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INTEGRATED WORK-BASED LEARNING (I-WBL) MODEL DEVELOPMENT IN LIGHT VEHICLE ENGINEERING COMPETENCY OF VOCATIONAL HIGH SCHOOL

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Abstract

This research is to (1) analyze the implementation of new field project; (2) develop conceptual model of WBL integrated to industry; (3) test the validity of WBL integrated; (4) test the effectiveness of integrated WBL. This is educational and development research using randomized pretest-posttest and controlled group design. The population was all vocational school students. The research was conducted from March to December 2016. Data were collected by listing, using observation sheet, interviewing guidline and documenting. Validating was done by some experts. The data were analyzed in descriptive and multivariate Analysis of Variance by SPSS.17. The result shows that (1) the implementation field project has some weaknesses; (a) the schools are less prepared to plan the program, place and MoU; (b) schools never formally invite outside; (c) not all schools have a guidance to do a field project and schools only measure student's skill aspect after doing field project; (2) developing model through philosophical level, theoritical level, methodological level, dan classroom practice; (3) after validation of the guidance book by 12 experts, it shows the average score up to 4; (4) The group using WBL is more effective than that using field project in increasing the student'.

Keywords: *development, model, Work-Based Learning (WBL), integration*

INTRODUCTION

The improvement of a nation is influenced by the quality of its education. An education with a quality will change the people of the nation's mindset. Then, this change within the people's mindset will certainly lead to a change in many aspects of human life. Those aspects include social, cultural, economic, and political aspects. If any of the four aspects mentioned undergoes a decrease in quality, it shows the imperfect of the quality of the nation's education.

Meanwhile, the Indonesian National Education aims to improve the whole human quality, which includes a human with a noble character, advanced personality, firm, intelligent, creative, ingenious, discipline, professional work ethics, responsibility, productive, and physically and mentally healthy. To reach the goal, the quality of the learning process needs to be adjusted to knowledge and improvement as what is needed through educational innovation.

Teachers/ instructors/ educators had a strategic role in the formal education. The improvement of the education quality should be improved in accordance with the improvement of the teacher quality. (Wiyanto, Samani, & Sugiyono, 2017, p. 350).

Education is supposed to be able to invest knowledge, skills, and values that will be able to improve human ability in living (Ghozali, 2010, p. 5). The philosophy of vocational within essentialism believes that vocational education must relate to other systems such as economy, employment, social, and many others (Djojonegoro, 1998, p. 41). When attributed to economy, the vocational education is hoped to improve the quality. When attributed to employment, it is hoped to provide jobs in the business and industrial worlds. When attributed to social, it is hoped to create a prosperous society.

According to Joyce, Weil, & Calhoun, (2009, p. 7) , the application method of certain learning will affect the students' ability in educating themselves. As stated by Hansen (Billet, 2011, p. 59) "...vocational does not imply a one-way subordination of the person to the practice. Vocation describes work that is fulfilling and meaningful to the individual, such that it helps to provide a sense of self, of personal identify". Moreover, vocational education, according to Kuswana (2013, p. 157), is an education held by an education institution (secondary, engineering college secondary post) which is managed by the government or the industrial society.

The low number of unemployed citizens in Indonesia is caused by the incompatibility between the education limit and the work field needed by employers. This phenomenon requires the Indonesian governments' efforts in changing the education paradigm so that the educated work forces own the competence to work. Pavlova, (2009, p. 7) stated that vocational education is an education that studies specific training that can be applied at work. The concept of Investment in Human Capital (Becker, 1975, p. 45) stated that education, training, or other forms of human investment provides knowledge, values, and skills that are beneficial for human beings so that they can enhance their learning and productivity capacity. The enhancement will allow human to pursue a higher level of education. Vocational education mostly learns the preparations of working. The learning includes cognitive, affective, and psychomotor learning (Suyitno, 2016, p. 101).

The deal on the presence of natural person principle (the allowance of employing foreign employers) is one of the challenges that need to be faced in the MEA era. Therefore, to face it, employers should be provided with technological capabilities as the management of technologies used in the production processes. During the MEA era, employers would be able to hire employees based on their level from around the world. For example is professional staffs would be given to those with an international experience, or unskilled labourers taken from developing countries. Hence, with the presence of globalization, human movement will become easier and freer. On the other hand, the small amount of employees needed is the cause of the increase in unemployed citizens in Indonesia. Unemployment in Indonesia is mostly caused by the imbalance number between job seekers and job vacancies, the imbalance of work field structure, the imbalance of work forces provision and utilization in regions, and the job seekers' competence which does not correspond to the on needed by the employers.

When studied in depth, such as the double system education concept, it is found

that through industrial work practices are not only about conducting the school curriculum obligations, but they are also able to provide more knowledge on work ethics, able to train their mindset for work, and prepare the students before they graduate and take part in the real life. The industrial learning does not only aim to complete the curriculum, but also to teach students on how to interact with their employers, co-workers, and clients in order to train the soft skills that should be possessed by every student.

