



## Development of Technopreneurship Learning Model in Vocational High School Machinery Program

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### Abstrack

This research aims to develop Technopreneurship learning model in package engineering expertise machining; test the effectiveness and practicality of the Technopreneurship learning model in package engineering expertise machining. The methods used are research and development. Subjects trials one Technopreneurship learning group. Instruments of collecting data are teacher and student's questionnaire sheets, validation instruments, interpersonal, intrapersonal, skill observation sheet, product result, teachers and students response, cognitive test. Analysis of data with t test for effectiveness and practicality of learning. Results of the research is a Technopreneurship learning model that has 4 stages to improve attitudes technopreneur, develop products based on the results of an investigation into the need for appropriate technology tools in surrounding communities. Technopreneurship learning model effectively declared the results of post test better assessment of the results of pre-test assessment. Technopreneurship learning model implemented in the second semesters of grade XI who have taken industrial practice. Teachers must have a productive capabilities and entrepreneurship.

## PRELIMINARY

National Labour Force Survey Data (Sakernas) 2004-2014 showed unemployment Vocational High School in February 2013 amounted to 864.649 (Central Bureau Statistik, 2014). Data in August 2013 the unemployment rate increased by 45.51 % of the data in February 2013. Data in February 2014 decreased by 32.65 % of the data in August 2013 and by a further unemployment rose by 67.34 % in August 2015 increase in the unemployment rate in each month of August due to post-graduate students. It is caused by one factor imbalance between the numbers of jobs provided by the number of potential workers and occur a lack of compatibility link and matches the needs of the competencies needed by the company with the education provider. Problematic number of job seekers exceeded the number of jobs available will be able to be minimized by the ability of student entrepreneurs who owned the time of graduation.

This study discusses the development model of learning that can improve students' entrepreneurial competence-based technology by considering the potential to help solve environmental technology needs for the community. Entrepreneurship synergized with technology is a form of Technopreneurship (Gonzales in Depositario et al, 2011: 106). Technopreneurship is an entrepreneurial process begins with innovation (Siswadi, 2013: 7). Technopreneurship can grow well if there is a partnership of industry, academia and government through education, training and coaching to achieve competitive advantage (Etzkowitz and Leydesdorff, 2000 in Walker, 2012: 12). Technopreneurship learning process would be achieved if supported by the right curriculum, effective learning methods and good management (Sudarsih, 2013: 62). So technopreneurship education would be better if synergy with practical learning.

Educational practice has been more oriented to the completion of the teacher's job sheet based on competence appropriate curriculum. Determination job sheet product yet

practice -oriented technology needs for the community. Competence development would be more meaningful if needed surroundings. Learning-based productive practices in social productive activities will provide a real experience to achieve something important for themselves and the environment (INEPS, 2012).

So the need for synergy between learning Technopreneurship with productive practice learning to improve students' attitudes Technopreneurship before completing vocational education . It created a basis for consideration in dealing with various issues , among others : (1) The challenges of globalization associated with readiness skills and the quality of vocational school graduates, but stock in Technopreneurship still minimal, (2) Unemployment are open for vocational tend to be high because of the vocational school graduates are not absorbed in employment which are available.

(3) Entrepreneurship education given vocational student's engineering expertise machining program is general, not related to the practice of learning outcomes. (6) Reinforcement learning practices that integrates with Technopreneurship elements as a first step to increase human resources who are ready to face the globalization era, which is still not optimal.

The purposes of this study are: (1) Describe the learning model Technopreneurship on a package of technical expertise machining. (2) Testing the effectiveness of the learning model Technopreneurship on a package of technical expertise machining. (3) Explains the practicality of learning model Technopreneurship on a package of technical expertise machining.

