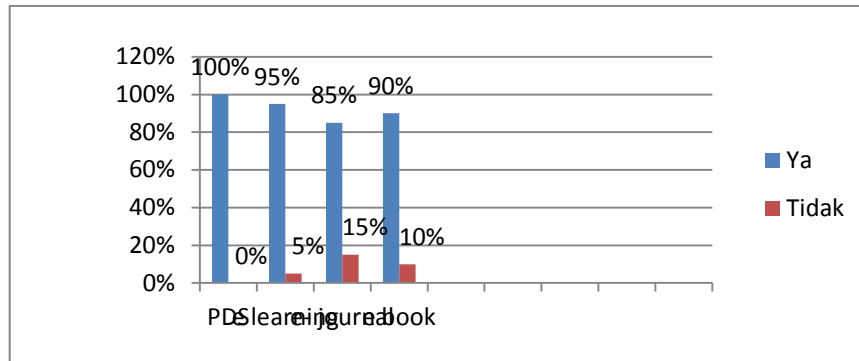


Fig . Pie Chart 2 Percentage of students PPDS Tests

### c. The response of students in making PDS pattern using both e-learning, e-journal and e-book

Overall the students give a positive response. Create a pattern with the PDS system, the student responds to 100%. the application of e-learning students to respond to 95%, the implementation of e-journal students responded to 85% and the application of e-book student responds to 90%. The data can be seen in Figure 3.



**Fig . 3** Bar Chart student responses to learning innovation

#### IV. CONCLUSION

Based on the results of research and discussion that has been carried out can be concluded as follows:

a. Student activity

Activities of students in the learning process innovation makes menggunakan pattern pattern design system by using a source of learning resources e-learning, e-journal and e-book is very good.

b. The test results make patterns using the pattern design system all students memberoleh value in B. B +, A- and A. 82% of students gained grades A- and A, and 18% received grades B

c. The response of students to instructional innovation PDS

Activities of students in the learning process innovation makes menggunakan pattern pattern design system by using a source of learning resources e-learning, e-journal and e-book is very good.

#### SUGGESTION

Create a pattern includes the thoroughness and creativity. To make a pattern with the Pattern system design system must master manual pattern making system, so as to create and establish a good pattern according to the size and proportions of sizes available. Before making a pattern using e-learning learning resources, needs to be read carefully, if there are less understood immediately communicate with instructor.

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EI-05-029

## GROUNDING RESISTANCE REDUCTION OF PARALLEL ROD ELECTRODE AT UIN SUSKA RIAU

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**ABSTRACT** : Grounding resistance uses ground rod electrode is influenced soil condition, soil structure, soil chemical composition, size and ground rod electrode placement. The grounding resistance should be made as small as possible and fulfill its standard ( PUIL 2000) in order to flows fault current as well to ground. In this research to reduce grounding resistance at homogeneous kind of grounding resistance according without and used trench method is fulfilled salt and charcoal that is depended on parallel rod electrode having the length of 0.5m. From result of measurement without Trench Methode, degradation of grounding resistance by 2, 3, and 4 parallel electrode equal to 46,13%, 63,75%, and 72,93%. While from result of calculation, there are degradation equal to 50%, 66,69%, and 74,98%. After Trench Methode with addition of salt and charcoal, degradation of grounding resistance from result of measurement equal to 85%, 88,81% and 91,97%. While from result of calculation got degradation equal to 85,96%, 90,67%, and 92,99%. The resulted of measurement agree with IEEE Standard 141-1993. This standard shows that the decrement of grounding resistance of one ground rod with chemical treatment will be in the range of 15% up to 90%.

**Key words** : trench methode, grounding resistance, parallel rod electrode

### I. INTRODUCTION

Grounding system has't used when energy system stills has little capacity size (until year 1910). this matter can caused by at that moment if there are any disturbance to the ground in system, and where does disturbance current magnitude same or less than 5 ampere (hutaaruk, 1991), so in condition such fire arch extinguished by itself.

Along with electricity load development then will increase to causes electric power system develop too like theirs fed and voltage so that fault current that flow to the ground will bigger and fire arch that appear can not extinguished self. this matter cause very high transient voltage so that very dangerous for system, therefore, very be need plan a system that can overcome disturbance. system then known with grounding system.

One of the grounding system was done by plant ground rod electrode that functioned to decrease grounding resistance. Grounding resistance that fulfil standard safe is maked to anticipate disturbance. Grounding resistance must be small value so that can flow fault current well to the ground. Grounding resistance with ground rod electrode very depending of kind, condition, size with grounding electrode location.

To get lower kind of lower soil resistance , often tried with change soil chemical composition. some ways often done with give salts in soil near grounding electrode, give water or wet soil, or give special treatment with gives ingredient or certain materials among others natrium chloride, sulphate magnesium, chloride calcium, bentonite, and charcoal. Based on IEEE standart 141-1993 declare to decrease grounding resistance value can be done with change soil chemical composition revolves 15% up to 90%.



Grounding Resistance have value as small as possible so that can flow fault better to the ground. Grounding Resistance with electrode of rod very depended to type, condition, size measure and also the way of location electrode.(Eduful, Cole, & Okyere, 2009; IEEE 81, 2012; Khan, Qureshi, Malik, & Pazheri, 2011; Rio & Bambang, 2014).

To get lower resistivity especially for land with high ground resistance, often tried by change ground chemical composition. (Al-Ammar, Khan, Malik, & Wani, 2010; Eduful et al., 2009; Hu et al., 2012; Khan, Malik, Qureshi, & Pazheri, 2010; Zhaosheng, Cheng, Zhongyi, Zhenhua, & Yanxin, 2011).

Giving bentonite to circle trench method in certain depth with outside radius variation and bentonite trench depth, electrode depth, and radius in constant was got decrease grounding resistance (Harnoko, 2003)

Herman (2006) declare to a size mass economical bentonite, in certain soil resistance, with diameter 18.8 mm, radius in 0.23 m, radius outside 0.83 m with depth trench bentonite 0.2 m and long electrode 1 m would get depreciation maximal grounding resistance.

In this research is effort to reduces grounding resistance was done with deep to plant ground rod electrode and change soil chemical composition with bentonite, method that used to reduce value grounding resistance a ground rod electrode by using circle trench method. in this research is called with circle trench method because trench geometry that is made formed full circle, with give bentonite at around trench. Analysis varians two directions applied to prove there or not influence change high trench bentonite towards grounding resistance.

### **Grounding Resistance**

Grounding system is protection system fault current that can cause gradien voltage between devices, device with soil and also gradien voltage in itself soil surface. In big system haven't grounding system for example in system delta, fault current at electric power system is relative big (>5 ampere) so that electricity arch can not extinguished self that cause the happening of soil arch, in system have grounding system phenomenon can be minimized, besides with grounding syatem at a power system can limit voltage in fasa well so grounding system is of the key factor in protection electric power system.

### **Ground Rod Electrode**

Ground rod electrode is conductor that planted in soil and make direct contact with soil. Purpose Direct contact conduct can flow current as well possible if havent fault so that current can be flow to the ground.

A Resistance ground rod electrode planted soil surface vertical (Hutauruk, 1991)

$$R_p = \frac{\rho}{2\pi L} \ln\left(\frac{4L}{a} - 1\right) \text{ (for } L \gg a \text{)} \dots\dots (1)$$



with

$R_p$  = grounding resistance ( $\Omega$ )

$\rho$  = resistivity soil ( $\Omega\text{m}$ )

$a$  = radius electrode (m)

$L$  = Electrode depth (m)

Formula (1) is used to determine grounding resistance value with opinion that soil resistivity value at place uniform measurement.

### Soil Resistivity

Balance factor between grounding resistance and capacitance at around it is soil resistivity that represented with  $\rho$ . Resistivity value in limited depth region is not same. Several factors that influence resistivity of soil that is:

- soil structure condition among like the geology structure are loamy, marshland, stony soil, sandy soil, peat soil and extra.
- chemical element that implied in soil, like salt, metal, and another minerals.
- climate conditon, wet or dry.
- soil temperature and soil kind

Soil resistivity value varies depend on soil composition likes included in Table 1 (Pijpaert, 1999).

**Tabel 1** Soil Resistivity Value

Kind of soil	Soil Resistivity ( $\Omega\text{-m}$ )
swamp	10 – 40
clay dan farmste	20 – 100
wet sand	50 – 200
wet gravel	200 – 300
dry sand/gravel	<10000
stony soil	2000 – 3000
sea water dan fresh water	10 – 100

### Soil Resistivity Measurement

Soil resistivity measurement usually done with three-point methode. for example there three ground rod electrode with rod 1 the resistance wants to measured and rod 2 and 3 as ground rod assistant also not yet known the resistance, like in figure 1. Resistance of ground rod 1 can be made:

$$R_{12} + R_{13} - R_{23} = 0 \dots\dots\dots (2)$$

with

$R_{12}$  = electrode resistance 1 and 2

$R_{13}$  = electrode resistance 1 and 2

$R_{23}$  = electrode resistance 2 and 3

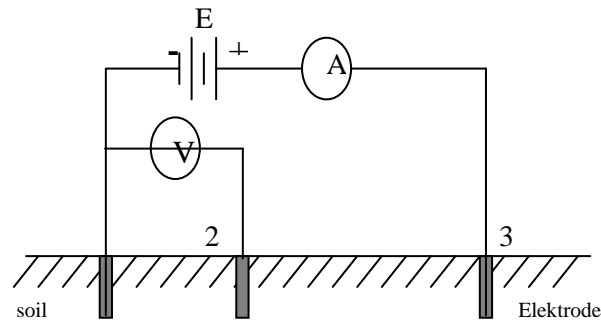


Figure 1. Soil Resistivity Measurement series with Three Point Method Salt and Charcoal for Grounding Resistance Reduction

a. Salt

In general there is two type land;ground type that is bargaining and briny , when is briny making of grounding will far easier because salt content in it, where itself salt represent media conductor of good electrics but the nature of other is corrosive. Its meaning that the salt content easy to make any metal is broken.

b. Charcoal

Treatment of chemistry to land felt cheap and compatible applied as resolving solution to land with high resistivity. The metode is conducted by giving materials of reduction, is used charcoal to low ground resitivitas. Nature of absorbent charcoal of damp water from the air, later then discharging it at condition of dry, so that making it function as regulator of good dampness.

**Grounding Resistance with Trench Methode**

For the equation of electrode resistance which around filled with charcoal and salt can be expressed with the following formula is based to standard of IEEE ( Roy B. Carpenter, Jr, 2007 :

$$R_b = \frac{1}{2\pi L} \left( \rho \left( \ln \frac{8L}{D_b} - 1 \right) + \rho_b \left( \ln \frac{8L}{d} - 1 \right) - \rho_b \left( \ln \frac{8L}{D_b} - 1 \right) \right) \dots (3)$$

with

$R_b$  = Grounding Resistance with ( $\Omega$ )

$\rho_b$  = Low Material Resistivity ( $\Omega m$ )

$\rho$  = Ground resistivity ( $\Omega m$ )

$D_b$  = Trench diameter (m)

$d$  = electrode diameter (m)

$L$  = planted electrode length (m)

**Material and Method**

Research Material

The Material was used in this research:

1. ground rod Elektrode with long 0.5 m amount 15
2. Salt : 100 kg
3. Charcoal : 200 kg

Device that used

1. One set Earth Resistance Tester tipe 3235 JEW from buatan German that use grounding resistance measurement
2. Hammer, jumper, sack and another addition device that need.
3. scales with scale maks. 50 kg for surveyor mass bentonite measurement and digital scales to measures bentonite specific mass.

Research Methode

To get grounding resistance to location research at Imogiri, so was done step as follows:

1. This research is done at condition doesn't happen rain that is at dry season so that soil at research location in a condition dry, this done to watch over data accuracy.
2. For grounding resistance value uniform, so necessary done soil resistivity measurement around research location, then determined location genuinely has uniform soil resistivity for three ground rod locations .
3. Plant single and parallel ground rod electrode with depth 0.5 m without trench
4. Measures grounding resistance for 2, 3, and 4 parallel electrode with three points method with alliterations 5 times then taken the average. the average value be compared with grounding resistance after be used salt and charcoal .
5. Make trench for all location likes in Figure 2, trench is given salt and charcoal. So Measure grounding resistance for 2, 3, and 4 parallel rod electrode with depth 0.5 m

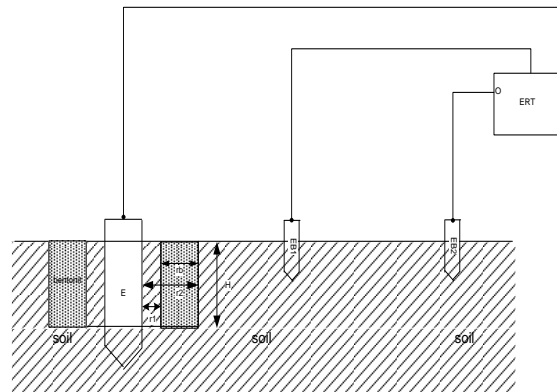


Figure 2. Grounding Resistance Measurement with Salt and Charcoal

## II. RESULT AND ANALYSIS

Measurement Result

Table 2. Grounding resistance rod electrode before Trench Methode

Amount of rod electrode	Grounding Resistance $R_p$ ( $\Omega$ ) Measurement					Average $R_p$ ( $\Omega$ )	% Degradation $R_p(\Omega)$
	1	2	3	4	5		





1	1120	1120	1120	1120	1120	1120	0,00
2	603	603	604	604	603	603,4	46,13
3	405	407	406	406	406	406	63,75
4	302	302	303	304	305	303,2	72,93

Electrode radius (a) = 3,175 mm

Depth electrode (L) = 0,5 m

Kind of soil: sand/ dry gravel

**Tabel 3.** Grounding Resistance measurement after Trench Methode

Amount of rod electrode	Grounding Resistance Rp (Ω)					Average Rp (Ω)	% Degradation Rp (Ω)
	Measurement						
	1	2	3	4	5		
1	403	403	403	404	403	403,2	64,03
2	168	169	168	168	168	168,2	85,00
3	125	125	125	126	126	125,4	88,81
4	90	90	90	90	90	90	91,97

Hb =0,5 m

rb =0,3 m

**Tabel 4.** Percentage of degradation grounding resistance

Amount of rod electrode	Average Rp (Ω) before trench methode	Average Rp (Ω) after trench methode	% Degradation Rp (Ω)
1	1120,00	403,20	64,00
2	603,40	168,20	72,12
3	406,00	125,40	69,11
4	303,20	90,00	70,32

Calculation Result

**Tabel 5.** Calculation of Grounding resistance rod electrode before Trench Methode

Amount of rod electrode	Rp (Ω)	% Degradation Rp(Ω)
1	1121,6	0,00
2	560,8	50,00
3	373,6	66,69
4	280,6	74,98

**Tabel 6.** Grounding Resistance calculation after Trench Methode

Amount of rod electrode	Rp ( $\Omega$ )	% Degradation Rp ( $\Omega$ )
1	315,4	71,86
2	157,4	85,96
3	104,6	90,67
4	78,6	92,99

**Tabel 7.** Percentage of degradation grounding resistance

Amount of rod electrode	Average Rp ( $\Omega$ ) before trench methode	Average Rp ( $\Omega$ ) after trench methode	% Degradation Rp ( $\Omega$ )
1	1121,60	315,40	71,88
2	560,80	157,40	71,93
3	373,60	104,60	72,00
4	280,60	78,60	71,99

### Analysis

Based of data result of measurement and calculation of grounding resistance value ( Rp), effect of influence of change of electrode amount before and after making of grounding resistance value will smaller if parallel amount of electrode also increase.

Comparison of measurement result and result calculation of parallel and single rod electrode land, before and after trench methode show there are difference between result of calculation and measurement. Difference of result because of grounding resistance influenced by materials of reduction salt and charcoal, cause of difference of result also earn because of difference of compound content which there are in salt and charcoal, from theory, explain that materials of reduction in area investigation, chemical analysis have looking like, only its different just water content.

Difference of result also can be caused by difference of land, ground type, chemical element in land, ground like metal, other chemical compound and salt, influence of temperature and also influence of dampness around ground location.

### III. CONCLUSION

1. Result of measurement and calculation of grounding resistance value ( Rp), effect of influence of change of electrode amount before and after making of grounding resistance value will smaller if parallel amount of electrode also increase.
2. From result of measurement without Trench Methode, degradation of grounding resistance by 2, 3, and 4 parallel electrode equal to 46,13%, 63,75%, and 72,93%. While from result of calculation, there are degradation equal to 50%, 66,69%, and 74,98%. After Trench Methode with addition of salt and charcoal, degradation of grounding resistance from result of measurement equal to 85%,



88,81% and 91,97%. While from result of calculation got degradation equal to 85,96%, 90,67%, and 92,99%.

### **Recomendation**

This research was done at dry season at soil condition really dry. This aim for accurate data

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EI-05-030

**THE EVALUATION OF LEARNING DEVICE IN THE EFFORT OF IMPROVING  
LEARNING QUALITY OF MATHEMATICS IN UNDERGRADUATE EDUCATION  
OF BUILDING ENGINEERING DEPARTMENT OF CIVIL ENGINEERING  
FACULTY OF ENGINEERING STATE UNIVERSITY OF SURABAYA**

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**ABSTRACT** : *The quality of learning can be defined operationally as the intensity of systemic linkages and synergy of teachers, undergraduate students, curriculum and teaching materials, media, facilities, and learning system in the producing process and optimal learning results in accordance with curricular demands. The quality or the quality of an education must be improved in the human resources, material resources, the quality of teaching, the quality of graduates and so on. In associated with improving the quality of learning, an evaluation is needed for evaluating the availability and quality of the learning device of Mathematics Subjects at the Department of Civil Engineering, Faculty of Engineering, State University of Surabaya. The evaluation was done through document analysis and observation in the course of learning by two colleagues who are expert in their field. The analysis conducted on Syllabus documents, SAP and Teaching Materials. The teaching materials were in the Textbook. While the observation was made during the learning media assessment, which is done during the lectures take place in the classroom. The results of the evaluation were assessed using a Likert scale (1-4), then was presented in the form of a percentage. The results showed the availability category and quality of the learning device Mathematics Subjects classed as 'high', with the explanation that the availability of Applied Learning Device only reached 66.9%, with details of: (1) Syllabus 77.27%, (2) SAP 71.30 %, (3) Textbook 67.5%, and (4) Learning Media 52.8%. The Availability Device of learning is still far from 100%, so that in each of the learning device needs to be enhanced by using Mathematics Course. The quality of the learning device Mathematics course only reached 67.67%, with details: Syllabus 78.41% (1), (2) SAP 72.69%, (3) Textbook 67.5%, and (4) Learning Media 52.08%. The quality of learning devices, despite being more than 50%, but still needs improvements in these devices in order to improve the learning objectives.*

**Keywords:** *analysis of documents, observation, evaluation, learning devices, Mathematics*

## **I. PRELIMINARY**

As course that is generating Prospective Vocational Building Engineering Competent Teachers, therefore undergraduate students in the Program SI Technical Education Building Department of Civil Engineering, Faculty of Engineering, State University of Surabaya (Prodi SI PTB JTS FT Unesa) are expected to have knowledge and skills who are professionals. The expertise subject which is in Prodi PTB is based on mathematics, especially the courses containing the count, namely Mechanic Engineering, Measure Soil Science, Soil Mechanics, Hydrology, Engineering Mechanics and many other subjects that require some measure of mathematics.

Assuming that the mastery learning (competence) of undergraduate students required minimal acquire Value B (66.00), based on the data of undergraduate students result SI PTB in the last three years from 2012 to 2014 showed that mastery learning undergraduate students in the subject of Mathematics yet achieve the expected standards. Acquisition of learning results getting value E (6.16%), the value of D (20.05%), the value of C (49.6%), the value of B (26.9%) and the value of A (6.31%). It means that the competency or mastery learning undergraduate students have not achieved in accordance with a standardized, because only (33.21%) who obtain a minimum grade B.



