The role of industry partners to improving student competency of vocational high school

by Wirawan Sumbodo

The role of industry partners to improving student competency of vocational high school

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Abstract. The partner industry has an important role in increasing the competence of vocational students. Therefore they have the competencies needed by the partner industry, since it has a role in increasing student competence. This study aims to determine the relationship of the role of partner industries in improving milling machine competencies, to find out the differences in student competencies after engagement with industry. This study is an ex-post facto study and the population from 34 students of class XI in SMK N 1 Semarang, a public vocational high school (VHS). Data collection techniques in the form of observations, in-depth interviews, and questionnaires. Data analysis uses descriptive statistics. The results of the study show that there was a positive and significant relationship between the role of industry in improving student competence. Based on data analysis using IBM SPSS Statistics 20, the results of coefficient number correlation between the role of industry and increasing competency are classified as high with a value of 0.690. There are differences in student competencies before and after partnering with industry, average to 8.75%. VHS should always involve the industry in improving student competencies to be relevant to industry needs.

1. Introduction

The partnership between Vocational High Schools (VHS) and industries is needed to produce competitive graduates in the Industrial era 4.0. Such individuals will help in obtaining employees who are able to sustain the industrial growth. This is because such interrelations are mutually beneficial and can help develop students' competence level. In the 4.0 era, learning systems in VHS need to optimize the use of information technology in improving student capabilities. This is necessary because their graduates do not only require competency in this regard, but also need the ability to design, and produce, a marketing ability based on information technology. The online marketing ability is a competency aspect that needs to be provided to students, ensuring what is designed and produced are appropriate with the needs of consumers who are always dynamic. The increasing demand of consumers who want to be served quickly and easily pushes the industry and VHS needs to continue with innovations for more efficiency [1].

Information technology previously been used to describe the needs of human resource, something that will continue to develop. This is the reason why VHS students should be equipped with the ability to use information technology and foreign languages optimally according to the needs of industry 4.0. In this regard, human resource needs on information technology-based manufacturing sector will continue to grow along with the development of robotics. Therefore, it is necessary to implement

reskilling programs for human resources on VHS and Industrial or employees based on current consumer needs.

The industrial era 4.0 requires prepared human resources (HR), especially a vocational graduates. The total Open Unemployment Rate (OUR) of vocational graduated is the highest compared to other levels of education with 11.24% not been accepted to work. If the management follow the industrial needs in planning, then there should be no unemployed graduates. Schools should train students and ensure they have skills needed by industries [2].

Facing existing unemployment problems, the world of education must take part in preparing human resources to be ready to compete in the labor market. VHS is secondary schooling that prepares students primarily to work in various fields. Its main purpose is to make individuals acquire knowledge, abilities, and practical skills needed in certain jobs. Furthermore, it helps individuals earn a living, making the society socially responsible. More qualified labor needs to be provided to obtain a stronger economy and fasten social development, though this require efforts [3].

In most communities, the quality of VHS graduates is poor and need to be improved, theory and practice must be in line with the curriculum based on the needs of industrial partners. The school and industry have their own advantages and disadvantages, something that requires careful consideration. The availability of teachers is relatively sufficient, though necessary practice equipment is still limited. In comparison, industries tend to have relatively sufficient industrial equipment, but does not have the necessary education personnel [4].

In structuring Indonesia 4.0 roadmap, one of the priority programs is to improve the quality of human resources (HR). A talent is an important factor in the execution of the program. Therefore, Indonesia plans to rearrange the education curriculum through emphasizing more on STEAM (Science, Technology, Engineering, the Arts, and Mathematics), balancing it with the needs of the industry in the future. The country will work with key industry players and foreign governments to improve the quality of VHSs and the global workforce mobility program. This will help utilize the availability of HR in accelerating the transfer of capabilities [5].