## METHODS

In this study, using R & D on developing learning model Technopreneurship. The steps of research R&D according to Sugiyono (2013: 532) consists of 11 steps, among others: Potential and problems, (2) Literature and collection of data, (3) design study model Technopreneurship, (4) Validation of the model

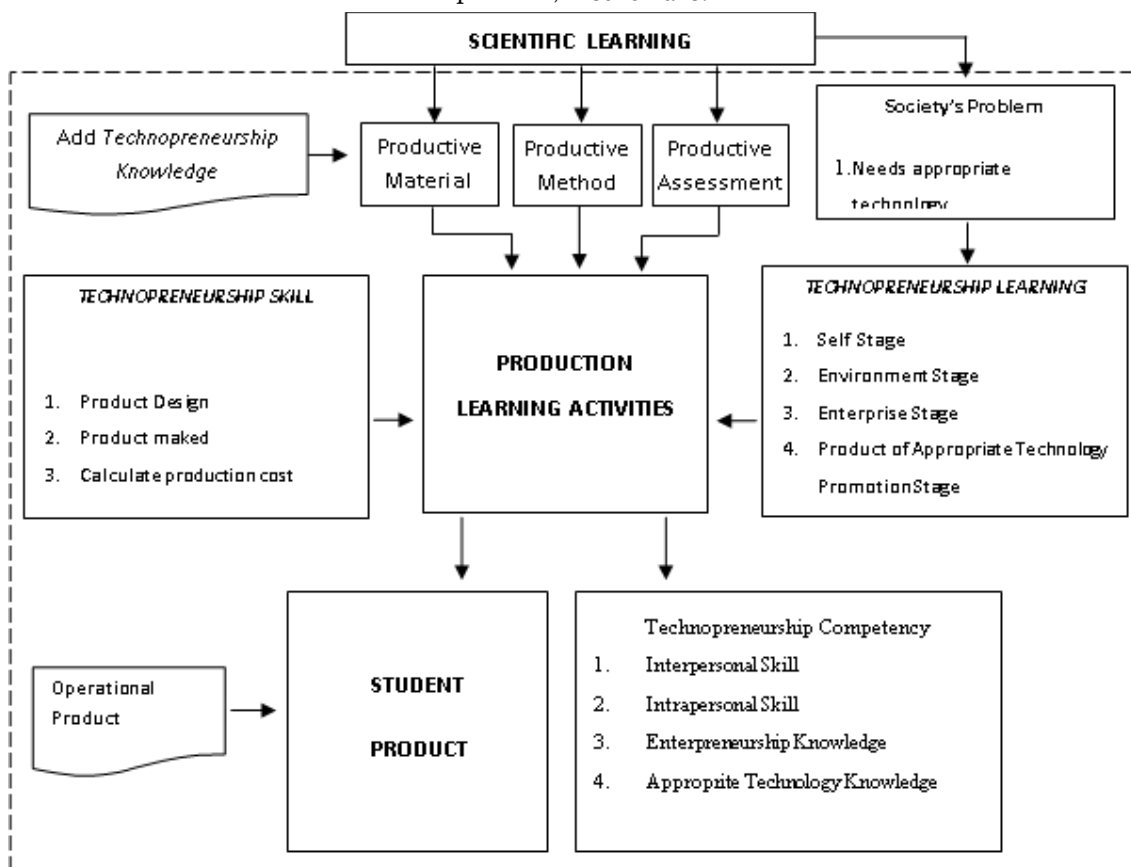
design, (5) Revised design, (6) Making learning model technopreneurship, (7) Trial Limited learning model technopreneurship, (8) revision learning Model technopreneurship, (9) Testing learning Model Technopreneurship, (10) Revised learning Model technopreneurship and (11) Test Field.

The subject of this research is the study group Technopreneurship SMK Saraswati Salatiga. Data collection instruments used includes questionnaires, written test, observation sheets and evaluation sheets. The measured variable is the attitude of interpersonal,

intrapersonal, product knowledge and appropriate technology. Analysis of the data used to test the effectiveness test T test, practical test by analyzing the response of the respondents.