As it fact, can be a challenge for teachers to make increasing effort to the undergraduate students' competency. The Reflection results of Teachers, lack achievement of learning objectives is caused by various factors in terms of the limited resources available, both from undergraduate students and professors as teachers. Thus, it is necessary to study in more depth about the availability and quality of learning devices that have been used are: Syllabus, SAP, Teaching Materials and Media Learning on Course MATH APPLIED I through a study titled "*The Evaluation of Learning Device in the Effort of Improving Learning Quality of Mathematics in Undergraduate Education of Building Engineering Department of Civil Engineering Faculty of Engineering State University Of Surabaya*"

So expect the results of the mathematical lectures will be more optimal, and can help undergraduate students to facilitate the division courses that require basic math.

## **II. OBJECTIVES AND BENEFITS**

### **A. Objective Research**

The goals of this research is,

To evaluate the quality of learning devices that includes Syllabus, SAP, Teaching Materials and Learning Media in Mathematics Course in **Undergraduate Education of Building Engineering Department of Civil Engineering Faculty of Engineering State University Of Surabaya.**

### **B. Benefits**

- For the lecturer, can determine the availability and quality of Math Learning device Subjects that have been used.
- For undergraduate students, it can improve undergraduate students learning outcomes in order to achieve the competency in Mathematics Subject.
- For an institution, as an input for the evaluation of learning courses.

## **III. RESEARCH METHODS**

This research is descriptive research that will provide an overview of the availability and quality of Applied Mathematics I Learning Course in Undergraduate Education of Building Engineering. The collecting data through observation learning device was used by the lecturer during lectures conducted. The observations were made by two observers from peers. The instrument that is used in this study is *a check list of device availability of learning and observation sheet quality assessment learning device (GBPP, SAP, Teaching Materials and Learning Media).*

The data analysis was conducted both quantitatively and qualitatively. In quantitative data, the analysis is using descriptive statistics such as average value. Whereas qualitative data analysis is done by providing a description of the existing data by linking results that have been obtained accompanying the theories that have been discussed. Steps in data analysis:

1. Instruments that have been filled by the observer 1 and observer 2 sought the average score.

2. Wanted standard deviation formula,  $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$
3. The next category of availability and quality of the measurement results can be seen in Table 1. The following below,

**Table 1.** Categorization availability or interests of students

No.	Score	Category Availability and Quality
1	$x \geq \bar{x} + 1.SB_x$	Very positive / very high
2	$\bar{x} + 1.SB_x > x \geq \bar{x}$	High / positive
3	$\bar{x} > x \geq \bar{x} - 1.SB_x$	Negative / low
4	$x < \bar{x} - 1.SB_x$	Very negative / low

Source: Mardapi, D (20

#### IV. Results and Discussion

##### A. Research Results

##### A1. Syllabus

The results of Applied Mathematics I Course Syllabus Assessment were carried out by two people. A peer through the analysis of existing documents can be seen in the table below,

**Table 2.** The Results of Course Syllabus Applied Mathematics I Assessment

No.	Assessment Aspects	Appraisal		
		Completeness Score	Quality Score	Average
<b>A</b>	<b>Syllabus</b>			
1	Identity	4	4	4
	<b>Indicator</b>			
2	Cognitive-Products	4	4	4
3	Cognitive-Process	2	2	2
4	Psychomotor	3	3	3
5	Affective-Character	1.5	1.5	1.5
6	Affective-Social Skills	2	2	2
7	The learning experience	3	3	3
8	Subject matter	4	4	4
9	Appraisal	2.5	3	2.75
10	Time Allocation	4	4	4
11	Learning Resources	4	4	4
	<b>Total</b>	<b>34</b>	<b>34.5</b>	<b>34.25</b>
	<b>Average</b>	<b>3:10</b>	<b>3:12</b>	<b>3:11</b>

Based on the above can be seen in Table 2. The average yield of Applied Mathematics Syllabus I assessment through the analysis of the document in terms of completeness gained 3.1, or



77.27%. While the quality score gained 3.12, or 77.41% of the maximum score. With referred to the *Likert scale* (1-4), based on the availability and k Quality of Syllabus is a category that still relatively 'high'. However, if observed per section still has a lot to be improved on Applied Mathematics Syllabus I. That is especially on the value of less than 3, namely Cognitive-process, Affective-Character, Social and Affective-Skills and Assessment factor.

These elements do not seem that even when the quality is still not good. Furthermore, it needs to be observed and corrected for subsequent development of kindness.

## A2. Unit Events Class (SAP)

The SAP Course assessment results Applied Mathematics I, carried out by two people peer through the analysis of the document. The result can be seen below,

**Table 3.** The SAP Courses Applied Mathematics Assessments

No.	Assessment Aspects	Appraisal		
		Completeness Score	Quality Score	Average
<b>B</b>	<b>SAP</b>			
1	Identity	4	4	4
2	SK	4	4	4
3	KD	4	4	4
	<b>Indicator</b>			
4	Cognitive-Products	3.5	3.5	3.5
5	Cognitive-Process	2	2	2
6	Psychomotor	2	2	2
7	Affective-Character	1.5	1.5	1.5
8	Affective-Social Skills	2	2	2
	<b>Aim</b>			
9	Cognitive-Products	3.5	3	3:25
10	Cognitive-Process	1	0	0.5
11	Psychomotor	2	2	2
12	Affective-Character	1.5	1.5	1.5
13	Affective-Social Skills	2	2	2
14	Teaching Materials	2.5	3.5	1.5
15	Learning Model	2.5	4	2
16	Learning Methods	3.5	3	3
	<b>Learning steps</b>			
17	Opening	4	4	3:25
18	Core	3.5	3.5	3:25
19	Cover	4	4	4



No.	Assessment Aspects	Appraisal		
		Completeness Score	Quality Score	Average
	<b>If Course Theory</b>			
20	LKS	3	3.5	3:25
	<b>Assessments (LP)</b>			
21	LP Konigtif	1	3	2
22	LP Affective	1	3	2
23	LP Psychomotor	1	3	2
24	Learning Resources	4	4	4
25	Learning Media	3	4	3.5
26	Time Allocation	4	4	4
27	Module	3	4	3.75
	<b>Total</b>	<b>77</b>	<b>78.5</b>	<b>77.75</b>
	<b>Average</b>	<b>2.85</b>	<b>2.91</b>	<b>2.88</b>

Based on the results of the assessment obtained, can be seen in Table 3 above, that is from 27 aspects assessed, completeness for SAP substance in the course of Applied Mathematics I only reached 2.85, or 71.30% of the maximum score. The assessment in terms of quality reaches 2.91 or 72.69%. With reference to Likert scale (1-4), it was concluded that the results of an assessment of the availability and quality of SAP courses Applied Mathematics I is 3.90. The value category is still relatively 'high'. Nevertheless they should be improvements and additions to the aspects that contained in SAP to improve the quality of learning in the classroom. The feedback is given by peers as a team of experts are:

(1) indicators and objectives need to be distinguished in each category, (2) the need for additional methods, (3) added a LKS key, (4) LP needs to be repaired and needs to LP key.

### A3. Learning Materials

Learning materials for the course Applied Mathematics Textbook packaged in the book. By holding textbook is intended to facilitate undergraduate students attend math lectures. The assessment of quality textbook is used by a team of experts from *MIPA* as many as two persons. The recapitulation of textbook assessment can be seen in the following table below,

**Table 4.** The result of Format Textbook Writing Course Applied Mathematics I assessment

No.	Assessment Aspect	Appraisal		
		Completeness Score	Quality Score	Average
<b>C</b>	<b>Textbooks</b>			
	<b>Format</b>			
1	Preface	3.5	3.5	3.5



	2	Textbook Guidance	1	1	1
	3	Course description	1	1	1
	4	Table of Contents / Table / Image	2	2	2
	5	Sample questions and exercises	2.5	3	2.75
		<b>substance</b>			
	6	Use of Languages	3.5	3.5	3.5
	7	Breadth of Coverage	3.5	3.5	3.5
	8	Description clarity (legibility)	4	4	4
	9	The use of illustrations	3	3	3
	10	Latest referral	2.5	2.5	2.5
		<b>Total</b>	<b>26.5</b>	<b>27</b>	<b>26.75</b>
		<b>Average</b>	<b>2,65</b>	<b>2.7</b>	<b>2,675</b>

Based on assessment data on textbook writing format of completeness score obtained average 2.65 or 66.25% of the maximum score. In terms of the quality of the writing format is obtained by an average of 2.7 or 67.50%. With reference to the *Likert* scale (1-4), according to the results of its assessment of textbook writing format of the availability or quality aspect is 3.73, which is higher category. That is to be considered as a textbook format, it has to improve and develop in appropriate rules that set out in terms of writing textbook requirements.

The expert team suggestion is for improving textbooks, among others: (1) Figures must be equipped with images, (2) need to complete courses description and textbooks guidance, (3) exercises need to be supplemented equipped with question key (4) Reference is taken  $\leq 5$  years of renewal, (5) add index and glossary.

#### A4. Instructional Media

Instructional media that used in the course of Applied Mathematics I use powerpoint. The assessment of the availability or quality score based on the assessment of two observers can be seen in the following table,

**Table 5.** The Assessment of Learning Media Courses Applied Mathematics I

No.	Assessment Aspects	Appraisal		
		Completeness Score	Quality Score	Average
<b>D</b>	<b>Instructional Media</b>			
	<b>Indicator</b>			
1	Communicative (according to the message and acceptable)	3.5	3.5	3.5
2	Visualization of ideas (creative in the following ideas pouring in ideas)	2.5	2.5	2.5



	3	Simple and Alluring	3	3	3
	4	Audio (backsound, music)	1	1	1
	5	Visual (layout design, color)	1.5	1.5	1.5
	6	Moves Media (animations, movie)	1	1	1
		<b>Total</b>	<b>12.5</b>	<b>12.5</b>	<b>12.5</b>
		<b>Average</b>	<b>2.1</b>	<b>2.1</b>	<b>2.1</b>

The conclusion is based on an assessment of two observer is the aspect of completeness, in this case is a powerpoint scores of 2.1 or 52.08% of the maximum score. Meanwhile, from the aspect of quality get the same value. It is 2.1 or 52.28% of the maximum score. Based on the Likert scale (1-4), the value obtained is 3.15 in the category of "high", although this is still necessary to develop better in terms of completeness or quality. The feedback obtained from the observer, mathematics media needs to be made more attractive to include sound and animation. The aim of using attractive media is to attract and to make it fun. It is expected to further enhance the interest of undergraduate students that will enhance undergraduate students' motivation in learning mathematics.

## **B. Discussion**

In the course syllabus Applied Mathematics I, the results of the analysis of documents obtained based on an assessment of an expert team, based on the aspect of availability and quality aspects categorized as 'high' or 78.84% of the maximum score. But still there must be concern on several indicators for improvement of Applied Mathematics Syllabus courses I mentioned. Especially on indicators, namely: (1) cognitive processes, (2) affective Social Skills, (3) a learning experience, and (4) assessment. The feedback is given by a team of experts, to be made with the indicator of the operational sentence. Indicators of the product and the process must be separated, and the hope is raised affective indicators of character and social skills. During the learning process, the assessment should not only by questions and answers, but could be with a quiz, a kind of evaluation in the form of a written test.

The SAP component availability and quality is still no improvement because it has only reached 72% of the maximum score or worth 3.9 categorized as "high". The improvements are mainly on indicators of cognitive processes, psychomotor indicator, the affective character indicators and affective social skills. In the aim of cognitive processes, psychomotor, and affective skills and affective skills process does not yet appear clearly, moreover between indicators and aim needs to be distinguished in each category. Other SAP components that need attention is on aspects of assessment, namely the cognitive LP, affective LP and psychomotor LP has not appeared, but it is necessary to add a LP key.

Teaching material is packed in a textbook, while the assessment for the completeness of the textbook is 66.25% of the maximum score. The completeness to be added are the textbooks guidance, course descriptions and a list of tables as well as a list of images that did not exist. Whereas In terms



of the quality of the assessment from the experts team is 67.5% of the maximum score. Although not 100% for quality has included the category of 'good' because the value obtained 3.73, it indicates that the textbook is appropriate for use in the learning process. Aspects that need to be added are the exercises along with the keys in order to have more undergraduate students skilled can work on the problems. The aspects to be considered is, in the selection of literature should wear literature  $\leq 5$  years of renewal.

Learning media which was used learning course on applied mathematics I was LCD with powerpoint software. According to observations from peers, the assessment that is given is a good assessment of the availability and quality aspects are 52.08% of the maximum score. In the Likert scale (1-4), scored 3.15 is in the category of 'high' and that even though it has been worth but still needs to develop a better media to increase undergraduate students' interest in learning mathematics. If the interest increases, in automated undergraduate students' motivation to learn mathematics will increase too. Thus expected student results will be better as expected.

## **V. CONCLUSIONS AND RECOMMENDATIONS**

### **A. Conclusion**

Based on the research assessment of the learning device in the course of Applied Mathematics I, can be summarized as follows:

1. The availability in learning device Subjects Applied Mathematics I only reached 66.9%, with the details:  
Syllabus 77.27%, (2) SAP 71.30%, (3) Textbook of 66.25%, and (4) Learning Media 52.8%. Device Availability of learning is still far from 100%, so that in each of these learning devices need to be refined to provide the components - components that are required for the sake of completeness respective learning device.
2. The quality of learning devices subject Applied Mathematics I just reached 67.67%, with the details:  
Syllabus 78.41% (1), (2) SAP 72.69%, (3) Textbook of 67.5%, and (4) Learning Media 52.08%. The quality of learning devices, despite being more than 50%, but still needs improvements in these devices in order to improve quality.
3. The category of availability and quality of Applied Mathematics Lecture device is relatively "high". It has meaning that the learning device is feasible to use but still need improvement and development could improve the learning objectives for Mathematics.

### **B. Suggestion**

Based on the results of research and discussion, it is suggested that in making the learning device:

1. The Indicators need to be grouped based on the cognitive, psychomotor and affective.
2. The aim of learning that perfect should have elements of Audience (A), Behavior (B), Condition (C), and Degree (D)



3. The Sheet Assessment (LP) also need to be added the answer key

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## THE VOCATIONALISATION OF EDUCATION: SKILLS PROGRAM REVITALIZATION IN PRIMARY AND SECONDARY EDUCATION FOR BUILDING OF EARNING GENERATION

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**ABSTRACT :** *The purpose of this paper is to identify the skills reinforcement program, for Indonesian workers as an alternative solution in the face of global competition. The method used is the study of literature related to employment and vocational education. According to the Central Statistics Agency (BPS), a low dependency ratio would occur in 2030 which amounted to 46.8% with the proportion of people who are not productive and are considered productive population reached the lowest number or the productive age population is abundant. So it can be used as capital basis for an increase in the labor capacity and productivity to support economic growth in Indonesia. The fact showed that the age profile of productive labor in Indonesia is currently dominated by graduates of primary and junior secondary education (64.6%) and senior high school graduates (16.0%) or a total of 80.6%. In general, they are very little given the knowledge, attitudes and skills to work, but they were forced to deal with the world of work that may be incompatible with the provision of skills acquired during formal schooling. They will be faced with many risks among others, a mismatch of work, low productivity, lack of competitiveness, lack of opportunities for development, and the low wages received. These issues will become increasingly critical as the Indonesian nation is bound by the various free trade agreements including the Asean Economic Community (AEC). Therefore, is needed an efforts breakthrough against employment issues through various alternative solutions, among others through the vocationalisation of education as a form of re-actualization of skills programs in primary and secondary education.*

**Keywords:** *employment, vocational education, vocationalisation of education*

### I. PREFACE

*This paper is partly taken from scientific papers when the inaugural authors as Professor at the Universitas Negeri Jakarta.*

The problems and challenges faced by Indonesia in order to increase human resource capacity through education and training is the ASEAN Economic Community (AEC) as a form of implementation of the agreement of the ASEAN Free Trade Area (AFTA) which was signed on January 28, 1992. The purpose of the MEA is to accelerate economic growth, social progress and cultural development among ASEAN countries. In the MEA, there are four important things that are called as the main pillars for building of the MEA, namely ASEAN as, (1) a single market and production base internationally, (2) the region with high economic competitiveness, (3) a region with economic development evenly, and (4) a region fully integrated into the global economy (Apindo, 2015). Slowly but surely there will be free flow of goods, free flow of services, free flow of investment, free flow of capital, and free flow of professionals and skilled labor from and to countries that are members of ASEAN. That means there will be the competition is very tight in many sectors including education, in particular competition for education and training graduates to find and get a job. If the Indonesian nation is determined to be able to compete in the competition arena, then we

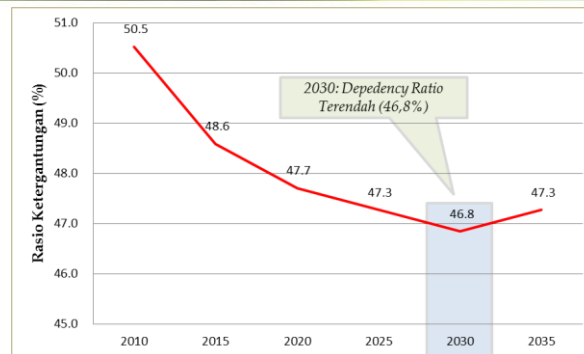


have to produce graduates who have the education and training with high adaptability and adapt to dynamic changes in employment situation as a result of the progress of science and technology.

As an illustration of Indonesia's position in global competition, it can be seen through the global competitiveness index and the human development index. According to the Global Competitiveness Index (GCI) issued by the World Economic Forum in 2014, the position of Indonesia is ranked 34<sup>th</sup> out of 144 countries assessed by 12 pillars, including a pillar of education and workforce trained and skilled. The position was below from Singapore (2<sup>nd</sup>), Malaysia (20<sup>th</sup>), and Thailand (3<sup>st</sup>). Indonesia's position at the top of the Philippines, Vietnam, Lao PDR, Cambodia, and Myanmar. Indonesia included in the category State Phase-2 (efficiency-driven of development) which is the stage where an increase in competitiveness, productivity, and employee wages (WEC, 2014). Moreover, the report of the United Nations Development Programme (UNDP) in 2014 related to the Human Development Index (HDI), placing Indonesia ranks 108<sup>th</sup> among 187 countries assessed by three dimensions of human development, namely life expectancy, access to education, and standard a decent life. Indonesia's position is under from Singapore (9<sup>th</sup>), Brunei Darussalam (30<sup>th</sup>), Malaysia (62<sup>nd</sup>), and Thailand (89<sup>th</sup>). While the next position after Indonesia, in order are Philippines, Vietnam, Cambodia, Lao PDR, and Myanmar (UNDP, 2014)

At this time the opportunity arose discourse on the demographic bonus, in the discourse of the population in Indonesia. Demographic dividend refers to the understanding of a decline in the numbers of dependence (dependency ratio), with the increase in the working age population, ie, the proportion of people who are not productive and are considered productive population, reaching its lowest dependency. Dependency ratio is calculated from the number of non-productive age population (0-14 years and 65 years and above) compared to the productive age (15-64 years). It can be advantageous, because at the moment there are abundant population of productive age, can be used as the basis for the capital increase of capacity and labor productivity to support economic growth.

According to the Central Statistic Bureau (BPS), the number of low dependency will occur in 2030 amounted to 46.8%, as shown in Figure 1. However, it should be realized that chances of the demographic bonus is not automatically going to contribute to economic growth, if the productive age population do not have adequate education and skills (Suyono, 2014). Projected population of productive age, increasing from year to year, and the peak occurred in 2030 amounted to 68.1%. BPS projected that Indonesia's population in 2030 will reach about 296 million. That means the number of productive age population in 2030 to reach about 200 million. The experts reminded that if they only less educated and do not have sufficient skills for a productive business, the demographic bonus will not happen. However, it will happen instead into the explosion of social problems, such as high unemployment because not many available new workplaces for graduates, increasing food needs are not comparable to its availability, and lead to increased potential for social conflict. Therefore, the question that arises is, what and how to attempt a breakthrough that could provide an alternative solution to the problem of employment in order to face global competition?