VHS graduates are expected to work in the industrial sector. According to a report [6], these are the main inputs for the industry. Therefore, schools must have close relationships with industries to gain support in improving practical training through activities such as donating equipment and tools, staff exchange programs and placement of students and staff as work experience. Figure 1 shows vocational graduates, the HR inputs for the industry.
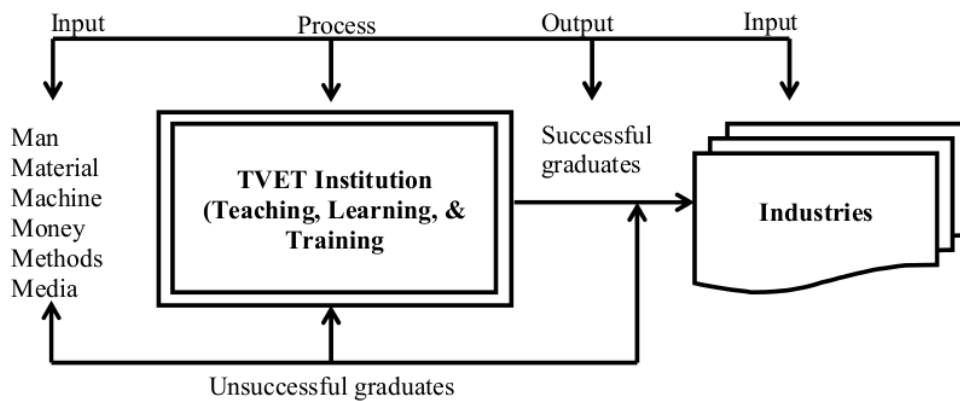

Figure 1. Outputs of Vocational High School (VHS) / Technical and VHS and training (TVET) are the inputs of industries [6].

The teaching method in VHS have not succeeded in having a positive impact on the acquisition of practical skills of the graduates. These teaching methods include: traditional lecture approach based on strong theoretical background, group discussions, field trips and Student Industrial Work Experience. Therefore, the role of industry partners is needed to meet the current industrial challenges [7].

The graduates must have the competencies needed in developing industrial partner. This is essentially done with the intention of making ready for both work and competition in the 4.0 era. The graduates will greatly help the industry improve efficiency and thus remain superior and on upward trend in terms of growth.

Competency is the capacity to carry out special activities that often require combination of knowledge, skills and values [8]. The theory of developing competencies emphasizes that students must not only acquire but also integrate knowledge, skills and attitudes to achieve vocational competence [9]. The general idea of most competency definitions consists of pieces of integrated knowledge, skills and attitudes to carry out professional tasks successfully. Many researchers define competence as a whole of knowledge, skills and attitudes. Integration must be measured as a learning process and competence as erudition products. This integration process leads to a certain level of knowledge, skills and attitudes (i.e. level 2 is more difficult than level 1; for example, worker assistants need a lower level of competence than supervisors). In measuring proficiency, we can assess the certain level of knowledge, skills, and attitudes when applied together to perform professional tasks. This limits the meaning of competencies (i.e. products) to the combination of knowledge, skills, and attitudes used to carry out tasks, which may also facilitate valid and reliable judgments. This does not mean that the three aspects might measure completely and separately. [10].

The transformation in the planned education department has to meet the principles of link and match which is the cornerstone of the successful implementation of VHS. The adoption of this concept not only triggered the transformation of educational facilities and infrastructure massively but also demanded changes to the teachers as the main stakeholders facilitating learning in school. This happened in Indonesia as one of the developing countries facing several obstacles in attempts to realize ideal VHS based on the concept of link and match. Such challenges include lack of qualified teachers, high operational costs, inadequate equipment for practice, and lack of curriculum clarity, maintenance problems and repair equipment [11].

In response to the aforementioned, the Directorate of Vocational Development should prepare graduates in the most efficient way. The strategies to be used in this regard include: changing and improving the curriculum appropriated to the needs of work and industry, short-term fulfillment of teachers, availability of cheap equipment, and implementation of the Indonesian trade and service industry based on the partnership of VHS and Industry. The effort was made to improve the implementation of the learning process to be more effective and efficient [12]. In line with the goal of a long-term education development 2005-2024, Vocational development is directed at increasing international competitiveness as a foundation in building national independence and competitiveness in facing global competition in the future.