## RESULTS AND DISCUSSION

The final result of the development of the learning model Technopreneurship on a package of technical expertise machining is “*Produktif Orientasi Lapangan 4 Tahap (POL 4T)*”. Model schema is:



**Pictures 1.** POL4T Technopreneurship Learning Model

POL 4T technopreneurship learning model is an integration of productive practice learning class XI student of Mechanical Machining with learning technopreneurship developed from models SEED. An achievement competence technopreneurship section on the material this entrepreneurship will facilitate students in creating creativity and innovation having gained knowledge to solve problems and find appropriate opportunities Zimmerer

opinion and Scarborough, 2002 in Sudarsih 2013:57).

The final model of learning Technopreneurship after the test phase experience a change in the stage of building a business. Reduction of this stage due to the consequences of the cost and time required to reach the stages of building a business very much and students in a class that many are not allowed to do in learning optimally.

Development is done on aspects of the syllabus, lesson plans, teaching materials. Productive materials given to the student teachers are given additional material about Technopreneurship to students. Competencies productive granted in accordance with the order in the syllabus of existing product and developed elements of competence Technopreneurship material.

Early learning method used is the method of teacher lectures related to the description of the reality of the needs of technology, observation of students, community technology problem identification, determination of efforts to solve community problems further product planning practices already consulted with teacher educators to serve as a practice project was undertaken. The measures resulted in stages Technopreneurship students directly involved with the problems of society needs technology that will increase the level of awareness of students, reading opportunities, solve the problem of the solution is a form of the character of a Technopreneurship the opinion of Okorie (2004: 66). So this technopreneurship model execution will improve the indicators of a techno.

Assessment is done with the product assessment of student outcomes and competencies Technopreneurship students grouped in the attitude of interpersonal, intrapersonal, entrepreneurial knowledge and knowledge tools Appropriate Technology (TTG). Activities in Technopreneurship learning models include: the first phase of self-understanding. This stage of the teacher role is to help students understand their potential, hobbies, abilities and skills of students. At this stage aims to enable students to know the extent of their potential, ideas, knowledge and technical skills and productive capabilities so that when learning is done in groups can be optimized in the division of tasks and responsibilities of the group. The process of self-understanding of students conducted by one teacher in team teaching.

The second stage is the stage of understanding the environment is about mastering the environment by observing the

condition of the environment, the needs of the environment so as to generate product ideas are needed community. Understanding the environment is done by direct observation, look at existing technology tool, view videos, images in the process of generating ideas based on existing local potential. This process is part of learning in vocational education. Vocational education is an education that takes into account local potentials in learning activities (Slamet, 2011: 197). Local potential include all the wealth that has distinctiveness, uniqueness, historical as markers in the city or region (Roesmanto, 2007: 23). This stage appears the level of creativity, innovation, future-oriented toward environmental potential student observed. Leadership, communication skills, and express opinions will appear in this stage.

Aspects of the skills that appear at this stage is the ability of the students in making the design tools and the results of the observation field supplies. The process of designing a control group with the guidance and direction of teachers 2 in team teaching. The results of this phase in the form of product design practices that further consultation with the teacher for a productive product done during the learning practice.

The third stage is the stage of understanding entrepreneurship is related to student knowledge stage entrepreneurial element that contains knowledge about the definition of the business, the elements in self-employment and entrepreneurial character traits, how to calculate the cost of production, marketing, how to face obstacles and risks. At this stage student entrepreneurs are combining knowledge already acquired on entrepreneurial learning is applied in practice learning. Patterson and Mitchell in Putero et al (2013: 19) argue that an engineer not only understand the physical characteristics of a product or system that is designed, but also the general business perspective in its management system. This stage of the process is guided by three teachers in team teaching.