Source: Adapted from BPS, 2013

Figure 1. Trend of Dependency Ratio 2010-2035

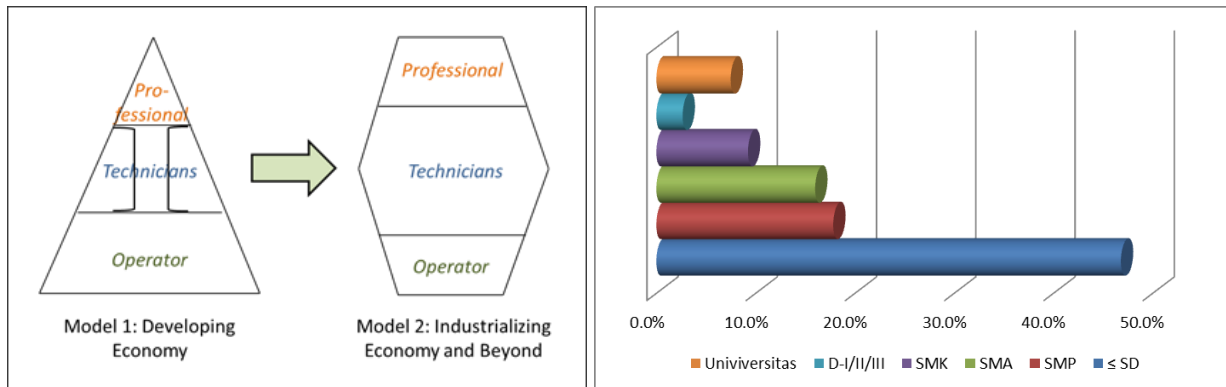
## I. CHALLENGES OF LABOR IN INDONESIA

Ideally, developing countries have employment ratios of 1: 5: 25 between the positions of experts/professionals as compared to the technician/analyst and operator. To reach developed country-based industries with high economic growth should be supported by knowledge workers, especially in the post of technician/analyst (ADB, 2004). For this reason, the structure of the productive labor force, mainly technician/analyst should be more than the other positions, as illustrated in Figure 2. What about the labor structure in Indonesia today? Until February 2014, the employment is still dominated by labor with low education as shown in Figure 3.

Employment data today showed that primary school graduates, approximately 55.31 million (46.8%), junior high school graduates, approximately 21.06 million (17.8%), high school graduates, 29.82 million (25.2 %), consisting of secondary School 18.91 million (16.0%) and secondary vocational schools 10.91 million (9.2%). Meanwhile, a highly educated workforce as much as 11.98 million (10.1%) consists of 3.13 million (2.6%) Diploma, and the remaining 8.85 million (7.5%) University education (BPS, 2014 ). The data shows that in the world of work in Indonesia, the educational background of labor is still relatively low. To encourage increased productivity in various sectors of employment and provide support to Indonesia's economic growth, especially in the era of free trade like today, it is necessary to increase the educational qualifications of labor, especially the technician/analyst.

In fact that the profile of labor productive age in Indonesia is still dominated by basic education graduates (64.6%) and partly of high school graduates (16.0%) with a total of 80.6%. In general, they are very few equipped with the knowledge, attitudes and skills specifically for work (life skills). But with the emergency situation, they have to deal with the world of work that may be incompatible with the provision of knowledge, attitudes and skills acquired during the school. With such conditions, of course many possible risks that must be faced, from a mismatch of work, low productivity, lack of competitiveness, lack of opportunities for development, to the low wages received. These issues will become increasingly critical time of the Indonesian nation is bound by various free trade agreements, including the Asean Economic Community (AEC). Therefore, appropriate efforts are needed to face and solve the problem through careful planning and commitment, and the support of all parties

concerned. Countries Indonesia requires the ratio of educated and skilled labor (knowledge and skilled worker) is ideal to support increased productivity and competitiveness in order to support economic growth in the future. However, by looking at the existing workforce condition, it is necessary breakthrough that could provide an alternative solution to the problem of current employment. In the field of education and training, alternative opportunities that can be done is through reactualization, skills program in elementary and secondary education.



**Figure 2.** Structure Model of Labor (Source: ADB, 2004)

**Figure 3.** Workers and Their Educational Background (Source: BPS, 2014)

## II. THE VOCATIONALIZATION OF EDUCATION

Richard Pring (1994), a professor of education at the University of Winchester, England, said "Education is Essentially a preparation for life, and life must be seen in basically economic terms, namely, the employability of young people and the enhanced economic welfare of the nation." The statement gives meaning that in principle knowledge, attitudes, and skills are provided in the educational process is the provision of students to enter the workforce as well as an effort to support the capacity and productivity of work. The result of productive work will increase the contribution to the welfare of individuals and communities, which in turn can support the country's economic growth. Thus, education and the world of work should be a unified whole, support each other and strengthen each other for the purpose of increasing the nation's economy and competitiveness. In a meeting of the World Education Forum, organized by Unesco in April 2000 in Dakar, Senegal, the delegation is committed to supporting the achievement of goals and objectives of Education For All (EFA), for every citizen and society, known as the Dakar Framework for Action. One of the commitments written in item 3 is "ensuring that the learning needs of all young people and adults are met through equitable access to Appropriate learning and life skills Programmes." It refers to the effort to provide access to learning programs and the provision of life skills for all learners at every level of education without exception, as an attempt to give recognition and appreciation of the world of work.

The vocationalization of education is an effort to encourage awareness of learners, especially in the nature of academic education into the world of work through the introduction of practical subjects or vocational training. The main purpose of the vocationalization of education is to improve the relevance of graduates and the world of work needs (Lauglo, 2004). In addition, the vocationalization





of education also intended to instill understanding, knowledge, attitudes and basic skills in science and technology gradually to develop the capacity of learners. Implications of the vocationalization of education expected to support improving the local economy through the role of human resources and competitive production oriented.

Meanwhile, Kelly and Prince (2009) states that the programs that are vocational, in the school curriculum can also create a more inclusive environment for students who are economically disadvantaged. In the vocationalization of education, learning processes and outcomes still refer to the academic curriculum, but the curriculum material inserted vocational fields or vocational-oriented practices, or productive work, as a small part of the subject matter of the school (Louglo, 2004). It was also in line with the principles of vocational education, namely as: (1) an integral part of general education; (2) the means to prepare learners to participate effectively in the world of work; (3) aspects of lifelong learning and a preparation for responsible citizenship; (4) tool to promote environmentally sustainable development; and (5) method of facilitating poverty alleviation (UNESCO, 2001).

The program of the basic introduction to science and technology, attitude and appreciation of the work, as well as the culture of the world of work is a form of initiation of vocationalization of education. It should be a priority component that must be acquired learners gradually ranging from basic education to secondary education. This initiation should be a concern of making changes in the field of education as an effort to focus the national education policy, particularly with respect to improving the quality and access of education to face global competition. The framework of strategy planning of the Ministry of Education and Culture (2015-2019), stated that the focus of the policy is based on accelerating the improvement of quality and access to face global competition with the appreciation of diversity, strengthening good practice and innovation (MOEC, 2015).

Furthermore, debriefing skills, attitudes in the work, and the introduction of an adequate job, can be an important and necessary element in the development of educational curriculum. Education should be organized using a more functional approach to capacity development, so that learners can think and actively participate in productive activities (Louglo and Lillis, 1988; Lauglo, 2004; Maclean and Pavlova, 2013). For this reason, educational programme of skills in general education, need to be reinforced through the process of re-actualization, with programs in addition to providing an understanding and ability in technical fields (hard skills)), also provided supplies the ability to solve problems, think alternatif, and able to perform evaluation of the results of his own work (academic skills), as well as having good interpersonal (soft skills) are balanced. To develop the knowledge, attitudes, and skills are balanced for a graduate education, especially in academic education, the skills program should provide an atmosphere that encourages third above capabilities internalized into the self-learners. Skills programs in science and technology have characteristics that correspond to these criteria, namely (1) to provide reinforcement against logical thinking, critical and innovative through design and manufacture of simple products of science and technology; (2) improve the technical



capabilities through the study, use, and troubleshooting of science and technology; and (3) build social awareness and responsibility through teamwork in the learning process.

The implementation of programme of skills in the field of science and technology, which has been running and become a pioneer in primary education, especially in secondary schools, namely basic technology education (PTD). PTD give provisions on the process and knowledge in the field of technology needed to solve the problem in the community and increase the capacity of self-learners. There are three main reasons for the need of learning related to technology in schools, namely (1) preparation to play a role in the society of the future, which is full of various kinds of equipment technology in everyday life; (2) an orientation toward the future of education and work as a provision for choosing further education; and (3) in accordance with the purpose of learning the basic technology, particularly to developing problem-solving in the context of real life through student centered learning approach / action oriented learning (Dit. PSMP, 2009).

The results of the implementation of basic technology education in the junior high school, concluded that learners have the ability to pre-vocational, including being able to use work equipment, such as hand tools and simple machines, performing simple measurements, select materials, and able to make the results of alternative technologies simple one. Learning outcomes more invisible (intangible), but it is important the individual learner is the establishment attitude and interpersonal behavior in the form of mutual aid, cooperation, involvement and active participation problem solving, persistence and curiosity in investigation activities, understand the process and working principle technology, as well as the impact of technology on humans (Thamrin, 2007). In an effort to address the development of the world of work, required painstaking efforts primarily related to the preparation of well-educated human resources in order to be able to think productively. The programme of skills, as well as the basic technology education can provide initial supplies orientation, introduction, and the basics of understanding and ability to work, so that it can create a broad pattern of thinking, including how to produce the products in a simple form. Thus, the necessary adjustments to the shape, type, and level of skill learning charge against the age of learners and education levels. Space to implement literacy programs have been facilitated through the structure of the school curriculum, both in Curriculum 2006 (KTSP), as well as on the Curriculum 2013 (K-13). Skills programs at all levels needs to be made clear category with the age and development of learners carefully, so as not to give the impression that the basic education graduates prepared to work. Indeed, all the school-age population should be encouraged to move on to the next education level, for the purpose of Universal Secondary Education program (PMU), which is endorsed by the Ministry of Education and Culture was successful and increased the Gross Enrolment Ratio (GER) in secondary education.

In other words, all the school-age population or those who do not get the chance schools, can pursue and complete secondary education. However, we also can not deny the fact that some of them are not able to proceed to further education caused by many factors. For this reason, educational



institutions need to re-actualization skills program at every level of education, in order to prepare students to have the knowledge, understanding, and the provision of basic work of skills, and more importantly is the learners have a productive mindset. Meanwhile, on the side of keduniakerjaan require workers with soft skills in order to increase their competitiveness. The world of work and industry requires a workforce that is not only able to work in the fields practiced, but also need workers who have the attitude, skills and adaptability to climate bekerja. Karakteristik work and structure of the industry is changing rapidly with the progress and development of science and technology.

Structural changes in the industry is also changing the labor structure and create a knowledgeable workforce. Wilson in Bakar (2011) defines a knowledgeable workforce are those who think using logic-abstract to diagnose problems, propose solutions problem solving, and design and implement a plan solution. Currently, workers are not only required to perform their jobs well on a particular area of work, but also must be able to sustain jobs and improve the quality of their work in order to compete in society. Some results of studies in many countries concluded that the world's environmental work, including the industrial sector, services and trade requires a workforce that not only have the technical skills associated with a particular line of work, but to prioritize the strengthening of employability skills to support the sustainability of jobs and anticipate the dynamic changes the world of work (Fuel & Hanafi, 2007; Rasul, MS et. all, 2009; Shafie, LA, 2010; Suarta 2011; Murgor, TK, 2013).

### **III. CONCLUSION**

Prof. Rupert MacLean (2009), a former director of the International Center for TVET, Unesco, warned that "we are not living in an era of change, but in a change of eras." Education is expected to be the key to breaking the cycle of poverty, sustainable development and peace. In an effort to achieve national education goals and the strategy required the strengthening of programs to address the fundamental issue, namely the preparation of human resources, which is able to adapt to situations of rapid change and dynamic face of increasingly tough competition.

Based on data from the Indonesian labor educational qualifications, the revitalization program of skills in primary education and secondary education becomes very important. The aim is to give basic skills in science and technology in accordance with the age and level of education of students, in order to have sufficient initial provision for continuing education. In addition, the strengthening and the provision of basic skills, can encourage students to think and work-oriented productive and as a preliminary preparation work in the community, if the students can not to continue their education.

On the other hand, with the rapid of technological development and climate change will implications to the demands of the labor requirements. In addition to technical skills and knowledge, the world of work is also prioritizing employability skills to be able to guarantee the continuity of the work processes and produce high quality products in order to increase their competitiveness. The



vocationalization of education is expected to pay close attention to sincerely towards strengthening employability skills in the learning process in order to produce graduates who have a balance between the technical skills of certain occupations standards-compliant, high-thinking skills, and have good individual quality. For all that, need an understanding of all stakeholders in the educational environment, especially in primary and secondary education to organize basic skills program in science and technology and embed employability skills to prepare a productive generation for a better future.

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## EFFECT OF FLUIDIZATION RATIO ON THE PERFORMANCE OF AN INTERNALLY CIRCULATING AERATED FLUIDIZED BED GASIFIER WITH CONCENTRIC CYLINDERS

*Janter Pangaduan Simanjuntak*

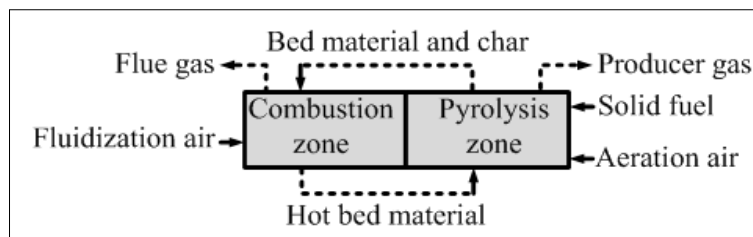
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**ABSTRACT :** Effects of fluidization ratio ( $R_Q$ ) on the bed temperature, composition and heating value (HV) of producer gas (PG) during gasification of sawdust in an internally circulating aerated fluidized bed gasifier (ICAFBG) based on the indirect heating principle with concentric cylinders were studied.  $R_Q$  which is the ratio of aeration rate in annulus ( $Q_{an}$ ) to the fluidization rate in the draft tube ( $Q_{dt}$ ) strongly affect the ICAFBG performance as it is a driving force to transport the char from gasification to the combustion zones. The char combustion in the combustor (draft tube) is the heat provider to the gasification process in the gasification zone (annulus). The results showed that by increasing  $R_Q$  resulting in increased bed material temperature, PG composition and HV. However, increase  $R_Q$  further caused temperature reduction as well as PG composition and HV. The HV could be increased from 4.52 to 6.98 MJ/m<sup>3</sup> in the  $R_Q$  ranges from 0.14 to 0.43. However, by increasing  $R_Q$  further to 0.57 caused reduction in HV to 5.61 MJ/m<sup>3</sup>. The highest bed temperature which can be achieved was 806 °C at 0.43 of  $R_Q$ .

**Keywords:** Sawdust gasification, Internally circulating aerated fluidized bed gasifier. Bed material circulation

### I. INTRODUCTION

An internally circulating aerated fluidized bed gasifier (ICAFBG) is an indirect heated gasification process, where the energy required is provided from a combustion zone through bed material circulation due to direct contact between the combustion and pyrolysis zones. The advantage of this reactor to ICFB is that the combustion zone operates in the vigorous bubbling regime with restricted aeration in the pyrolysis zone. Biomass is directly fed into the pyrolysis zone, whilst the char (pyrolysis product) moves into the combustion zone. The term aeration is used to describe the fluidization regime in the pyrolysis zone [26]. The basic principle of ICAFB is shown in Fig. 1.



**Fig. 1.** Principle of ICAFB.

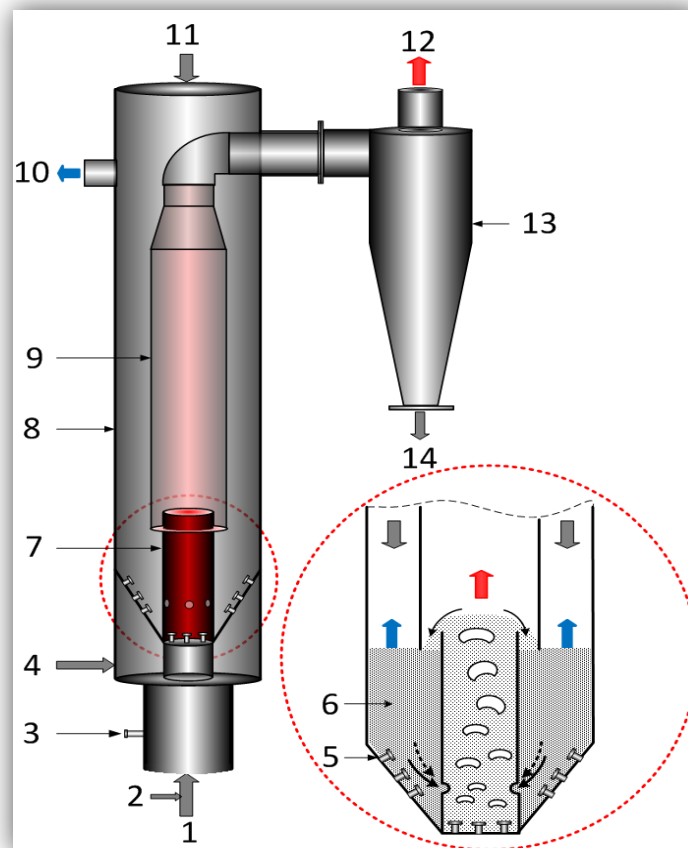
In this work the ICAFB pyrolyzer is constructed of two concentric cylinders. The inner cylinder (draft tube) acts as a combustion zone or heat generator providing heat to the annulus that acts as a pyrolysis zone. Aeration in the annulus is needed to ensure the circulation of the bed particles between the annulus and the draft tube and to purge the pyrolysis gaseous product from the annulus. Solid circulation rate ( $G_s$ ) between the annulus and the draft tube is an important parameter to determine the overall performance of the ICAFB system. The novelty is in using an ER far below common gasification and a possible increase in the heating value. Restricted aeration in the pyrolysis zone

causes a low ER. Therefore the main objective of this study is to evaluate the effect of ER on the operating temperature stabilization, composition and heating value of the producer gas.

## II. METHODOLOGY

### 2.1. System Setup

The ICAFB pyrolyzer with a total height of 1.1m consists of two parts: an annulus (pyrolysis zone) with a diameter of 0.3 m and a draft tube (combustion zone) with a height of 0.32 m and diameter of 0.1m. The two zones are connected via orifices at the lower section of the draft tube to enable the solids to move from the annulus to the draft tube. Eight equally spaced 0.02m diameter holes were drilled in the wall of the draft tube, 0.08m above its base. The ICAFB system is shown in Fig. 2.



**Fig. 2.** Schematic diagram of the ICAFBG.

The biomass (sawdust) is fed directly to the annulus from the top of the reactor. Char, a byproduct of the pyrolysis process and the bed material moves toward the draft tube via the orifice. A dipleg is installed to separate the flue gas and the producer gas. The bed material overflows from the top of the draft tube to the annulus and the flue gas passes through the dipleg and enters the cyclone separator. The axial temperature in the bed was measured using three K-type thermocouples mounted along the bed height from the distributor. The air chamber comprises of two plenums to separately supply fluidization air into the draft tube ( $Q_{dt}$ ) and aeration air into the annulus ( $Q_{an}$ ). The draft tube air supply consists of a distributor plate with seven bubble caps, whilst the annulus has a 60° conical



base with 18 bubble caps.