To support the development of regionally competitive education in 2015-2019 and to prepare for the industrial era 4.0, it is necessary to increase the competency level of students. As part of stakeholders, students are supposed to be qualified and have the ability to express Knowledge and Technology by involving industry partners through mutually agreed upon vocational partnership programs. Therefore, the role of industrial partner in improving student competency, and acknowledging the differences in competencies is a concern.

In learning, there are critical aspects for consideration, the most critical one being the method used. The learning method applied must also be adapted to the appropriate media for the software used. A good example in this regard involves using module learning media, hand out, animation/simulation, and the application of problem based learning to practical subjects [13]. Therefore, there is a need for the industry to take part in improving student competence, a move that can be achieve through: preparation of teaching modules, practice facilities, and facilitate of projects from industry.

One of the competencies that must be possessed by vocational graduates is the milling machine technique, a process is used to remove material with a rotating cutter. It is usually used by industry for cutting unnecessary materials as well as to produce various characters in a part [14].

Several VHS still uses traditional strategies in teaching and do not involved the industry in planning, implementation and evaluation. This is needed in improving student competencies, making them relevant to the industrial needs. For example, Public SMKN 1 Semarang has partner industries such as CV Suryacip Semarang, a printing machine maker industry. In the production process the industry requires the ability to make gears, components in making printing machines. This study was meant to determine the role of industry in improving student competencies.

Despite hard skills, Soft skills are also needed in the partner industries. These are characteristic abilities that individuals have in responding to their environment. It involves interpersonal abilities such as the aptitude to manage self and relational skills including how individuals interact with others, something that helps individuals apply the knowledge in work field [15]. The study was also meant to determine the soft skills needed by vocational graduates to suit the needs of the related industries.

2. Method

This study included ex-post facto research to reveal events that have occurred as well as various factors related to the occasion. The sample population involved 34 students, 11st grade of SMKN 1 Semarang. The data collection techniques consisted of observations, in-depth interviews, and questionnaires, with descriptive statistics analysis. The validity of the instrument was tested by expert judgment and empirical checks using Product Moment correlation. The instrument was the Alpha cronbach formula and the data obtained were descriptive statistics. Requirements test analysis and scrutiny of computer-assisted correlation IBM SPSS Statistics 20. Interpretation of correlation were as shown in Table 1.

Table 1. Interpretation of correlation coefficients

Correlation coefficients	Reliability level
0,00 – 0,199	Very low
0,200 – 0,399	Low
0,400 – 0,599	Enough
0,600 – 0,799	High
0,800 – 1,000	Very high

3. Results and Discussion

The research data was obtained in the Mechanical Engineering skill competence. Furthermore, Information from partner industry role variables were obtained using questionnaires with Likert scale answers. These tools were given as many as 34 copies to students.

Industrial role questionnaire instruments involved 28 items. Through tests for validity and reliability, 3 questions were confirmed invalid. The questionnaire instrument for increasing student competency of 28 items was confirmed valid and reliable, while 3 items were declared invalid and unreliable.

The validity of the instrument used the product moment and Pearson correlation with a significance level of 5% and N = 28. In testing the instrument, the r table price was 0.374. The results of the analysis using IBM SPSS Statistics 20 for industrial role instruments were declared valid with a correlation index of 0.69. The reliability of the instrument used alpha formula. From the calculation results by IBM SPSS Statistics 20, the results of the r value were 0.69 with a high reliability level and were confirmed dependable.

The data analysis technique used was parametric system, a strategy that must meet the data distribution requirements. It addition it must be normal with the relationship between role variables (X) only affects the Y variable (competency).

From the statistical calculations, it can be seen that the role of industry is quite high, probably 72 percent. Based on the calculation of the analysis, the value of r was 0.69. This proved that there is a positive relationship between industries and schools in improving the competency levels in a direct proportional manner. The relationship indicators of industry roles and milling machine competencies in details were as shown in Table 2.