The fourth stage in this learning model is the result of the introduction of technology products that made the students. Students do a

presentation to the class associated with how the background of the device is made, how the tool works, how to make, how to test the feasibility of tools and pricing tools. Product introduction phase improves communication skills, confidence, and teamwork. The effectiveness of the learning model technopreneurship tested using different test pre test and post test. Testing the use of test results technopreneurship learning

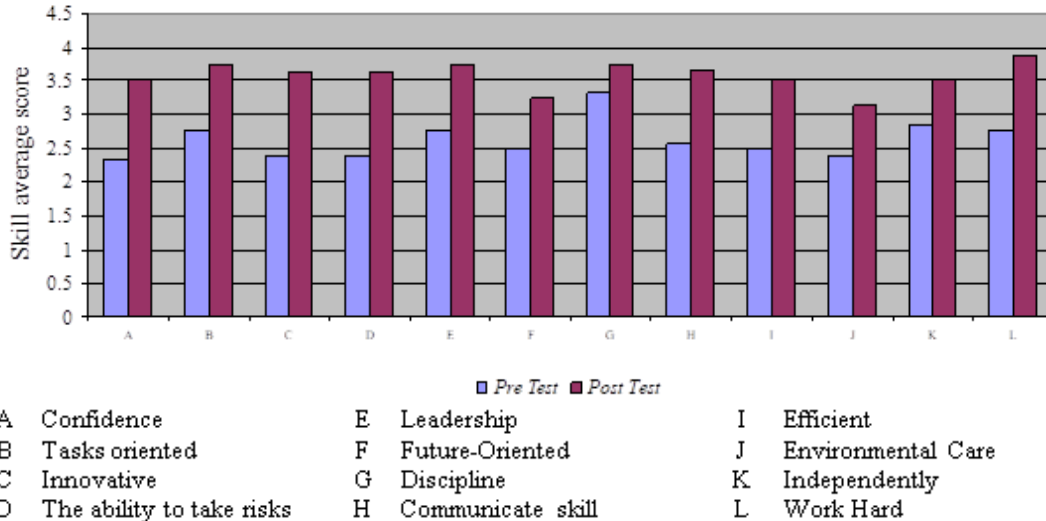
model that was tested in one classroom with one group scale limited number of 4 people with pre test and post test. Analysis of differences in learning outcomes of students carried out to determine whether the differences in learning outcomes of students with the use of the technopreneurship learning model. Assessment Results pre test and post test are as follows:

**Table 1.** Results of the assessment pre-test and post-test on the learning model components Technopreneurship on a package of technical expertise machining

Rated aspect	Pre-Test		Post-Test	
	Average	Criteria	Average	Criteria
Interpersonal Skill	2,42	More low	3,56	Very High
Intrapersonal Skill	2,69	High	3,64	Very High
Knowledge	1,37	Low	2,69	High
Productive Skill	1,75	Low	3,50	Very High
The ability of appropriate technology product	1,00	Low	3,66	Very High

This Technopreneurship learning model declared effective by the test results of all aspects of the overall model is rated at trial Technopreneurship learning model occur significant increase. Attitude interpersonal skill