Sawdust is fed from the top of the reactor through a screw feeder connected to a sawdust hopper. Since sawdust pyrolysis takes place in the annulus, sawdust is fed from the top of the reactor to provide a longer residence time before the sawdust becomes char and enters the combustor. A cyclone (0.20 m i.d. and 0.43 m high) is installed at the outlet of the draft tube. Since no solid elutriation occurs at the annulus, a cyclone separator is not installed at the exit. The effects of equivalence ratio (ER) on the temperature system stabilization, composition, and heating value of producer gas at constant fluidization ratio ( $R_Q = Q_{an}/Q_{dt}$ ) were studied. The ER was adjusted by controlling the feed rate of sawdust in the annulus ( $W_f$ ). The  $R_Q$  used according to the optimum value of  $G_s$ , obtained from experimental hydrodynamic test.

## 2.2. Material and preparations

### 2.2.1. Bed material

The bed material is sand, with a mean particle size of 425–600  $\mu\text{m}$  and a density of  $1520 \text{ kg/m}^3$ , belonging to Geldart Group B particles. The static bed height in the annulus and the draft tube were maintained at 0.28 m. The bed was fluidized with air provided from a blower. The pressure drop across the draft tube is measured by a digital manometer through two pressure tappings, one at the disengaging zone and the other before the air distribution plate. Different air flow rates were performed in the draft tube and the annulus to induce circulation of the bed material between the draft tube and the annulus.  $Q_{dt}$  is set 350 Lpm, which is about 2.33 times of the minimum fluidization flow rate ( $Q_{mf} = 150 \text{ Lpm}$ ), while the  $Q_{an}$  is set to 33%, 66%, 100% and 133% of the  $Q_{mf}$ .  $G_s$  is an important parameter for heat transfer and to control the pyrolysis zone temperature. Measurement of  $G_s$  was carried out experimentally using hydrodynamic studies. The solid circulation rate was determined by collecting solids emerging from the top of the draft tube for a known interval of time and weighing to obtain the circulation rate.

### 2.2.2. Biomass material

Biomass material is sawdust obtained from local Malaysian rubber wood furniture home industries. Size distribution, ultimate and proximate analysis of the sawdust are presented in Tables 1 and 2 respectively.

**Table 1.** Size distribution of sawdust.

Size (mm)	Weight (%)
$S > 1.7-2.0$	2.24
1.17-1.70	2.60
0.6-1.17	76.40
0.5-0.6	5.32
0.425-0.5	3.64
0.3-0.425	5.20

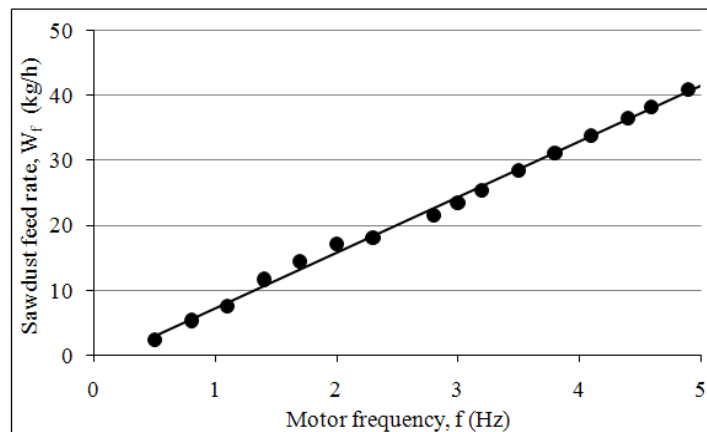


S<0.3	4.6
Sum	100.00

**Table 2.**Ultimate and proximate analysis of sawdust.

<i>Ultimate analysis, wt.% (air dry basis)</i>	
C	50.54
H	7.08
O	41.11
N	0.15
S	0.57
<i>Proximate analysis, wt.% (air dry basis)</i>	
Volatiles	82.29
Fixed carbon	17.16
Moisture	8.0
Ash	0.55
<i>Heating value (dry basis)</i>	
<i>Low heating value (MJ/kg)</i>	15.00

The sawdust feeding system consists of a hopper and a screw feeder with a variable speed drive (VSD). The screw feeder was calibrated to determine the sawdust load capacity or feed rate ( $W_f$ ) through the feeding system. The average sawdust flow rate is plotted against the screw feeder operating frequency as shown in Fig. 3.



**Fig. 3.** Screw feeder calibration.

### 2.3. Start-up method

An important aspect of the operation of ICAFB pyrolyzer is the start-up process. The combustor was initially heated, using liquid petroleum gas (LPG). At the start of the experiment, air was supplied to the draft tube at 200 Lpm with LPG at 20 Lpm. The air and LPG mixture was ignited using a spark plug. The hot gas fluidizes the sand and increases the bed temperature. Temperatures at



the annulus and the draft tube were recorded using type K thermocouples. A thermocouple was also installed at the air-LPG combustor chamber to detect combustion during start-up process.

The difference between the annulus and the draft tube air flow rates promotes solid circulation from the two zones through the connecting orifices. Circulation of the bed material from the draft tube to the annulus provides heat transfer from the combustion zone to the pyrolysis zone. When the bed temperature in the annulus reached 400 °C ( $T_{c-2}$ ), sawdust was fed into the annulus. The sawdust starts to pyrolyze and converts into volatiles and char. The char together with sand move under gravity, flow into the draft tube and are burnt to produce heat with excess air. When the temperature of draft tube reached 650–700°C ( $T_{c-1}$ ), the LPG was switched-off and the experimental parameter was setup to the desired value based on  $R_Q$  and ER. The heat produced by the char combustion in the draft tube further increases the temperature to the desired level. After 40 minutes at which time the pyrolyzer operation reached a steady state, gas samples were collected. Temperatures at various points of the system, the aeration, and the fluidization air flow were recorded and controlled.

#### **2.4. Producer gas sampling and analysis**

The producer gas was collected using a gas sampling train that removes any moisture and particulates. The gas composition was determined using TCD gas chromatograph equipped with Carboxene 1000 (Supelco, USA) column (15 ft x 1/8 in, 80/100 mesh).

### **III. RESULTS AND DISCUSSION**

#### **a. Effect of $R_Q$ on draft tube and annulus bed temperature**

Bed temperature affects the chemical reactions in the pyrolysis process. In this work, the operating temperature is controlled by adjusting the ER based on  $R_Q$  and  $W_f$ . The range of ER used in this work was 0.047 to 0.075 which considerably lower than the normal range of ER for fluidized bed gasifier (0.20–0.40).[11]. However, in the ICAFB a low ( $ER < 0.1$ ) could be used, because the most important parameter is  $G_s$ , which is highly dependent on  $Q_{an}$ . Fig. 6 illustrates the effect of ER on the operating temperatures of the draft tube ( $T_{c-1}$ ) and the annulus ( $T_{c-2}$ ). The increase in temperature with ER is well understood because ER increases with  $R_Q$ . By increasing  $R_Q$  at a constant  $W_f$ , ER increases as well as  $G_s$  and thus the amount of char released from the annulus to the draft tube also increases.

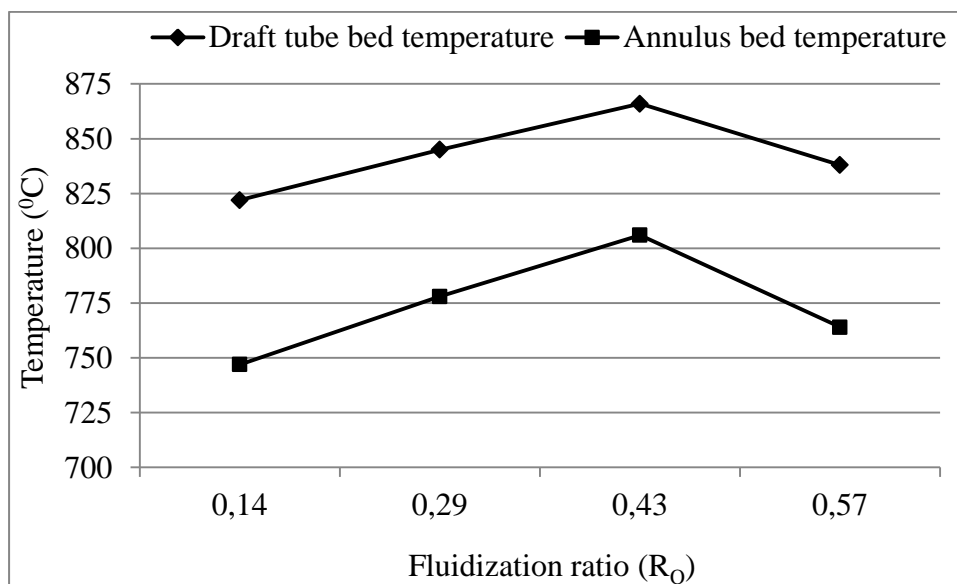
Increasing char formation in the annulus increases its flow into the draft tube resulting in higher heat production during the combustion process. But there is an optimum limit that should not be exceeded else it would lead to two effects: 1. The temperature inside the annulus becomes uncontrollable or overheats; 2. Char accumulates in the annulus because gas production is not balanced with feeding, resulting in an impaired pyrolysis process.

Increasing  $R_Q$  further leads to an increase in ER, but decrease in  $G_s$ . This causes the whole temperature to decrease. It was found that for  $Q_{dt}$  either below or above 350 Lpm, the temperature of the whole system gradually decreases. Below 350 Lpm,  $G_s$  is low and causes insufficient char transfer to the draft tube for heat generation. Above 350 Lpm however the fluidization regime becomes vigorous,

causing some of the char to elutriate from the draft tube, and thus reducing heat generation during combustion. Therefore  $Q_{dt}$  is maintained constant at 350 Lpm for all tests.

In this study, the pyrolysis operating temperatures that can be achieved were in the range 725–800 °C. This temperature range is categorized in the intermediate temperature pyrolysis where the major product is gas [27, 28]. This temperature is sufficient for char reaction with reactive gases such as  $O_2$ ,  $H_2$  and  $CO_2$ .

From Fig. 6, the highest combustion temperature was found to be approximately 866 °C. This is an important issue in the design of fluidized bed combustor, because typical fluidized bed furnaces operate at 800–900 °C to avoid fouling and  $NO_x$  [29]. However, high combustion temperature (900–1100 °C) contribute to better combustion efficiency where carbon fines are burnt completely before they escape from the combustor through the cyclone.



### 3.2. Effect of $R_Q$ on PG composition

ER has a strong effect on all chemical reactions in the pyrolysis process. Fig. 7 shows the variation in the producer gas composition from the annulus with respect to ER. Fig. 7 indicates the optimum operating condition at an ER of 0.051 producing gas compositions of 3.13%, 25.8%, 8.2%, 17.39% and 41.21% for  $H_2$ , CO,  $CH_4$ ,  $CO_2$  and  $N_2$  respectively. Carbon monoxide and methane are the largest constituents of the producer gas, and are much higher than typically found from air-blown gasification as described in Table 3.

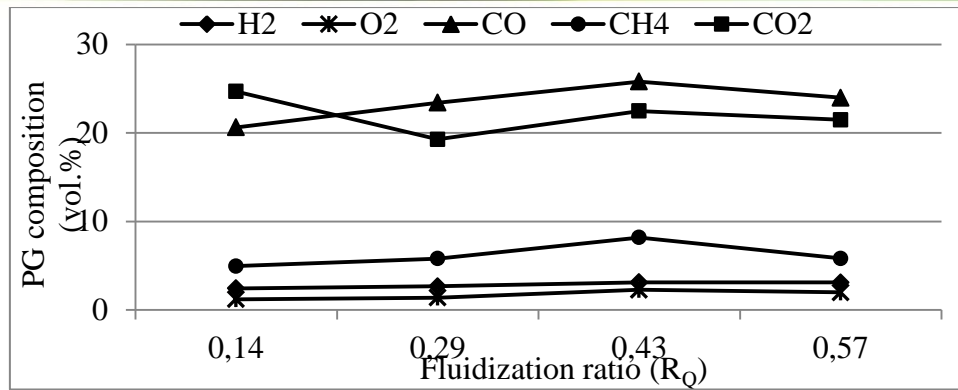


Fig. 7. Producer gas composition.

Table 3. Comparison of producer gas produced by air-blown ICAFB.

Ref	Fuel constituent (vol.%)					HV (MJ/m <sup>3</sup> )
	H <sub>2</sub>	CO	CH <sub>4</sub>	CO <sub>2</sub>	N <sub>2</sub>	
[4]	16	10	-	30	-	3.90
[5]	7.5	27	3.5	7.5	-	5.7
[6]	14.61	25.71	2.45	12	-	6.67
[7]	9.5	18	4.5	13.5	-	6.3
[8]	19.5	17.5	2.5	13.75	-	5.88
[9]	9.27	9.25	4.21	13.28	-	5
[10]	7	16	3	18	-	5
[*]	3.13	25.80	8.20	17.39	41.21	6.96

[\*] Current work

By increasing the ER the CO content increases, attributed to the Boudouard and water gas reactions where the CO<sub>2</sub> present in the methane reforming reactions reacts with char to produce CO, and the high temperature of the bed particles facilitates this reaction. The CO concentration of the producer gas markedly increases from 20.64% to 25.80% in the investigated ER range.

It was found that the highest concentration of H<sub>2</sub> was 3.13%. This is low compared to common air-blown sawdust gasification[4–10]. This is due to the effect of the pyrolysis reaction temperature. The composition of H<sub>2</sub> is very dependent on the reaction temperature. A high pyrolysis temperature (800–1000 °C) favors the thermal cracking of the hydrocarbons in the gaseous products and thus sharply increases the yield of H<sub>2</sub> through Boudouard, water gas, methanation, and water gas shift reactions[30, 31]. However, in this study the pyrolysis reaction temperature is limited to a maximum of 800°C resulting in low H<sub>2</sub> yield.

### 3.3 Effect of $R_Q$ on PG composition

Fig. 8 shows the heating value of the producer gas. The heating value increases with an increase in ER due to the increase in the percentages of CO and CH<sub>4</sub>. The highest heating value of the producer gas was an average of 6.96 MJ/m<sup>3</sup>.

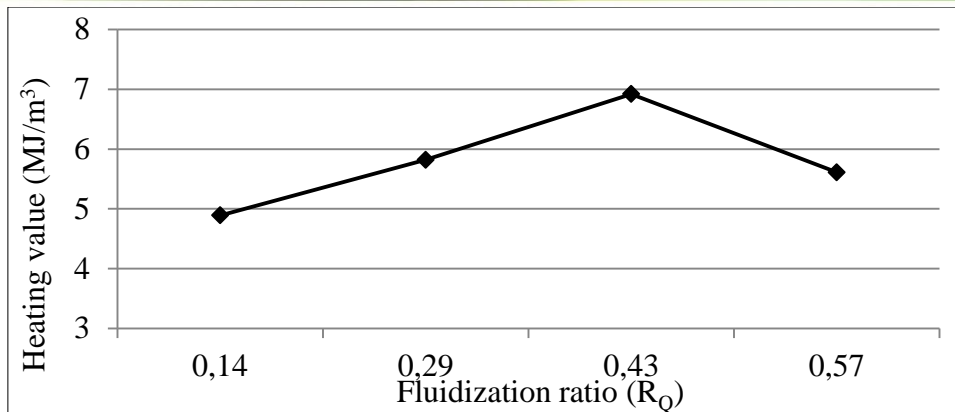


Fig. 8. Effect of equivalence ratio on heating value.

#### IV. CONCLUSIONS

A pilot-scale internally circulating aerated fluidized bed (ICAFB) pyrolyzer has been successfully developed. The most important parameters in the ICAFB are the fluidization ratio ( $R_Q$ ) that controls the solid circulation rate ( $G_s$ ) and the ER in the pyrolysis zone. Circulation of the bed material from annulus to draft tube is the most important parameter and determines the heat transfer from the combustion zone to the pyrolysis zone. Fluidization ratio,  $R_Q$  is the key in solid circulation.

This study indicates that under the optimum operating conditions at an ER of 0.051 and pyrolysis temperature of about  $800^\circ\text{C}$ , producer gas compositions of 3.13%, 25.8%, 8.2%, 17.39% and 41.21% for  $\text{H}_2$ ,  $\text{CO}$ ,  $\text{CH}_4$ ,  $\text{CO}_2$  and  $\text{N}_2$  respectively with a heating value of about  $6.96 \text{ MJ/m}^3$  was achieved. Significant amounts of carbon monoxide ( $\text{CO}$ ) and methane ( $\text{CH}_4$ ) were produced at an intermediate operating temperature of about  $800^\circ\text{C}$ , where the reactions favor the production of  $\text{CO}$  and  $\text{CH}_4$ .

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## BUILDING PLAN OF WIND POWER PLANTS MICRO TURBINE FOR RESIDENTIAL HOUSE IN LOW WIND VELOCITY AREA

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**ABSTRACT :** Wind Energy is one of potential renewable energies that could contribute towards the needs of electricity in residential houses. Wind Power Plants are pollution free, so that it could address the environmental issue and the availability of renewable energy sources, hence this research supports the programs of the local government. Padang to be the shed of the renewable energy. The purpose of this research is to make a low capacity (micro) wind turbine which could help on supplying the electricity and could operate in areas with low wind speeds and can be set up on the houses' roofs. Methodology that is used to reach the purpose is experimental method with steps consist of gathering wind data on the field, wind turbine design, election of materials, manufacturing of the materials, and test of the tools. Padang city in West Sumatera is a city with low wind velocity, around 2-7 m/s, therefore the appropriate type of wind turbine is the savonius type because it could spin in low wind velocity with the starting speed could happen on the velocity of 2m/s and very simple construction. The design that is made is 2 savonius blades with overlap construction between both blade, the purpose is to utilize thereverse wind pressure from one blade to another and vice versa to increase the spin of the rotor. The savonius is planned to be 4 stories. The materials that are used for turbine blade is aluminium and hollow axis type. The generator that is used is Panasonic 400 watt permanent magnetic generator that could generate power on low rotation (150rpm) ; To enhance the rotation that reach the generator, belt and pully transmission system is used with transmission comparison of 5 : 1. Thus, bearing type that is used is ball bearing. From the test result, the maxium power of 7,7 watt is obtained with the rotor rotation of 340rpm and wind velocity of 5,68m/s and Cp 0.3

**Keywords :** renewable energy, wind turbine, VAWT, savonius

### I. INTRODUCTION

More than 86% of the recent world's energy are obtained from fossile fuel, meanwhile the energy demand are growing rapidly all around the world [Heier]. As we know, fossile fuels are unrenueable,therefore sooner or later we will be running our of energy if we keep relying on fossile energy as the source of energy. Thus, the utilization of fossile fuel as source of energy will increase the CO2 emission which could destruct the environment.

Furthermore, the electricity is getting more expensive especially in Indonesia where since 2013 PT.PLN has started to imply the Minister of Energy and Mineral Resources' decree to increase 15% of the electricity fare and to increase the fare of electricity once every three months. Based on this issue, we need to find the solution with finding the new energy sources that are environmentally friendly and renewable. Wind energy is one of renewable energy. Wind energy is environmentally friendly and renewable which makes it very potential to be explored.

Unfortunately, the wind velocity condition in Indonesia, especially in Padang city is very low which vary between 2m/s – 6m/s. Therefore, a design of wind turbine that suitable for this area is needed to fulfill the electricity needs of residential houses, especially for home lightning. Because of that, this research will discuss about Micro Wind Tubine's building plan that could operate in low wind velocity and could be set up on houses' roofs. This research is focused on savonius vertical axis



wind turbine because this type could receive wind's stream from every direction, has good self starting

which makes it possible to rotate the rotor in low wind velocity, other than that the torsion is also relatively high. These make savonius suitable to be applied in area with low wind velocity.