Table 2. Role Indicators of industry partners in the competence of students in Public Vocational High School (SMKN 1) Semarang

Sub variable	Indicator
Industry role	Teaching subjects
	Module
	Job sheet
	Job sheet
Sub variable	Indicator
Competence	Analyze work safety
	Determine the need for work
	Operate the milling machine
	Check components for adjustments to the details

The differences in learning outcomes (milling machine competencies) before and after industrial roles are clearly illustrated in figure 2. There was an increase in competency in the following measures: Analyze work safety 7.14%, job requirements 9.41%, operating a milling machine 22.7%, and checking components 8.23%. Students' competence levels increased by an average of 8.75%.
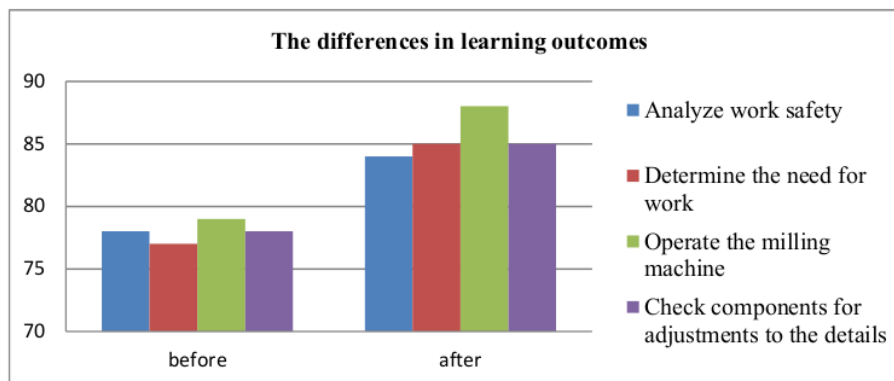

Figure 2. The differences in learning outcomes (milling machine competencies) before and after industrial roles

The interviews with partner industries of CV Suryacip requiring soft skills include honesty, discipline, work motivation, interpersonal skills, hard workers, carefully and detailed, leadership,

creative, responsibility, commitment, communication, and ethics. The research showing the percentage of soft skill requirements in the industry is represented in Figure 3.
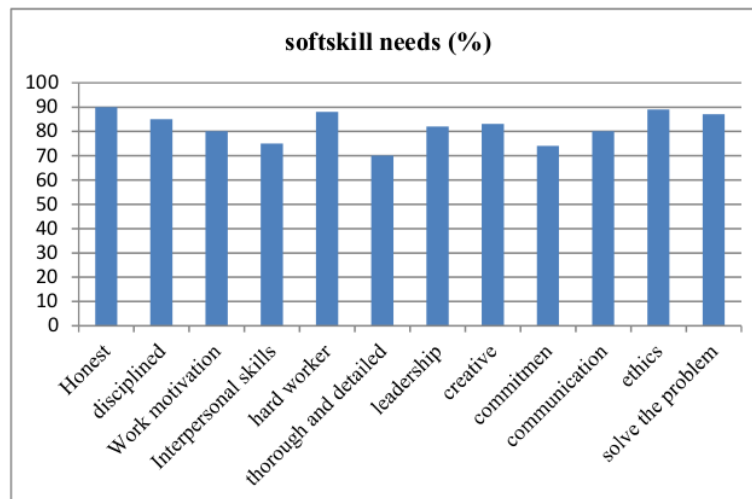

Figure 3. shows soft skill needs of Mechanical Engineering VHS graduates in the partner industry.

It is evident that Researchers prioritized the four main soft skills needed by machining vocational skills competency graduates. The first is honest with the highest score of 90%, ethics 89% because it is needed both for colleagues and superiors at work. The third one was hard-working with 88%, and lastly problem-solving ability with 87%. From the results, it is important to use character education in improving the soft skill's ability, something that helps individuals apply their knowledge in the work field.

4. Conclusions

The results of the study showed that there was a positive and significant relationship on industry when it comes to improving students' competence. From the results, the correlation coefficient number between the role of industry and the increase in competence is classified as high with a value of 0.690. There were differences in student competency before and after the material given by the partner industry, students' competence levels increased by an average of 8.75%. This study recommends that Vocational High Schools involve the industry in terms of management from the planning process, implementation of learning, monitoring, and evaluation as a partner. There is also a need for student character education to improve students' soft skills.

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