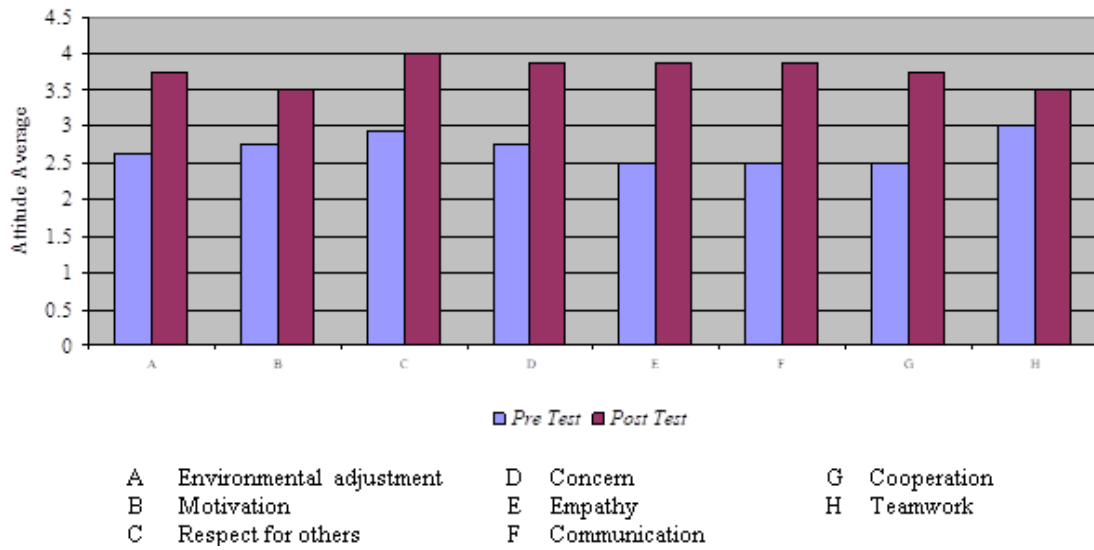
is an aspect that describes the ability to manage the work environment so as to adapt to the work situation (Hamidah, 2013: 55). The trial results interpersonal attitudes, among others:



**Picture 2.** Interpersonal Attitudes Result

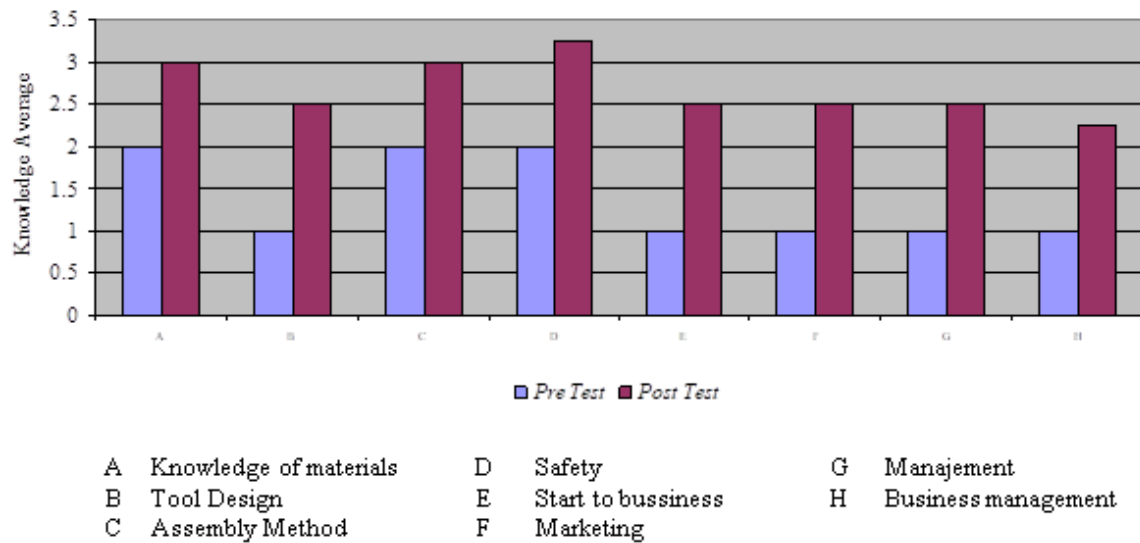
All aspects of interpersonal attitudes of students increased after using model Technopreneurship on a package of technical expertise machining. The highest ratings are in the attitude of hard work, this is because students are required to cooperate with other

students and complementary to complete its work in making products operations. Changes highest in the innovation element with a value of t -test paired sample test showed -19. That is a very high change in the aspect of innovation after Technopreneurship learning model.