## II. THEORETICAL BASIS

### a. Basic Principle of Wind turbine conversion

Wind is a form of renewable energy that is available in nature, Wind Energy power plant converts the wind energy into electricity by using wind turbine or wind mill. The work method is fairly simple, the wind energy that spins the turbine is forwarded to spin the rotor in the generator behind the wind turbine, which will produce the electricity energy. Electricity energy will usually be stored inside a battery before it could be used. This is the simple sketch of the wind mill :

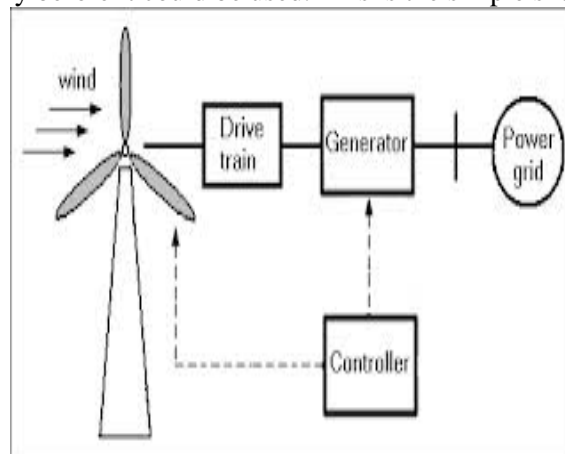


Figure 1. Wind Energy Conversion Scheme

### b. Savonius Wind Turbine

A simple constructed wind turbine that is found by a Finnish bachelor, Sigur J. Savonius (1922). This turbine is categorized as Vertical Axis Wind Turbine (TASV) and has a rotor with basic shape of half cylinder. The concept of Savonius turbine is fairly simple with the work principle of differential drag windmill.

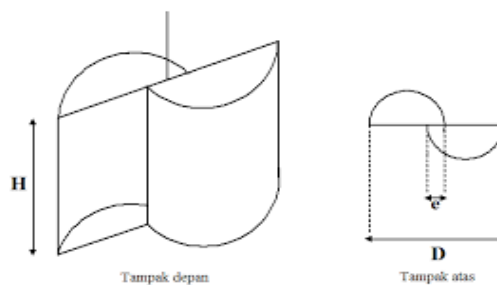
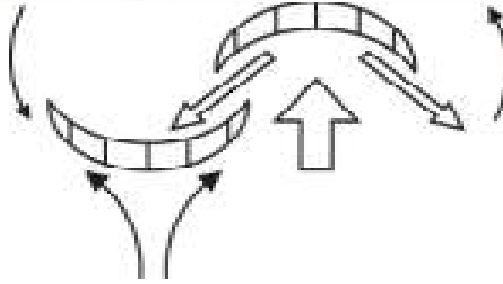


Figure 2. Wind Turbin Savonius Rotor

Savonius wind turbine is drag type of wind turbine, where this turbine generates power by utilizing drag forces that is produced from its each corners. Drag is force that works contrary to the direction of wind that hits blade (White, 1986: 412). Air stream pattern of Type I wind turbine can be seen below :



**Figure 3.** Blade Air Stream Pattern U Type

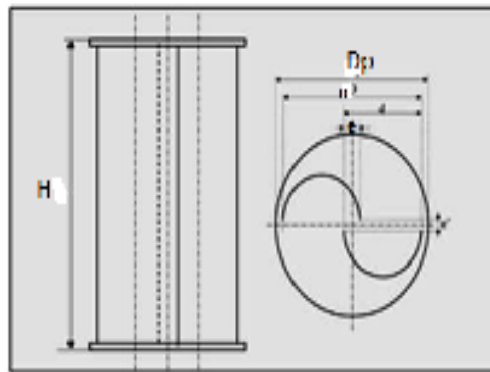
**c. Wind Turbine Power**

Turbine Power,  $P_w$ , is defined as multiplication between mass flow rate,  $\rho AV$ , with wind kinetic energy per mass unit  $\frac{1}{2} V^2$ , mathematically can be written as :

$$P_w = 1/2 \rho AV^3 \tag{1}$$

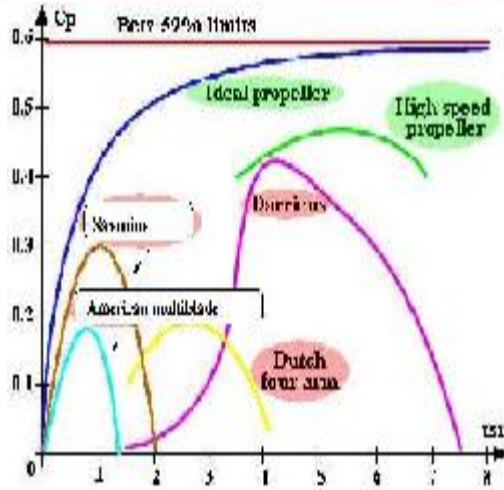
Hayasi, et Al (2004) finds that sweep area for savonius wind turbines is the result of multiplication between rotor's diameter,  $D$ , with rotor's height,  $H$ . The wider the sweep area, the bigger the power that is produced by turbine.

$$A = D.H \tag{2}$$



**Figure 4.** Dimention of Savonius 2 blades turbine

According to Betz Limit and Mangrove (2010) only 59% of converted wind energy that can be utilized. Meanwhile, waste energies happen because transmission system's gearbox, bearing, and generator (Jain, 2011). Therefore, the power coefficient of savonius wind turbine is  $C_p$  0.3 as seen as the diagram below :



**Figure 5.** Correlation diagram of  $C_p$  and TSR

Wind turbine's performance (non dimensional) can be known from 3 parameters through power coefficient  $C_p$ , torque coefficient  $C_t$  and Tip Speed Ratio (TSR)  $\lambda$

$$C_p = \frac{\text{Power Output}}{\text{Power Input}} = \frac{V_i}{1/2\rho AV^2} \quad (3)$$

Where  $V$  is the generator's output voltage and  $I$  is the generator's output current. For torque coefficient, the equation is :

$$C_t = \frac{\text{Torsi (T)}}{1/2\rho AV^2.D} \quad (4)$$

Mathematic equation of the tip speed ratio is resulted from multiplication between angular velocity and radius divided by the wind velocity :

$$TSR = \frac{R\omega}{V} \quad (5)$$

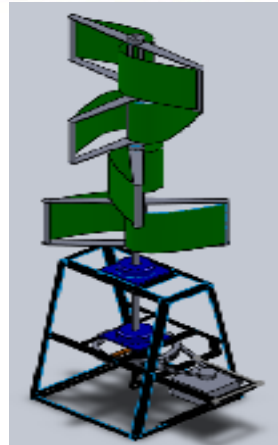
Where  $R$  is the rotor's radius,  $V$  is the wind velocity and  $\omega$  as angular velocity rad/s .

### III. Research Methods

Method that is used in this research is experiment method, by designing the wind turbine, manufacturing wind turbine and doing test by observing or measuring the specified variable to determine the working capacity of turbine that has been designed and manufactured.

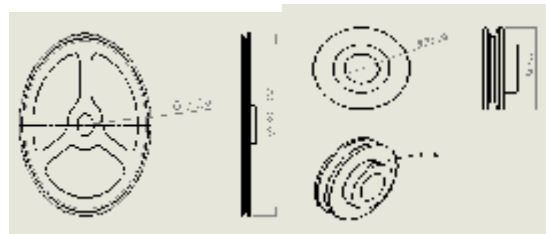
#### a. Design

The result of the design is savonius wind mill, L formed blade with 2 blades, 4 stories to make the sweep area wider so that the power that is generated is bigger. The design is made as follow :



**Figure 6.** Wind Turbine design

96 cm of rotor's diameter, overlap of 10cm and height per story of 22cm, angle among story is 22,5 degree. **Sudu** is made of thick aluminium of 0,9mm. The transmission that is used is Pully Belt transmission, small and big pully belt is made with comparison of 5 :1 and dimation as follow :



**Figure 7.** Design of Pully's pairs that are used

Using 2 ball bearing's cushions and gear shaft's cushions. Thus, the type of generator that is used is permanent magnetic generator from Panasonic with 400 watt capacity which able to generate electroicity at 150rpm rotation.



**Figure 8.** Permanent Magnetic Alternator

Permanent magnetic generator generates AC current to be stored inside the accumulator, therefore the series are completed by rectifier to make the current output from generator can be directly stored.

### b. Tools and Materials

Materials that are used for the test, are as follow :

**Table. 1** List of materials that are used for the test:

Materials	Functions
Anemometer	To measure the wind velocity
Permanent magnetic alternator (Panasonic) 400watt	Used as converter from kinetic energy to electricity energy

Digital Lutron Tachometer	Tool to measure each minute's rotation
10 watt of lamp	Used as burden in this experiment which is going to be measured. Using lamp.
SANWA Multitester	Used as tool to measure current (i) and voltage (v) to obtain the value of power that is resulted from the generator

**c. Tools Test Procedure:**

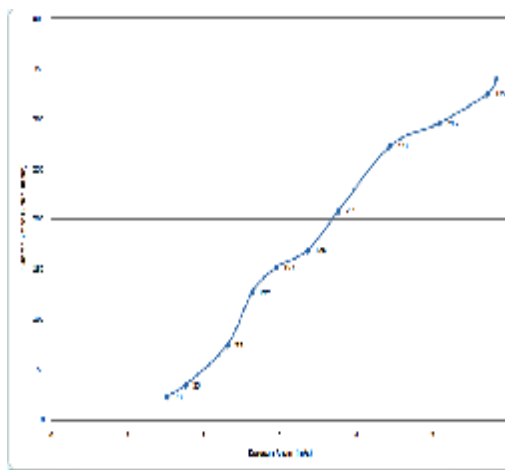
Test is done by these steps :

- Installation of savonius wind turbine at residential house along the side of padang beach. The first test is the rotation test with tachometer. The variables that are measured are rotation velocity of rotor turbine
- Then the second test is to measure the voltage and the current from the output of the generator with multimeter. The measuring to measure the current and the power from turbine is done based on the data from the result of voltage measurement.

**IV. RESULT AND DISCUSSION**

**a. Rotor Rotation**

From the result of the test, the rotor rotation to wind velocity is obtained as the graphic below :



**Figure 9.** Graphic of the relation between wind's velocity and the rotor's rotation

From the graphich, we can see that the highest RPM is achieved by the wind's velocity of 5,68m/s with rotor turbine's rotation of 340rpm. Since the transmission system that is used is 1:5, then the RPM on the generator is becoming 1700 rpm. For the lowest rotation on wind's velocity of 1,57m/s with turbine's rotation of 23rpm and rotation on generator is 115 rpm.

**b. Generator Power**

From the test result, the generator power is obtained as the graphic below. The random data is arranged based on the lowest to the highest wind's velocity.

**Table 2.** Power Output Data's Test

V m/s	Current (C)	Voltage (V)	Power (watt)	Pw	Cp
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2,14	0	0,00	0,00	1,74	0,00
2,16	0,21	1,30	0,34	2,28	0,11
2,18	0,33	2,40	0,88	3,49	0,13
2,27	0,4	2,50	1,40	4,48	0,29
3,33	0,45	3,30	1,89	8,65	0,22
3,52	0,65	4,50	3,34	11,29	0,29
4,59	0,77	5,25	4,53	15,49	0,29
5,33	0,89	6,53	6,55	21,27	0,29
5,58	1,3	6,63	7,88	23,71	0,3

From the test's result, the highest power was obtained during wind's velocity of 5,68m/s with rotor rotation of 340rpm which is as high as 7,72 watt.

## V. Conclusion

From the design and the test of wind's turbing for residential house in the areas. with low speed wind, the selected design for wind turbine is Savonius 2 blade wind turbine which is made 4 layered with rotor diameter of 96cm and the height of each layer is 25cm. From the test reult, the highest speed of rotor that was obtained is 340rpm during the wind's velocity of 5,68m/s where 5,68m/s is the highest wind's velocity which is obtained by the wind's velocity measurement during the test. The power that was obtained on the highest rotation is 7,78 watt with the CP's value of 0,3.

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EI-05-034

## EXPERT SYSTEM FOR DETECTING BREATHING DISORDERS IN HUMANS

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**ABSTRACT :** *The researched is going to diagnosis and detect human health respiratory and giving the solution by medicine plants. This Data gathered through observation, interviewed the expert and library researched about human health respiratory. The Method is Rule Based Expert System and used Backward chaining formula, which is started to browse the user's answered to the questioner table list and the solution by medicine plants. If user complaint the same caused with the table list then the diagnosis will show the diseases and solution by medicine plants .*

**Keywords :** *Diseases diagnosis, human respiratory, backward chaining.*

### I. PRELIMINARY

Advances in science and modern technology that is increasingly fast and sophisticated just not able to shift the role of medicinal plants. This is proven by the many enthusiasts of treatment with medicinal plants. But the trouble for enthusiasts of medicinal plants is the lack of adequate knowledge and information on the various types of plants used and the weave. Therefore, there is no harm if we glance back and try different recipes ancestors that can be obtained from various plants around us.

This study brings together several scientific fields, namely the field of informatics, medicine and agriculture. Scientific medicine is needed to analyze the disease, and then given a solution in the form of a medicinal plant which is part of the disciplines of agriculture, then analyzed and designed expert system applications.

The author would like to create an expert system application that is used as a detector of respiratory organ disorders in humans. Application of expert systems can help a layperson in the identification of illnesses suffered in order to take appropriate measures for the treatment of the disease. In this expert system author helps provide a solution treatment of several disorders Respiratory organ with medicinal plants.

### II. THE METHOD IS APPLIED.

#### 2.1 Research Objectives

1. Move the expertise of a physician into a computer system using Expert System Engineering Backward Chaining method, to identify the disorder in the human respiratory organs based on the existing symptoms and treatment using medicinal plants.
2. Designing an application program uses expert system software programming language.

#### 2.1 Stages of making expert system

In the expert system development there are five stages of the process, namely:



### 1. Identify the Problem

The first step that must be done is to identify problems, assess problems, and decide for certain issues to be used as an expert system and whether the expert system can make it better or not.

### 2. Conceptualization

Is the stage at which engineers and expert knowledge to determine what will be developed into an expert system. The whole concept of specified elements involved and reviewed the relationship between these elements and the mechanization of the controls needed to reach a settlement.

### 3. The formalization

At this stage of the formalization of the relationship between the elements depicted in the form of the usual format used by expert systems, data structures and inference techniques determined.

### 4. Implementation

Entered the implementation phase after the formalization of the relationship between the elements that have been made in full and tools appropriate builder has dipilih. Pada this stage of knowledge engineers also translates the relationship between these elements into computer language.

### 5. Testing

At this stage the necessary time to do the testing and searching kesalahan. Dan make improvements at each stage in order to obtain a complete and accurate system.

### 6. System Development

Development of the system is needed so that the system is built not become obsolete and investment system is not in vain. It's most useful system development is the process in which the system documentation in it stored all the important things that can be measured in the future development of the system including the dictionary of knowledge problem solved.

## 2.3 Field Research

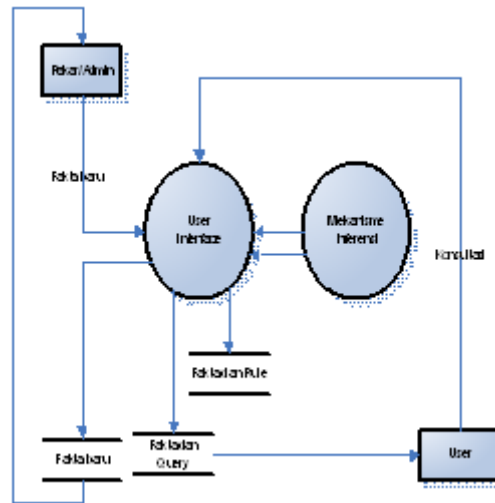
- 1) Interview (Interview), the author proposes some questions to a physician, dr. Elisabeth Dewi Augustine, place of practice at Jl. Hope, District Rumbai Coastal, to find some diseases, especially in the respiratory tract as well as its main symptoms, and interviewed an expert on medicinal plants, namely M. Yafiz Da'ir as well as people who have had organ Respiratory disorders (including medical workers) who later have successfully commercialize healing using medicinal plants.
- 2) Observation (Observation), which is a technique of data collection is done by observing and recording the systematics of the symptoms to be studied, namely:
  - a) To collect information and learn how to work a medical expert to diagnose a disease based on symptoms or complaints that exist in a patient.
  - a) To collect and study a variety of respiratory organ disorders and their symptoms encountered.

## 2.4 Tabel

Here are the plans for data flow diagram (DFD) for diagnosis expert system respiratory problems in humans.

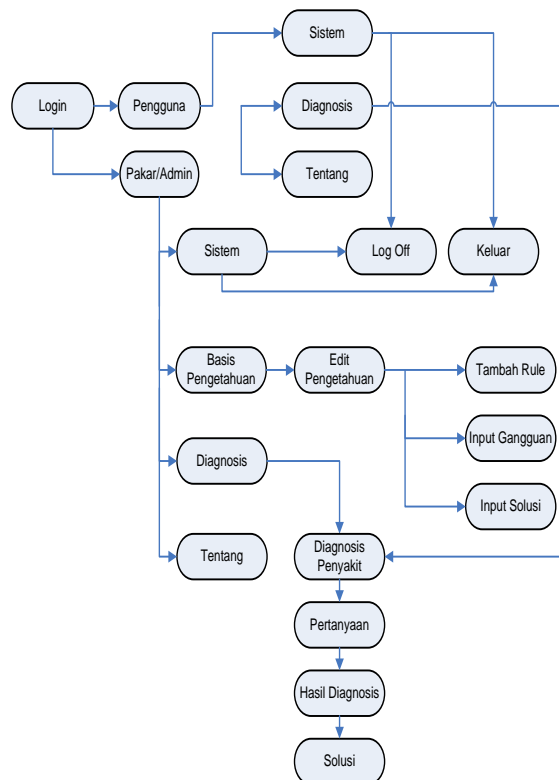


**Figure 1:** Image Data Flow Diagram design of the proposed expert system.



### 2.4 Rancangan Program sistem pakar

The result of the conclusion of the display diagnosis can be a possibility of disease, that disease is the conclusion derived from the process of consultation. Moreover, it also displayed the type of medicinal plants for the disease and how it's used. All the results of these conclusions will be displayed in text form. Flow menu in this application are as follows:



**Figure 1.** Figure groove draft program menu

### 2.5 Writing References



Expert System is a knowledge-based program that provides quality solutions to the problems of experts for a specific domain. Expert Knowledge or a combination of theoretical and practical understanding. Knowledge in an expert system taken in their expert or experts in the domain. And expert systems seek to imitate the methodology and performance or performance. Just as people trained, expert systems tend to be specialists focusing on a number of problems with a narrow range. As with humans, too, theoretical and practical knowledge that has been refined with experience in that domain (Muhammad Arhami, 2005).

### III. DISCUSSION OF RESULTS

External entity of the Expert System is the expert, the entity User. External Admin and enter data such facts into an inference engine through the userinterface.

#### 1. Database

1) Table Symptoms, contains a variety of respiratory disorders which are based on symptom information table. Its use as a disorder experienced by user when starting your search

ID_Symptoms	Type Symptoms
R1	Lung abscess
R2	Allergy
R3	Bronchitis
R4	influenza
R5	Pneumococcal
R6	Sore throat
R7	Out of breath
R8	Tuberculosis (TB) Lung
R9	Cold
R10	nasal polyps
R15	Respiratory tract inflammation

2). Table Solution, containing the results of diagnostics in the form of a solution. Used as the conclusion of the search. In this table barisi recommendations on the treatment solutions of diagnosis. Recommended treatment is a treatment using medicinal plants.