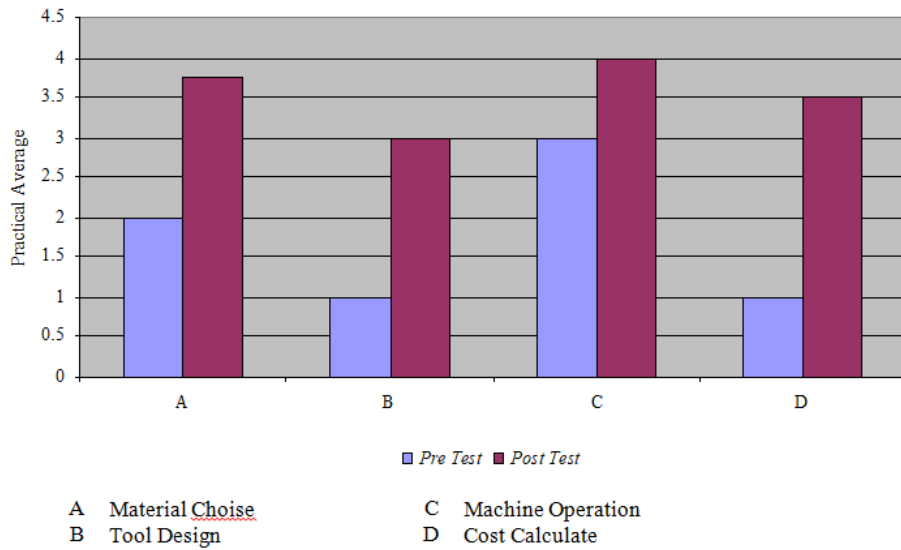
**Picture 3.** Intrapersonal Attitude Trial Results

Overall intrapersonal attitudes of students increased after using model Technopreneurship on a package of technical expertise machining. The highest ratings are in respect for others. The increase in pre-test and post-test highs on empathy and communication, this is because students work in teams, students practice their product linkages with other students to become operational products. The test results paired sample test showed the cooperative attitude of -15,121. Communications at -11,000. The test result can be imaged Technopreneurship knowledge graph as follows:



**Picture 4.** Technopreneurship knowledge testing Results

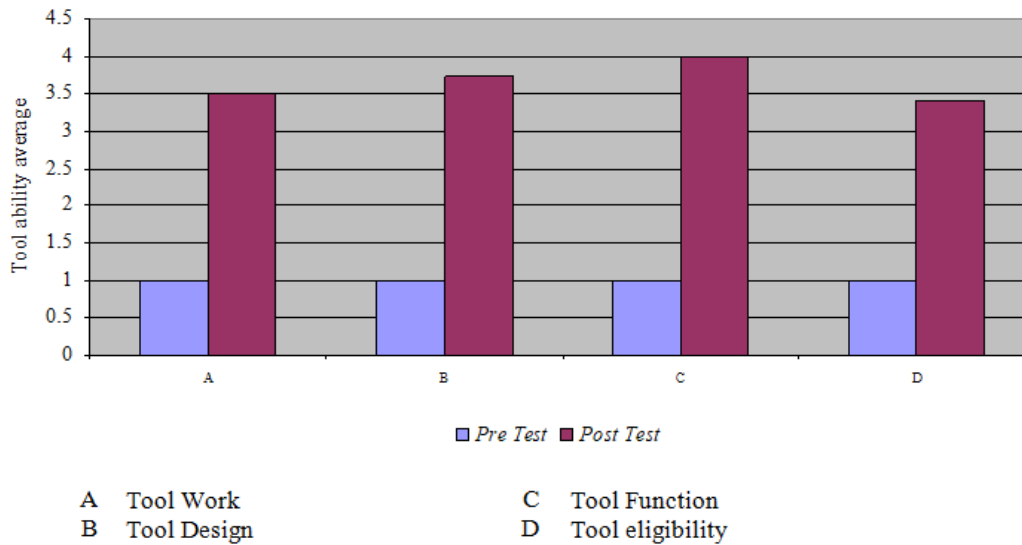
The test results paired sample test showed knowledge, design knowledge, and safety by an increase greatest in the indicator safety with t calculate equal to -8,660. Aspects of increased knowledge of the aspects of material selection



**Picture 5.** Technopreneurship Skills Trial Results

The test results paired sample test showed the biggest improvement in the indicator calculates the costs by t calculate equal -17,000. Increase student's skills in aspects of calculating

costs because during this time the student was never calculating the current cost of doing productive practices. The trial results TTG tool can be imaged graph as follows:



**Picture 6.** Appropriate Technology Product Testing Results

Function tool experienced the highest increase this matter because the results technopreneurship practice in learning is the result of the operation. So the focus in the final practice product is how the student can use and function. The test results proved the practicality of the results of the questionnaire respondents stated that 91.54 % stated that the practical learning model with very high criteria.

In the overall interpersonal attitudes occur significant differences between before and after application of learning models Technopreneurship. The increase in the interpersonal aspects contained in the aspect of improving the attitude of confidence increased since the implementation of the model is done in groups so that every moment of learning going discussion group for the process product. In the lead group learning ability to organize and affect other students in the discussion so that ads confidence of students increases. This task-

**DISCUSSION**

oriented attitude increases for each student in the group given the task or practices to create a product that is operational. The linkage rate and yield of products by the students greatly affect the results of other students practice and results in group practices. These results are also appropriate in the opinion of Geoffery G. Meredith (Ahmad et al, 2011: 24) the task-oriented attitude is characterized their achievement needs, result oriented, persevering, resolute, determined hard work, have a strong encouragement, energies and initiative. Innovative attitude will arise due to the manufacture of products that are the result of observation operational needs of the community. Prodan in Dolatabadi (2013: 140) argues that innovation will occur if separated from large groups or others. Implementation of practice in groups and come from the observation of people's needs would increase a person's attitude innovation.

The ability to take risks with their students increased synergy results working practices. The decision to undertake immediate student results according to the design and design practice will enhance students' ability to take risks to do during practice. This will increase the creation of new products that have not been tested reliability, strength and feasibility. Learning that originated from students and teachers do according jobsheet not associated with the practice of other students, Technopreneurship learning model these students are working on the workpiece according to the design that was designed and undertaken related to the results of other students.

There is communication and advise members during the learning process, so there is a student's ability to argue and accept criticism and suggestions from others. According to Geoffery G. Meredith in Ahmad (2011: 2) positions of leadership have the feature to behave as a leader, sociable, responding to suggestions and criticisms. Aspects of the highest increases in communication sociable attitude because in practice carried out in groups. Intrapersonal attitude overall increased after learning Technopreneurship with

demonstrated the entire t test paired sample test result was negative. Attitude, motivation increases because students feel product to be made is the responsibility of one team so that if there is an idea of the other students better than students' ideas, the students will use the idea. Cooperation, communication and team work increased in the test results because the learning models with group work in finishing products made by the students.

Increased knowledge aspect as in the manufacture of students should know and understand what kind of quality products that fit in a circuit made. Students are able to choose products that are ideal and suitable in making an efficient product, but the expected future performance is not reduced. Knowledge of safety, increase with more complex forms of work that the students in making the product. Skills choice of materials and design tools increased since the previous students have never done the design tools in practice, but just doing the work piece in accordance with a given job sheet. Products Technopreneurship overall learning outcomes, increased after learning Technopreneurship. An increase in the product features and functions of the tool. This is because the product is the result of observation of the tool needs as required by the operational community.

## CONCLUSION

Based on the results of research and development model that has been done, the results of the analysis and discussion can be summarized as follows : (1) learning model Technopreneurship on a package of technical expertise machining combine competence Technopreneurship and productive with yield practical products Appropriate Technology - based environment according to the needs of the technology community. (2) Learning model technopreneurship effectively used in learning the machining technique based membership packages were significant differences in post-test results better than pre-tested.



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