ID_solution	Solution
S1	15 grams of dried bitter, 100 grams of aloe leaves, peel, 30 grams of lily bulbs, 2 tablespoons honey. Rinse all ingredients, boiled with water until the remaining 600 cc to 300 cc, then strain. Add the honey, then drink 2 times a

	day.
S10	100 cc black rice vinegar (rice vinegar), 30 grams of ginger, mashed, brown sugar to taste. Boil all ingredients with 300 cc of water to the boil. Drink warm.
S2	7 pieces of betel leaf, ginger 20 grams, 15 grams of dried mandarin orange peel, rock sugar to taste. Rinse all ingredients, boiled with water until the remaining 600 cc to 300 cc, then strain. Drink 2 times a day.
S3	dried bitter leaf, made of powder, 1 tablespoon honey, 1 tbsp lemon juice to taste. Pour 1 teaspoon ground bitter (2 g) with 150 cc of hot water, add honey and lemon juice and stir. Drink warm 3 times a day.
S4	15 grams of dried bitter, 15 grams of dried Centella asiatica, 30 grams of pearl grass or grass snake tongue dry. Rinse all ingredients, boiled with water until the remaining 800 cc to 400 cc, then strain. Drink 2 times a day.
S5	7 leaves continued life, 30 g fresh gotu kola. Rinse all ingredients, adding a blender with a little water, lallu strain. Drink 2 times a day.
S6	15 gr leaves continued, one finger cinnamon, 15 g leaves of the gods. Rinse all ingredients, boiled with water until the remaining 600 cc to 300 cc, then strain. Drinking 150 cc 2 times a day (can be used for shortness of breath due to heart problems).
S7	60 grams of fresh gotu kola leaves (30 g dry), 30 grams of fresh bitter (15 g dry), 10 pieces of betel leaf, 30 g kencur. Rinse all ingredients, boiled with water until the remaining 800 cc to 400 cc, and filtered. Add honey, drank 200 cc 2 times a day.

S8	Dry leaves bitter taste, create a powder, honey to taste. Take 1-2 grams of powder, and brewed with hot water, add honey, stir and drink after warm. Do it three times a day.
S9	50 ounces ginger and white, 15 gr bitter. Rinse all ingredients, boiled with 700 cc of water until the remaining 300 cc, then strain. Drink 2 times a day.

#### IV. CONCLUSION

1. This expert system can help move the expertise of a doctor, for diagnosing respiratory disorders in humans, and can be an alternative or as a tool for people who need to handle mild cases.
2. Based on the analysis, the Expert System Software applications can be generated using Visual Basic 6.0 programming language, using the display user interface is easy to use user.

#### 5. Acknowledgements

Acknowledgements for the experts who have helped researchers to create an expert system to diagnose respiratory problems in humans.

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EI-05-035

## MODEL IMPROVING THE QUALITY OF VOCATIONAL SECONDARY EDUCATION THROUGH THE UTILIZATION OF ACADEMIC INFORMATION SYSTEM BASED ON INFORMATION TECHNOLOGY IN REMOTE AREA

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**ABSTRACT :** *Model improving the quality of vocational secondary education through the utilization of academic information system (SIA) based on information technology in remote areas has been investigated. Remote areas should receive special attention from the government over the field of vocational education, especially vocational secondary education (SMK) in District of Talaud, North Sulawesi. One effort in improving the quality of vocational education in remote areas is the utilization of SIA based on information technology. The objective of this research is to obtain a model of improving the quality of SMK through the utilization of SIA based on information technology in remote areas. The method used survey and observation of all the SMK in remote areas, interview with the head of the SMK, a SWOT analysis of the utilization of information technology in SMK, and modeling of SIA. The results showed that the utilization of SIA all the SMK in remote areas based on information technology is 0.22 %. Model SIA based on information technology can improve the quality of education of all the SMK located in a remote area. The model will be implemented in future studies to obtain significance of SMK education quality improvement.*

**Keywords:** *model, academic information system, information technology, remote area, vocational secondary education*

### I. INTRODUCTION

The improving the quality of education is a process that is integrated with the process of improving the quality of human resources itself. This means that there is continuity between the educations received by the human ability to receive such education. Therefore, it is very important to focus improving the quality of education to produce qualified human resources.

Competence is a comprehensive ability to perform duties in accordance with the profession being run. Such capabilities consist of knowledge, skills, attitudes, and values.<sup>4)</sup> Based on the competence theory, there are four competencies that should be possessed by a teacher as a foundation in carrying out their duties, namely: pedagogical competence, personal competence, social competence, and professional competence.<sup>7)</sup> Efforts to improve the quality of vocational school teachers either the competencies required of a teacher of vocational and graduate competencies that must be achieved. To get an understanding of the quality of education, the following cited various notions of quality from various sources. Quality in Indonesian called quality. Quality comes from the English quality. Quality is defined by Crosby as the alloy properties of the product, which demonstrated its ability to meet customer needs directly or indirectly, either the needs expressed (explicit) or implied, present and future.<sup>9)</sup> Quality in a variety of dictionaries has a meaning, three of which (1) a trait or attribute that is distinctive and different makes; (2) the highest standards of



goodness; and (3) have the highest quality of goodness. Thus, the integrated quality covering various aspects that occur in a series of activities carried or generated by the service organization.

A lot of controversy about the notion of vocational education, vocational education was originally defined as vocational educational is simply training for skills, training the hands. In the nineteenth century raised a new concept of vocational education, namely the inclusion of vocational education into professional empowerment, as well as legal, engineering profession, medicine, nursing and other professionals. Vocational education is education-oriented non-academic practices in the areas of carpentry, business, industry, agriculture, transportation, services, and so forth.<sup>8)</sup> Vocational education is secondary education that prepares students primarily to work in a particular field.<sup>6)</sup>

Vocational education is education that connects, match, train people to have the habit of working to be able to enter and thrive in the world of work (industry), which could be used to improve their lives. Furthermore, vocational education is concerned with preparing people for work and with improving the training potential of the labor force.<sup>1)</sup> It covers any forms of education, training, or retraining designed to prepare people to enter or to continue in employment in a recognized occupation. Melvin L. Barlow suggests that vocational education would be more effective if it is able to change the individual in accordance with attention, the nature and level of intelligence at the highest level possible, which means that after conducting education and training (training) trainees increased skills. Benchmark the success of a vocational education program must consider: (1) the target product must be defined properly, accurately, and clearly that is an intense interaction between the school and the community, (2) equipment (infrastructure) required to achieve predetermined to be sufficient, so that an element of the guarantor that the targets can be achieved well, (3) specification of a successful team or program management team that will be responsible for the success of the target must be complete and clear, (4) research or assessment continuous and sustainable in order to know, so that corrective measures and countermeasures can be determined immediately. Competency standards, curriculum standards and testing standards are intended to ensure that the vocational education system really gives competencies required by industry. Therefore, measurement of the quality of graduates of vocational education is not only seen from the results of National Examinations but also of competence achieved. Achievement of competence views of skills. Every skill that reached awarded certificates by competent authorities such as national vocational education assembly.

Competence of graduates of vocational education as a subsystem of the national education system are:<sup>10)</sup> (1) producing graduates who have the skills and mastery of science and technology to the field of the level of expertise appropriate to the needs of development, (2) producing graduates who have productive capability, producer alone, change the status of a graduate of an asset load status of an independent nation, (3) driving the development of industrial producer Indonesia competitive face the global market, (4) producing graduates and a strong mental attitude to be able to develop



themselves sustainably. The work of education should be able to be a differentiator in terms of performance, productivity, and quality of the work compared to workers without vocational education. The competencies required of a teacher that includes four aspects: Pedagogical Competence, Competence Personality, professional Competence, and Social Competence.<sup>4)</sup> The performance of teachers includes three aspects, namely: (a) professional ability, (b) social skills, and (c) the ability of personal (private).

Information technology is a technology used to process the data, including obtaining, preparing, processing, storing and manipulating data in various ways to produce information quality.<sup>14)</sup> So the information system can be regarded as a data processing activities starting from collecting, processing, analyzing, storing, and disseminating an information in order to achievement or interests of an organization. The information system is a man-made system which generally consists of a set of computer-based and manual components are made to collect, store, and manage and provide output information to the user.<sup>13)</sup>

Research and Development (Research and Development) or better known as R & D, a study that aims to produce a product that can be used to solve the problems facing the practitioner in completing its tasks. Research and development is a process used to develop or validate the products used in education and learning. The general purpose of the research development is not to test a theory, but to produce a product, such as developing learning models, develops instructional media, and others.

From various studies suggest that the method of R & D is the right approach for the development of the learning process in educational institutions. The study is expected to be able to generate a model of learning that can support solving problems that exist in the world of vocational education, especially in remote areas.<sup>24)</sup>

The objective of this research is to obtain a model of improving the quality of SMK through the utilization of SIA based on information technology in remote areas. The special objectives are to get data SMK in remote area (regency of Kepulauan Talaud North Sulawesi) about the ratio of student to teachers of SMK and the names of SMK used internet and SIA based web in remote area.

## **II. RESEARCH METHOD**

The method used is research and development (R & D). The beginning done the initial surveys did the literature study and field surveys. Field surveys to observe and discuss with practitioners in order to collect information on the obstacles encountered to seek alternative solutions to problems. Then, have perform a SWOT analysis for identifies your strengths, weaknesses, opportunities and threats to assist us in making strategic plans and decisions. Finally, the result was a planning study of materials to make data SMK in remote area (regency of Kepulauan Talaud North Sulawesi) about the



ratio of student to teachers of SMK and the names of SMK used internet and SIA based web in remote area. For research future is making a model of SIA.

The development stage is the draft model of the pilot phase, the next test results used to revise the draft model developed. These stages are grouped into three main stages, namely: (1) a preliminary study and design of the model; (2) development model; and (3) validation of model. Preliminary studies conducted collection information about the condition of vocational schools in remote areas Talaud Islands, the number of teachers and students productive, and the results of the learning process. The conclusion results of preliminary studies as a basis for designing models that SIA will be developed. Collect field survey activities such as information, events, and issues relating to the implementation of vocational education that are in remote areas Talaud Islands. The data collection is done by using questionnaires, interviews, and documentation. Development steps are:<sup>5)</sup> (a) making the design model of the SIA; (B) identify and school data; (C) make an internal school-based SIA; and (d) Creating a web-based SIA. D focuses on SIA which function in the manufacturing process involves principals, teachers, staff employees, and school data carriers. SIA model validation executed after a trial. The trial results used to revise and validate the models developed SIA. The evaluation process in this study emphasized on product assessment or final work that aims:<sup>2)</sup> (a) compares the outcomes to see SIA made with models SIA other schools, so it can be a model SIA is more efficient, and (b) determine what mistakes do which arise not only during data entry, but also zoom. Format assessment consists of several aspects: the aspect menu display, the data entry process, and product output. Finally, they are conducted product trials to get a view of your data in accordance with the willingness on the interest.

Instrument data collection used questionnaires incorporating the results of interviews, field studies, and documentation study. Qualitative analysis is used in the early stages in which to analyze the data, findings and facts relating to the use of information technology (SIA). Descriptive analysis is used at this stage of development, and implementation of the model. Top of Form

### **III. RESULTS AND DISCUSSION**

The study results to date are data SMK in remote area (regency of Kepulauan Talaud North Sulawesi) about the ratio of student to teachers of SMK, and the names of SMK used internet and SIA based web in remote area. Table 1 show that the number of vocational schools in remote areas is 9 units with the number of students and teachers from each of the 832 and 147.<sup>11),12)</sup> The ratio of teachers to students is 1: 6 that means a teacher educates 6 students. The ratio indicates that a teacher in educating students is adequate.

SWOT analysis results indicate that the problems facing vocational schools in remote areas is the lack of academic information system based on web but found only two that uses it, namely SMK Negeri 1 dan 4 Talaud from 9 SMK located in Talaud district. That means the average vocational





school in the remote area is still 0.22% (see table 2). Based on that data, it still needs to be fostered and directed to other SMK to use SIA as an information system that can support the academic activities and informing the public about the SIA of the SMK.

Table 2 shows the names of the SMK is available internet facilities in remote areas.<sup>15)-23)</sup> There are six SMK is using the internet facilities are SMK Negeri 1 Talaud / Melonguane, SMK Negeri 3 Talaud / Beo, SMK Negeri 4 Talaud / Gemeh, SMK Negeri 5 Talaud / Essang Selatan, SMK Kristen Lirung / Lirung, and SMK Baramuli Talaud / Melonguane while SMK who have no internet access there of 3. Based on annotation, there is a vocational school that has used a web-based SIA and no one who has used the SIA but not web based. The following research objective is to implement a web-based SIA to 7 SMK. It needs to be done so that all vocational school in the district Talaud Islands have internet access and web-based SIA.

**Table 1.** Ratio of Student to Teachers in SMK of Remote Area

No	District	SMK	Student	Teachers	Ratio of Student to Teachers
1	Melonguane	2	227	40	6
2	Miangas	1	62	9	7
3	Beo	1	70	20	4
4	Gemeh	1	85	7	12
5	Essang Selatan	1	53	13	4
6	Damau	1	85	17	5
7	Lirung	1	164	21	8
8	Salibabu	1	86	20	4
SUM		9	832	147	6

**Table 2.** The Names of SMK Used Internet and SIA Based Web in Remote Area

No	Name/District	Used Internet and SIA(+/-)/Accreditation	Annotation
1	SMK Negeri 1 Talaud/Melonguane	Yes <sup>+</sup> /C	have been using the SIA of based web
2	SMK Negeri 2 Talaud/Miangas	No/No	-
3	SMK Negeri 3 Talaud/Beo	Yes <sup>-</sup> /C	the SIA only used in internal school
4	SMK Negeri 4 Talaud/Gemeh	Yes <sup>+</sup> /No	have been using the SIA of based web
5	SMK Negeri 5 Talaud/Essang Selatan	Yes/No	-
6	SMK Negeri 6 Talaud/Damau	No/No	-
7	SMK Kristen Lirung/Lirung	Yes/No	-
8	SMK Baramuli Talaud/Melonguane	Yes/No	-
9	SMK Kristen Karya Bahari Salibabu/Salibabu	No/No	-

The planning of academic information systems for SMK in Kepulauan Talaud being offered are: web profiles are websites that can be visited by everyone. This site contains information about the school is well informed they are static or dynamic. The information contained on the web profiles among others, are as follows:



### *1. School Profile that consists of*

- a. History
- b. Vision and mission
- c. Organizational Structure/Organization
- d. Amenities and Support Facilities of Education
- e. School Address and Contacts

### *2. News and Announcements*

### *3. Links to Page/Other Modules*

- a. Links to the School of Information System Academic
- b. Links to e-Learning
- c. Links to Web Foundation / Related Institutions

### *4. Photo Gallery*

The front page of the School of Academic Information Systems is a page that first accessed by users (students, teachers, and administrators) who have not entered into the system as well as by public users. If the school has a webprofile, then the address of Academic Information Systems School can be a sub domain or directory of the web profiles (main web).

Display this page tailored to School characteristics Schools Academic Information System users. On the front page, the program contains general information that can be accessible to everyone. On the page is also provided a form to log in as the user. Once a user has logged into the system, the program will display different page with the page before the user logs in.

Display menu include:

1. Web profile
2. Schools Academic Information System
3. Home School Academic Information System
4. Data-Data in Information Systems Academic School
5. Export Data
6. Security systems
7. Financial Information Systems
8. E-Learning
9. Features e-Learning

## **IV. CONCLUSIONS**

The utilization of SIA all the SMK in remote areas based on information technology to date is 0.11 %. Preliminary studies are useful for organizing data into data that school more regularly and easily searchable if necessary. Design model SIA based on information technology can provide



improved the administration management of school for headmaster, teachers, and staff employees in SMK. The model will be implemented in future studies to obtain significance of SMK education quality improvement.

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## MEDIA DEVELOPMENT BASED LEARNING INTERACTIVE MULTIMEDIA SKILLS SUBJECT CRAFTS

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**ABSTRACT :** *This study aims to develop interactive multimedia-based learning media using Macromedia Flash Professional 8 at SMP Negeri 5 Percut Sei Tuan, using the stage of Research and Development. Development of interactive multimedia based learning media using Macromedia Flash Professional 8 with 7 steps as follows: (1) Analysis of needs; (2) To develop the initial product; (3) The expert validation and revision; (4) Trial Small groups; (5) The test groups were; (6) Trial major groups; (7) The final products. Prior to trial first be validated by media experts and subject matter experts to determine the feasibility of the media developed. Media development is said to be effective after a small group trial, trials moderate group and large group trial to determine efektif. Validasi experts composed of subject matter experts Craft Skills and learning media experts. The field trials carried through to trial small group, the group is and testing large groups. The results showed; (1) results in the media expert validation criteria very well (89.1%); (2) the results of the validation subject matter experts on the criteria of excellent skills (94%); (3) Results The test product on a small group with sufficient criteria (60.9%); (4) The results of product testing criteria for the group is moderate (74.6%); (5) the results of trials with a large group of criteria strongly agree (97.3%). Thus, development of instructional media craft skills feasible and effective use in teaching eighth grade students of SMP Negeri 5 Percut Sei Tuan.*

**Keywords:** *Media Development Learning and Skills Craft.*

### I. BACKGROUND

Education is very influential for the advancement of a country, through education dignity of the nation can be improved, so that the goal to advance towards a better state can be realized. National educational purposes as stated in Article 3 of the Law of the Republic of Indonesia Number 20 Year 2003 on National Education System is rooted in the Indonesian culture, based on Pancasila and develop skills and character as well as the civilization of the nation's dignity in the context of the intellectual life of the nation. Based on the functions and objectives of the National Education, it is clear that education at all levels, including Junior High School (SMP) should be conducted systematically in order to achieve these objectives. This relates to the character formation of the students so that they can compete, ethics, morals, manners and interacting with the community, so that potential students can develop into a man of faith and fear of God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable. But the fact that not all junior high school graduates can go on to higher education some of them have to enter the working world. Therefore, the curriculum includes subjects junior level skills. These subjects should be given to the junior high school level students, so if they do not proceed to higher education they already have a stock of skills that will be useful for future lives.

Junior High School (SMP) is a formal education which aims to improve intelligence, knowledge, personality, character, and skills to live independently. Lessons meaningful skills to develop the knowledge, skills, creativity, and attitudes in the work of students and the local content subjects to be taken in SMP Negeri 5 Percut Sei Tuan, with the allocation of lesson time of 90



minutes. Learning skills oriented on creating work that is supported by the knowledge, attitudes, and skills and creativity of the students. Make crafts embroidery tape is a matter of competence surpassed students with the aim that students have the ability and skills in decorating objects by using ribbon embroidery techniques according their individual creativity.

According to interviews with teachers of craft skills in SMP Negeri 5 Percut Sei Tuan, concluded that the work of students who have studied the craft skills assessed to be less varied, less creative and less still beautiful so that the acquisition value of students less than the maximum. It also complained of by some students that states are still confused in making a variation of craft skills, bored as often repeated on the job has the same. In line with student achievement data competence of the academic year 2013/2014 is still low category, out of 104 students only 40 students (38.4%) who meet the minimum completeness criteria and 64 students (61.5%) who do not meet the criteria of completeness, thus requiring remedial, Material skills too much with the demands of the curriculum lead to less meaningful learning, unfocused, thus learning skills that should attract into subjects that bore students, less than helpful, not even included in the National Exam. Society considers craft skills is not something that can be promising even called the science of derivatives that can be acquired in the community, this is the cause of students' lack of interest in learning.

To increase student competence in working on craft skills cannot be separated from all the components supporting the learning process in the classroom, in addition to the readiness of the teacher, the way teachers teach and the use of media that is primarily a means to convey the material in order to be well received. However the reality of media used by teachers when teaching is not maximized and only using media images, objects so even just using the media module only at the time of learning. Position of instructional media in teaching component as part of efforts to enhance the process of interaction teacher and student interaction and learning environments. The role of media-based interactive multimedia learning has great potential to stimulate students in order to respond to the learning materials are delivered. Sanjaya (2010) suggested that the media interpreted as a learning tool to facilitate the achievement of learning objectives.

While learning resource is anything containing messages that must be studied according to the subject matter. For the determination of instructional media, must be adapted to the characteristics of the area, because not all media according to the needs of students. Sudjana and Rival (2002) argued the benefits of learning media: (1) learning will be more attractive in order to motivate learning, (2) learning materials will be quite vague so it is easier to understand and enable the achievement of learning, (3) methods of teaching will be more varied, (4) students can more learning activities because not only listen to the description of the teacher, but other activities such as observing, doing, and demonstrate. Further Arsyad (2005) suggested that the characteristics of the media that the media have hardware, ie objects that can be seen, heard, or touched with the five senses, (2) the media has a sense of nonphysical (software), the content of the message contained in the hardware, (3) the emphasis media in visual and audio, (4) is a tool in the learning process both inside and outside the



classroom, (5) the media used in the context of communication and interaction of teachers and students in the learning process, (6) the media can used en masse (eg, radio and television), large groups and small groups (eg, films, slides, video OHP), individual (eg, modules, computer) and attitudes, actions, organization, strategy and management of which relate to the application of knowledge.

Role-based instructional media interactive multimedia has great potential to stimulate students in order to respond to the learning materials are delivered, but, in fact learning in SMP Negeri 5 Percut Sei Tuan, the use of the computer as a medium of learning, especially handy craft is still rarely applied, because not many teachers determine the type of media-based interactive multimedia computer that can be used in learning craft skills. Teachers when teaching use only the modules and image media. Computer utilization is very dependent on the teacher as a facilitator in designing computer as a medium of learning craft skills, for example the use of interactive multimedia based learning media, so some concepts craft skills such as embroidery ribbon can be easily visualized and can be presented more attractively.

Media interactive computer-based learning can be made with the help of software (Software). One software that can be used to develop learning media is Macromedia Flash. According Jayadi (2008), Macromedia Flash either a software program that is able to present the message of audiovisual clearly to students and materials that are real, so it can dilustrasikan more attractive to students with a variety of animated images that can stimulate student interest in learning to achieve learning objectives.

According to Sanjaya (2010), audiovisual media is a media intermediary or use of the materials through sight and hearing so as to establish the conditions that can make students become more active in learning and learning through the media can simplify and streamline the learning process. Appropriate learning media and innovative greatly affect the quality of teaching due to the use of the students' learning media becomes easier to accept the information submitted. The use of instructional media in the learning process should be tailored to the conditions and needs of students. Instructional media used in learning skills, including multimedia media types in the form of software. Instructional media must be designed and made in such a way that can be acquired competence craft skills, and can provide lots of ideas and creativity in the work, to the media that used to be able to attract the attention of students in order to stimulate inspiration in the creation of ideas and creativity in making variations craft. Learning curriculum for junior high skills in 2006, learning the skills of the craft contains a collection of study materials that provide insight about the skills and scope, knowledge of materials and tools, work, and presenting the work and entrepreneurial insight. Directed learning craft skills so that students can develop life skills which includes personal skills, social, and academic, with consideration of the interests and talents of students, as well as the potential for local, cultural, economic, and regional requirements.



Academic skills for students who will continue higher education, skills useful for those who will enter the workforce. Thus the craft skills were carried out in SMP are expected to provide food for a higher level or to enter the workforce, taking into account the needs of the community by supporting cultural traditions throughout Indonesia.

Implementation of learning skills need to pay attention to the signs as follows: learning skills include craft skills and technologies, skills performed by starting from the knowledge, materials, tools, and engineering work, learning materials craft skills and technology tailored to the interests and abilities of students as well as the ability of schools or areas, schools have more than one skill area teachers, each teacher provide learning skills in accordance with the field, the subject matter that are theoretical. Learning that are more process-oriented practices of the results, emphasizing mastery of skills work experience, leading to the mastery of professional expertise to be supported by the Program is carried out in accordance with the capabilities extracurricular school, district, talents and interests of students.

Learning media is something that can be used to deliver messages from the sender to the receiver in the learning process as an intermediary for the effective and efficient to achieve the learning objectives are set so as to stimulate the mind, feelings, interests and concerns of students in such a way. The media type of learning is visual media, image media, audio media, audiovisual media, multimedia.

Learning media has functions to: 1) as a source of learning, 2) as a tool. While the benefits of learning media to: 1) improve the quality of education, 2) provide broader educational presentation, 3) planning the teaching program in a logical and systematic. Multimedia is the combination of various media such as text, images, sound, animation, video by utilizing a computer program to deliver messages to users. Benefits of multimedia in learning is attracting the attention of students, the introduction of technology and communication for students, a new experience for teachers, motivated students. Macromedia Flash Professional 8 in learning is an instructional animation software to make it more attractive and easy to understand students and their application on a computer and projector imager.

Maswin (2010), suggests that multimedia is a combination of media or file format such as text, images (vector or bitmap), graphics, sound, animation, video interaction and others, while Niken and Haryano (2010) conclude that multimedia is the combination of various media (file format) in the form of text, images, animations, video, interaction, and others that had been packed into a digital file (computerization), is used to convey messages to the public. Daryanto (2010) describes the learning multimedia is a multimedia application that is used in the process of learning, ie learning multimedia useful to channel messages (knowledge, skills and attitudes) and can stimulate choices, feelings, concerns and the willingness of students to deliberately learning occurs, aims and control. In carrying out the process of learning the teacher should use the media complete, according to the needs. To fulfill this purpose, the use of multimedia become a good alternative for teaching. Further Daryanto



(2010), write down the benefits that can be taken in the use of multimedia for learning, namely: (a) Increase the attractiveness and attention of students, (b) introduction of information and communication technology to students, (c) Provide new experiences and fun both for teachers and students, (d) Pursuing dropping knowledge about science and technology in the field of education, (e) the use of multimedia can evoke motivation to learn the learners, because with the multimedia making instructional presentations more interesting, (f) Multimedia can be used to assist the learning mental models will make it easier to understand a concept, so concluded the benefits of multimedia in learning to draw the attention of students, the introduction of technology and communication for students, a new experience for teachers, motivated students.

To overcome these problems, teachers should be able to design and present a more interesting learning media so that the learning process can increase interest, more interactive, more effective awakens the desire, the motivation and stimulation of learning. With the development of instructional media can enhance learning craft skills.

Interactive multimedia-based learning is learning using multimedia or information and communication technology in which the learning process, students are more innovative, creative, motivation during the learning process. Because the media is able to combine text, pictures, audio, music, animated pictures and video in a single unit that supports in order to achieve learning objectives. Onesoftware that can be used is Macromedia Flash.

The role of the teacher becomes a facilitator of learning information by providing a variety of instructional media needed, to stimulate enthusiasm for learning, provide opportunities to practice the study results, provide feedback on the progress of learning, and it helps that what has been learned will be useful in life. That's necessary ribbon embroidery instructional media based interactive multimedia using Macromedia Flash professional 8 as a medium of learning in the activities of the learning process. In this study, in addition to arouse motivation and interest in learning skills of the students also want to see the development of Interactive Multimedia Learning Media Based on Using Macromedia Flash Subjects Craft Skills in SMP Negeri 5 Percut Sei Tuan.

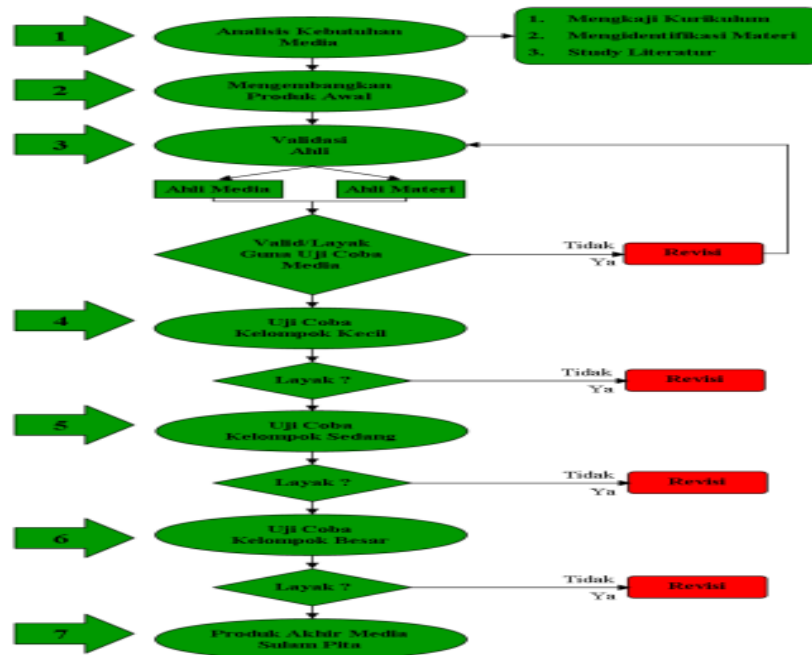
Based on the background of the problem, formulated objectives of this study: (1) Develop a learning medium ribbon-based interactive multimedia using Macromedia Flash Professional 8 on the subjects of craft skills class VIII SMP Negeri 5 Percut Sei Tuan, (2) Determine the effectiveness of instructional media ribbon-based interactive multimedia using Macromedia Flash Professional 8 on the subjects of craft skills SMP Negeri 5 Percut Sei Tuan.

## **II. RESEARCH METHODS**

This study is a research and development (Research and Development), which aims to develop learning media products to improve and develop the quality of education and learning effectively and efficiently. The study was conducted in class VIII SMP Negeri Odd Semester 5 Percut Sei Tuan



academic year 2015/2016. Subjects in this study were students of class VIII SMP Negeri 5 Percut Sei Tuan, with the object of the research is media literacy classes ribbon embroidery craft materials using Macromedia Flash Professional 8. Procedure development and research suggested Borg & Gall (1983), simplified namely: Conducting a needs analysis of media, develop initial product, expert validation and revision, a small group trials, trials moderate group, large group trials, the final product. Application Procedure Research and Media Development Ribbon Embroidery:



**Figure 1** Stages of Research and Development

Stages of research started from the needs analysis that examines the curriculum, identify the material, study of literature. Product development early is to establish a medium of learning, develop a media that has been designed. Making ribbon embroidery media include: the home menu, navigation instructions, profile, motivational menu, the menu description, the destination menu, menu ribbon embroidery materials, video menus, menu tests. Validation of the expert is an activity undertaken by experts to examine and evaluate systematically the instruments and media products that will be developed in accordance with the objectives undertaken by subject matter experts, and media experts.

Data collection techniques in this research is done by using a questionnaire. Aims to determine whether the development of the media can be accepted or not learning in SMP Negeri 5 Percut Sei Tuan. Questionnaire on this research that closed questionnaire where the respondents give an answer choice by providing checklist to mark answers provided. Once the data is obtained, then analyze the data and look at the effectiveness of the products designed.

$$P(s) = \frac{s}{N} \times 100 \%$$



Where:

P= Presentation Sub Variables

S= Total score of each of each variable

N= Number of maximum scores

**Table 1.** Interval acquisition score

No	Interval	Criteria	Nilai
1.	81% ≤ skor ≤ 100%	Very Good or Strongly Agree	5
2.	61% ≤ skor ≤ 80%	Good or Disagree Enough	4
3.	41% ≤ skor ≤ 60%	Less Good	3
4.	21% ≤ skor ≤ 40%	Less Agree	2
5.	0% ≤ skor ≤ 20%	Not Good or Disagree	1

### III. RESULTS AND DISCUSSION

The implementation process of the development of Interactive Multimedia based learning media using Macromedia Flash Professional 8 on the subjects of Crafts Skills done gradually. The initial process research and development conduct a needs analysis. The activity was conducted to obtain data on the learning process, learning characteristics of students, and the development of media required during the process of learning and teaching.

Activity of needs analysis was conducted to obtain data on the learning process, learning characteristics of students, and the development of media required during the process of learning and teaching. Activity needs analysis conducted in SMP Negeri 5 Percut Sei Tuan by distributing questionnaires to one craft skills of teachers and 35 students is class VIII1 SMP Negeri 5 Percut Sei Tuan.

The results of the questionnaire research needs of teachers are 100% stated-based learning media animation, images, video has never been. While the results of a questionnaire research needs of students is 100% said the media have never seen animation, images, video learning craft skills. Accordingly, because it required the development of interactive multimedia based learning media using Macromedia Flash Professional 8 on the subjects of craft skills. After conducting a needs analysis, the next step is the initial product development.

#### **Description Initial Product Development**

Basically, the purpose of learning media using Macromedia Flash Professional 8 is for the creation of interactive learning conditions, effective, and engaging between students and teachers so that creativity, interest in learning, motivation and learning outcomes in learning craft skills ribbon embroidery materials increased. Learning media products using MacromediaFlash Professional 8 and other support programs that assist in making background, backsound, effectsound, animated text or animated images.

#### **Data Validation Results Media Experts**

Tests performed four stages: (1) The media expert validation and validation of subject matter experts, (2) Trial small groups, (3) the trial group was, (4) Trial big group. Media specialists validate the product in the aspect of guidelines, indicators, content /materials, individual student interests, feedback, learning environment, the principles of computer components. Ratings do know the feasibility of the development of interactive multimedia based learning media using Macromedia Flash Professional 8 subjects craft skills ribbon embroidery materials class VIII SMP Negeri 5 Percut Sei Tuan.

Overall the average total score of aspects of the guide was 93.3% in the criteria very well, aspects of the indicator was 80% in both criteria, the aspects of the content/ materials was 93.3% in the criteria very well, the individual aspect is 90% in criteria very well, aspects of the student's interest is 93.3% in the criteria very well, aspects of the feedback is 80% in both criteria, aspects of the learning environment was 93.3% in the criteria very well, the principle aspects of the computer component is 90% in the very good criteria.

### Data Validation Results Matter Expert

Ratings used feasibility of developing interactive multimedia-based learning media using Macromedia Flash Professional 8 grade students of SMP Negeri 5 Percut Sei Tuan. The results of the validation in the form of a score rating of the component-based development of instructional media interactive multimedia using Macromedia Flah Professional 8 on the overall aspects include: the feasibility of the content / materials, the quality of the display. Overall the feasibility aspect contents with a total score of 93% in the criteria very well. Aspect display quality is 95% in the criteria very well.

### Data Field Trial Small Group

The trial results in the form of a score rating of the product development of Flash Professional 8 media that aspect of the appeal, the difficulty level, the view and the beneficial aspects. Results of the assessment student responses on aspects of appeal in small group trial overall was, in the aspect of the level of difficulty in the small group trial overall was, on aspects of the display in a small group trial as a whole is considered to agree, on the beneficial aspects in trials small group try's overall agree.

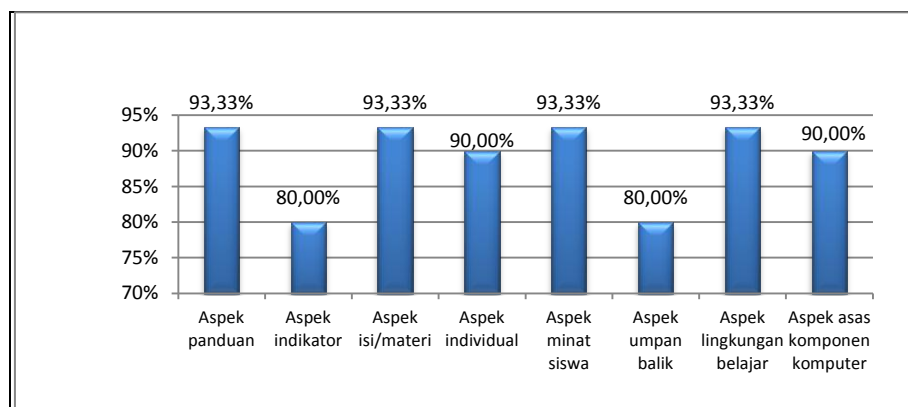
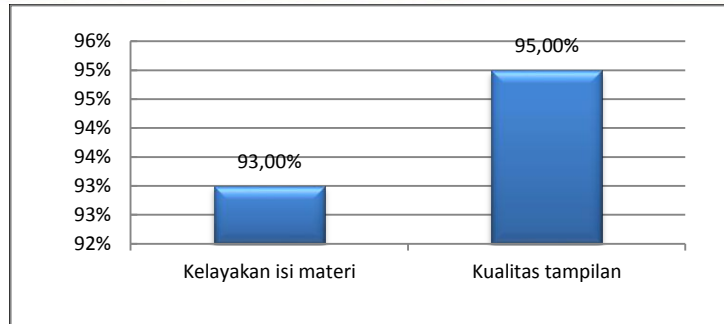
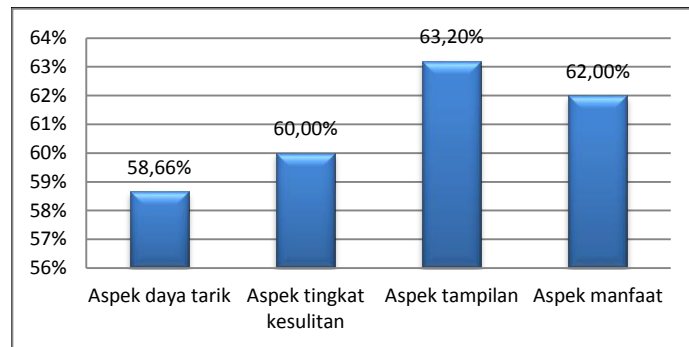


Figure 1. Acquisition By Score Media Experts.



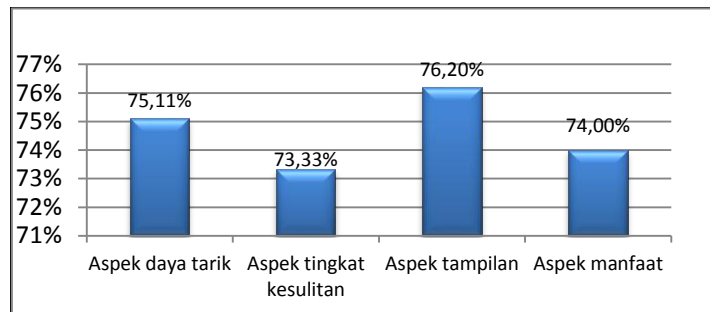
**Figure 2.** Diagram rod acquisition score by Expert Matter.

#### Data Analysis Results from Pilot Small Group



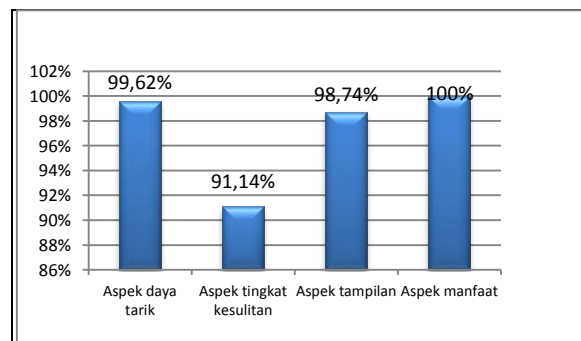
**Figure 3.** The bar chart on the acquisition of a score of small group trial.

#### Data Analysis Results Try Group Medium

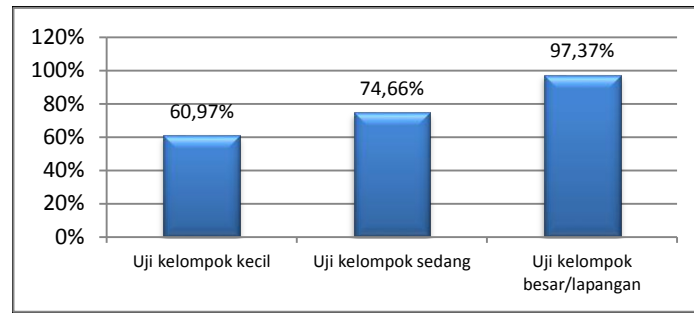


**Figure 4.** The bar chart on the acquisition of empirical score group trial being.

#### Data Analysis Results of Trial Large Group / Field.



**Figure 5.** The bar chart on the acquisition of scores of empirical testing large groups



**Figure 6.** Diagram rod small group test, test and test groups were large groups

Development of interactive multimedia based learning media using the main software Macromedia Flash Professional 8 and is supported by Sony Vegas Pro 9.0 software on the making of the video. With the ever using Macromedia Flash Professional 8 makes the display more attractive and interactive. In Sony Vegas Pro 9.0 software in the video creates a back sound and sound effects so that the video attracted the attention and interest of the students.

#### IV. CONCLUSION

Based on the results of the study concluded that the development of instructional media research craft skills to do a seven-stage. Based on the results of the study and a review of media learning craft skills assessment of media experts as a whole of 89.1% in the criteria very well. Assessment of subject matter experts an overall 94% in the criteria of "very good", fit for use as a medium of learning craft skills.

Based on the results of questionnaire responses of students who have done, got 97.37% responses in the criteria of "strongly agree" that the learning media attract attention, increase interest in learning, motivate students and media declared it looks interesting so effectively used as a medium of learning craft skills for the classroom VIII.

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## AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY

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**ABSTRACT** : Knowledge management system becomes a useful tool to manage knowledge in organizations. The goal of applying knowledge management system is to effectively utilize the existing knowledge to create new knowledge and to take some advantages to achieve organizational goal. Nowadays, knowledge management system is deeply applied in enterprises or companies yet limited in vocational education. This paper proposed a knowledge management system model for vocational education in terms of academic perspective to enhance learning capacity. Knowledge management system in this research is developed based on Balanced Scorecard. We first defined components of Balanced scorecard and build knowledge management system model is according to these components. The automated knowledge management system is generated by exploring weighted ontology. The proposed model has been validated by some experts and results revealed KMS model is recommended to be applied in vocational education to enhance learning capacity.

**Key Words:** Balanced Scorecard, Knowledge Management System, Learning capacity, Vocational education, Weighted Ontology.

### I. INTRODUCTION

Knowledge is a valuable asset for an organization or institution. It comprises individuals' experiences, values, insights, and contextual information which is required to be managed. The benefits of knowledge management (KM) are to increase profits, to improve quality of decision-making, to prevent knowledge loss, and to effectively reuse existing knowledge. Contrarily, KM have several limitations to be implemented, such as technical complexity, top management ambiguity (i.e. the management commitment to KM strategies is uncertain and unclear), and money/time consuming. Knowledge management system (KMS) therefore becomes a useful tool to manage knowledge in organizations. Many enterprises, such as Adobe, Microsoft, and IBM, have applied KMS to share knowledge resources, perform decision-making, etc.

On the other hand, Balanced Scorecards (BSC) is a well-known framework for organizational managerial. BSC is developed by David Kaplan and Robert Norton in 1992 to evaluate the organization's performance in financial, customer, internal business process, and learning and growth.

Knowledge management and Balanced Scorecards (BSC) proposals, projects, and systems are happening to appear in organizations. The relation between knowledge management and BSC has been widely applied in many enterprises recently. Enterprises such as AT&T, BMW, Dupont, Mellon, and UPS have revealed an excellent performance based on BSC which leads them to exploit resources effectively. The benefits of BSC are to implement strategic implementation, to drive the process of



change, and to aware the university staffs of the meaning of their work. However, there are limited vocational educations have applied KMS for academic domain.

Therefore, in this work we propose an automated knowledge management system model according to BSC in vocational education for enhancing learning capacity. The objective of this work is to develop a conceptual integrated view of knowledge management using BSC. The rest of this paper are as follows. Section 2 describes some related work about knowledge management system in education. Section 3 explains our proposed model. Finally, section 4 provides conclusions of this paper.

## **II. RELATED WORK**

A design and implementation of KMS, namely KMS-THU, has been proposed in Tsinghua University to support course-based learning system (Peng, Jiang, & Zhang, 2013). KMS-THU comprises three modules which are individual knowledge management (KM), group knowledge management, and public management. Individual KM is deployed for teacher and student to store and manage their learning documents or record their notes. Group KM and Public KM provide file management and open knowledge resource management, respectively. KMS-THU has been tested by several teachers and students. They agree that it benefits for storing, accessing, and sharing knowledge.

The predictive relationship between knowledge management and school capacity has been examined by (Cheng, 2013). A cross-sectional predictive quantitative survey has been conducted to aggregate data from secondary school teachers in Hong Kong. Knowledge management was evaluated as knowledge processes of accessibility, sharing, and application. The questionnaire investigated teacher perceptions of their learning capacity and the knowledge process and school learning capacity. A Structural Equation Model (SEM) was exploited to evaluate the questionnaire results. The results indicated that knowledge processes of sharing and application were identified as the predictive factors of teacher learning capacity while accessibility and sharing were identified as the predictive factors of school learning capacity.

KMS framework has been proposed by (Yeh, 2011) to enhance quality and performance of higher education. KM framework comprises a strategy for academic and organizational knowledge management. The academic knowledge consists of individual, institutional, and network knowledge while organizational knowledge consists of culture, leadership, technology, and measurement knowledge. The study claims that the proposed framework benefits to support educational administration which further supports teaching and learning process.

KMS is utilized as a flexible and adaptable tools for knowledge society and global market demand as proposed by (Trivella & Dimitrios, 2015). The study was conducted to consider knowledge management in public universities. A number of dynamic simulation models have been proposed to investigate the impact of the organizational culture, information systems, business



strategy, and structure. The dynamic simulation models revealed that the academic staff, students, and university staff satisfied to adopt a strategy to harness the bulk of knowledge and to manage it.

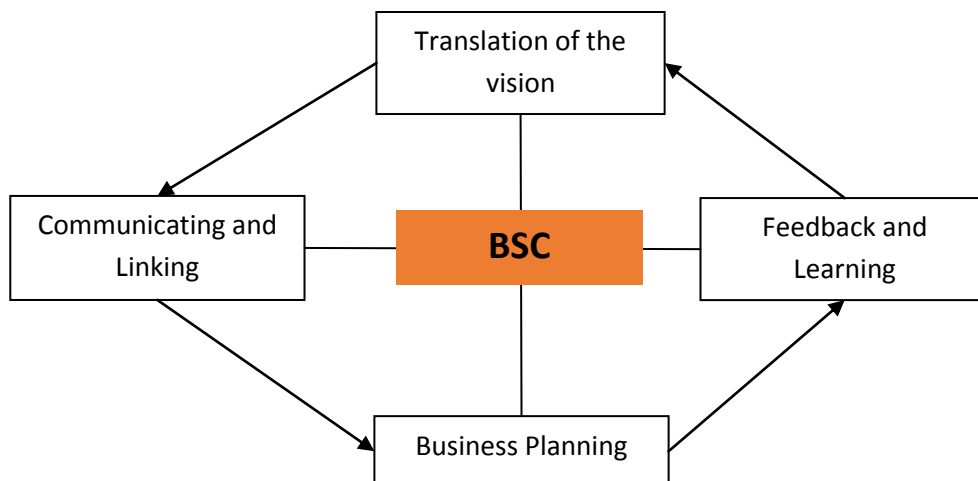


**Figure 1.** The basic concept of Balanced Scorecards

The aforementioned studies have not deeply explored Balanced Scorecards (BSC) for developing KMS in higher education. The basic concept of BSC is depicted in Figure 1. In our work, the basic concept is then adapted to the need of vocational education to build KMS model. KMS implementing BSC enables vocational education to recognize the most currently important and future knowledge priorities, goals and objectives, and the critical knowledge domains to develop strategic knowledge systems. Furthermore, integrated KMS and BSC supports vocational education to be more competitive by creating new knowledge according to the existing knowledge to reduce cost, to increase speed, and to meet vocational education requirements.

The steps for implementing BSC in vocational education are depicted in Figure 2 and listed as follows.

- Clarifying and translating vocational education vision and strategy;
- Communicating and linking strategic objectives and measurements;
- Planning, setting targets, and aligning strategic plans;
- Enhancing strategic feedback and learning.



**Figure 2.** Strategic Management System

### III. KNOWLEDGE MANAGEMENT SYSTEM MODEL

In building KMS, we first translate the basic concept of BSC to the need of vocational education as adopted from (Aljardali, Kaderi, & Levy-Tadjine, 2012) and (Sordo, Orelli,



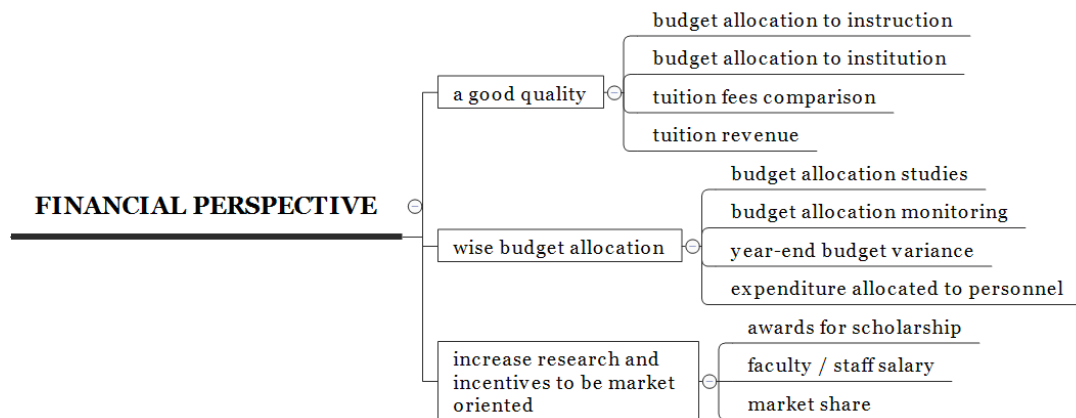
Padovani, & Gardini, 2012). A brief description of four perspectives of BSC is described as follows.

- a. Financial Perspective – *how do we look to stakeholders?*  
The aim of this perspective is monitoring the relationship between the organization and shareholders. The criteria for this perspective are such as shareholder value, profitability capability, income growth, and unit cost.
- b. Customer Perspective – *how do customers see us?*  
In this perspective, values for customers are targeted. The customers for this work are defined as students/parents, faculty/staff, industry, government, alumni, and society.
- c. Internal Process Perspective – *what must we excellent at?*  
This perspective determines the processes performance of identified strategy.
- d. Learning and Growth Perspective – *can we continue to improve and create value?*  
Strategic goals for this perspective are selected considering human capitals, staff abilities, knowledge, technology and organizational culture. The agreement about those elements is required to limit ambiguity.

In this work, the measurement for key performance indicator (KPI) of BSC is adapted from (Aljardali et al., 2012) with some improvement to meet the need of vocational education.

a. Financial Perspective

Let's assume that rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 3.



**Figure 3.** KPI measurement of Financial perspective

b. Customer Perspective



Let's assume that oval is stakeholder, rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 4.

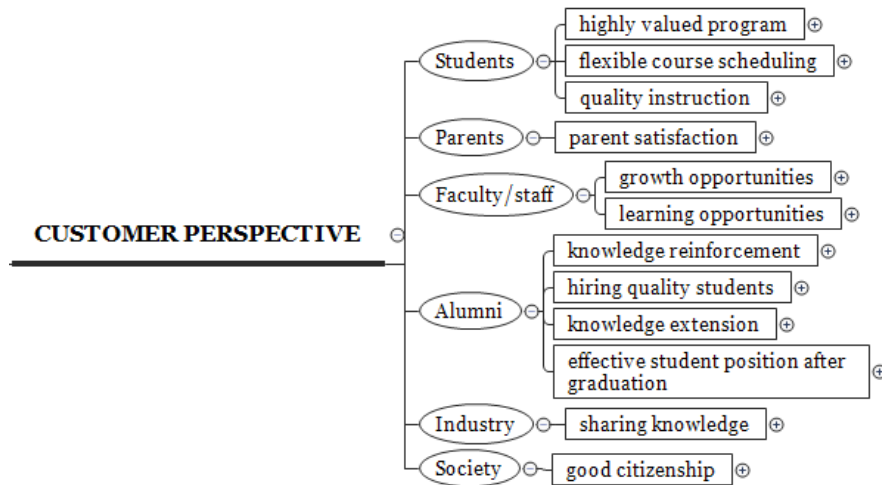


Figure 4. KPI measurement of customer perspective

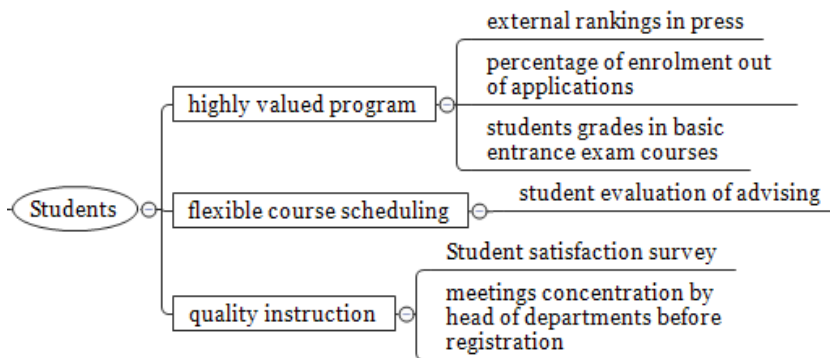


Figure 4 a. KPI measurement of customer perspective for students

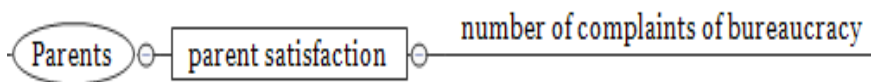


Figure 4 b. KPI measurement of customer perspective for parents

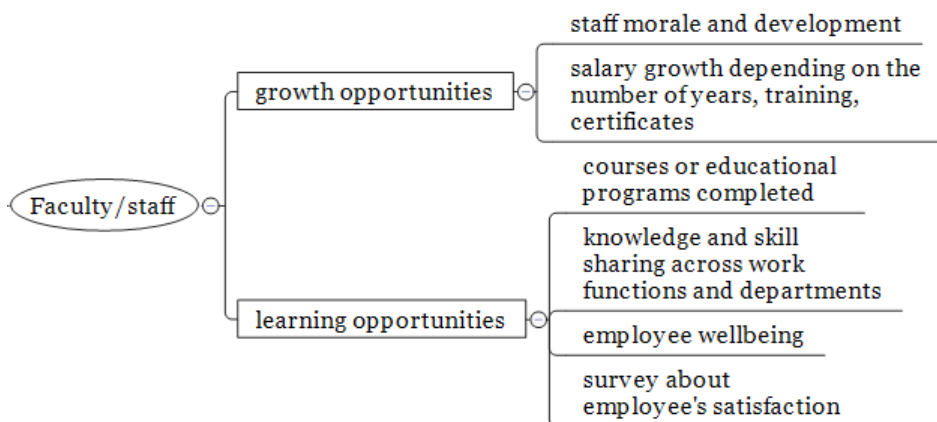


Figure 4 c. KPI measurement of customer perspective for faculty/staff

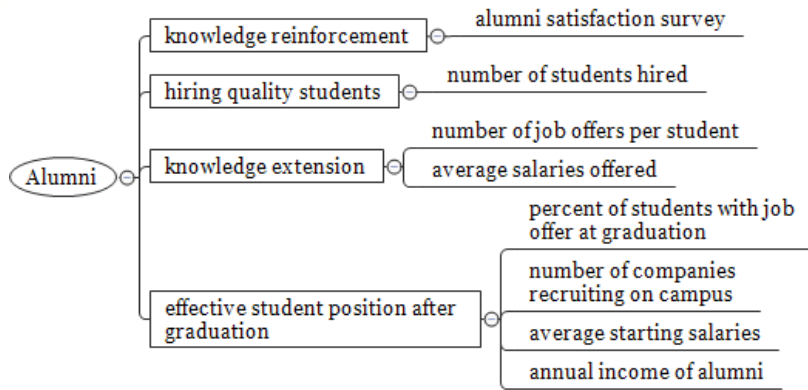


Figure 4 d. KPI measurement of customer perspective for alumni

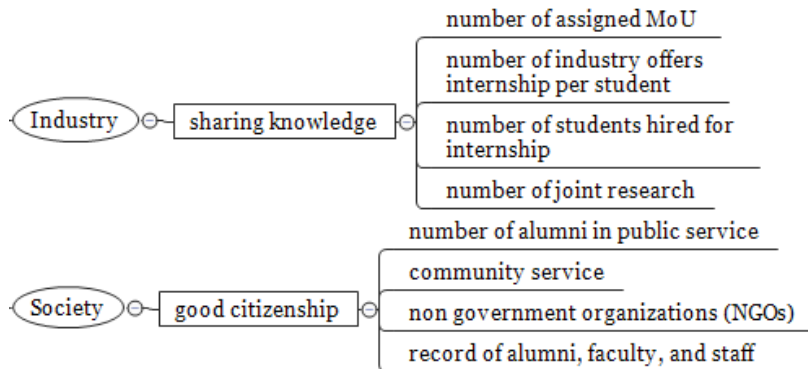


Figure 4 d. KPI measurement of customer perspective for industry and society

c. Internal Process Perspective

Let's assume that rectangular symbolizes the objectives of KPI and underline word is measurement of KPI. The measurement of KPI is depicted in Figure 5.

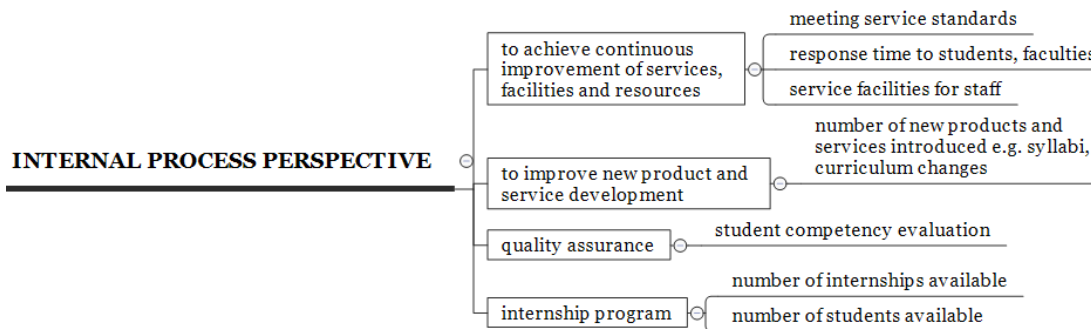


Figure 5. KPI measurement of internal process perspective

d. Learning and Growth Perspective

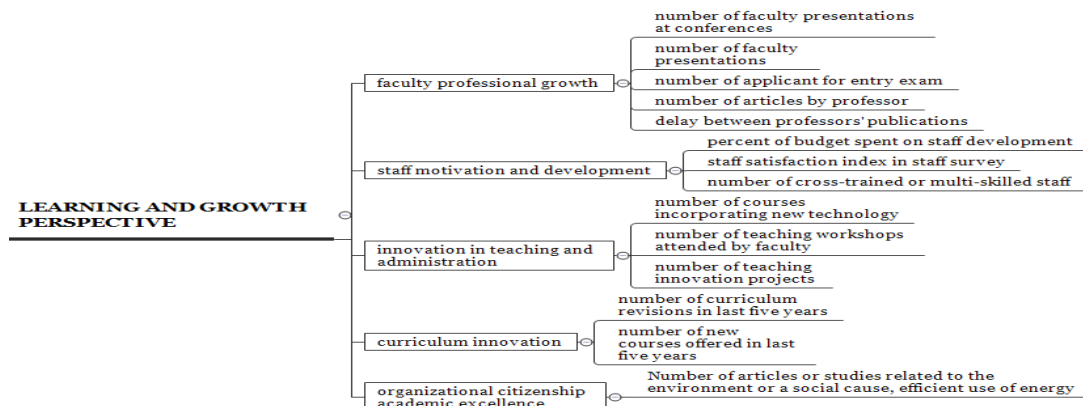


Figure 6. KPI measurement of internal process perspective



The next step after building the model of KPI of BSC is generating knowledge management system model. In this work, KMS model is built according to KPI measurement of BSC. The document is processed and classified into four classes, which are financial, customer, internal process, and learning and growth class. The objectives of KPI measurement are assigned to be subclasses of those four classes.

Each document which supports BSC perspective is processed automatically by utilizing weighted ontology model adapted from (Anistyasari & Sarno, 2011) which is an improvement of ontology model by adding some weight for each word according to its relation to other words. Words which have semantic similarity (i.e. estimated by dice similarity) are then grouped to further being measurement object of KPI of BSC.

The proposed KMS model has been validated by five experts. The validation results show that KMS model is recommended to be applied in vocational education to enhance learning capacity.

#### **IV. Conclusion**

This work proposes an automated-knowledge management system based on Balanced Scorecard. Four perspectives of Balanced Scorecard which are financial, customer, internal process, and learning and growth perspectives are first translated to the need of vocational education. Knowledge management system model is then built according to those four perspectives. Weighted ontology is explored to build an automated-knowledge management system model.

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