Witnessing the weaknesses of industrial work practices, both from schools and implementation processes, there needs to be a development within the work-based learning which is able to refer to the improvement of competence and industrial work practices instructional implementations which is provided in the integrated model. The word integrated refers to the connection between school and industrial learning, and to the planned industrial work practices. The plan should include place selection, competency agreement between schools and industries, learning the industrial work practice preparations in schools, learning the industrial work practice in industries, and school and industry evaluations. By applying the Integrated Work-Based Learning (I-WBL), it is predicted that the industrial work practices will be enhanced. Hence, the application a reference for SMK, especially the ones that are focused on light vehicle engineering competency, to apply industrial work practices based on WBL that will be done.

METHOD

This research is a form of education research and development. The population of the research includes every student that is conducting the industrial work practices in SMK Daerah Istimewa Yogyakarta. The research is conducted in Daerah Istimewa Yogyakarta's SMK and Industrial World. It is conducted since March until December 2016. Moreover, the data is collected through inventory, observation paper, in depth interview, and documentation. The Validation Analysis of content is done using the expert judgement. Data analysis technique includes the model development data analysis and experimental data analysis. The model development data analysis is done through qualitative descriptive and quantitative descriptive analysis. The analysis is conducted by analyzing the model effectiveness with experiments that include descriptive and inferential (hypothesis testing) analysis by first conducting the analysis requirement test.

RESULTS AND DISCUSSION

Model Development

After the test is done, it is found that the model should be revised, which is from the hypothetical model into I-WBL empirical model. I-WBL itself was made by the WBL concept (Boud, 2001) that explains that WBL is created in order to provide challenges in fulfil the students' and the companies' needs in the future. Education institutions also take part in making decisions for the program by appreciating the agreed standards and levels.

The inputs received from the test are: (1) theoretical study in the forms of philosophical, theoretical, methodological, and classroom practice is input, (2) empirical study within the model that is prakerin weaknesses and form of activities is input. Moreover, within the limited test, the following I-WBL application inputs are obtained: (1) the industry and school should work towards an agreement/ contract on the preparation of I-WBL application in schools, (2) students should make I-WBL application journal matrix. The following picture is the result of model revision made after conducting the limited test.

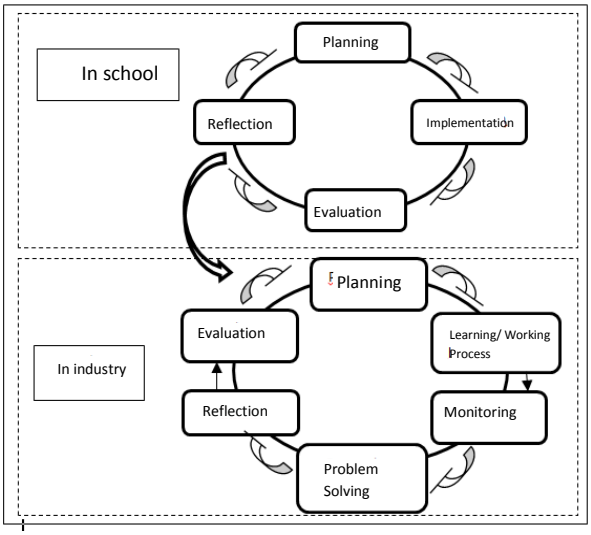

Figure 1. I-WBL Model

Validity result on I-WBL Model Guidebook

The model guide consists of: model guidebooks, guides for supervisor teachers, guides for instructors, and guides for students. Overall, the model guides after being validated by experts from both DUDI and university academics are as shown by Table 1.

Tabel 1. Validity result of I-WBL model

No	Description	AMT
1	Implementation Basic are stated clearly	51
2	Model component are stated clearly	52
3	Content trained are stated clearly	50
4	Learning steps/ syntaxes are stated clearly	53
5	Content within report format clarifies the book	52
6	Using language that is in accordance to Indonesian language rules	51
7	Communicative problem formulation	50
8	Using sentences and words that are easily understood	49
9	Does not use ambiguous (double meaning) vocabularies	47
10	General assessment on guidebook for learners in implementing I-WBL TKR SMK	53
	Total	508
	Average	4.23
	Chriteria	

After conducting the properness validation test by 12 experts on the model guidebook, most of the results show a number above 4. There are 9 experts who gave an average score of 4 (good) and wrote B (may be used with a little revision). From the 9 experts, it is proven that the model guidebook is proper to be used within the I-WBL learning. Moreover, there were 3 experts who gave an average score of 5 (very good) and wrote A (may be used without revision). The evaluation of the 3 experts has proven that the model guidebook is very proper to be used within the I-WBL learning of Light Vehicle Engineering competency in SMK.

The product generated from this research is Integrated Work-Based Learning (I-WBL) model for students of Light Vehicle Engineering (TKR) of Vocational Junior High (SMK). The concept that was built based on I-WBL begins from theoretical and empirical foundation that has been done. The theoretical study was begun based on philosophical, theoretical, methodological, and classroom practice studies. On the other hand, theoretical base always develops based on the field context which always undergoes development. The result of data description shows that the participated students generally do not find difficulties in conducting I-WBL activities. Competencies achieved by every aspect, including knowledge, behaviour, and skill, experience a significant increase. Based on the result average and multivariate analysis, the increase in competency is sequentially started from skill, behaviour, and knowledge aspects.

The model test has shown that the I-WBL model is effective and efficient to be conducted. The effectiveness is seen from the aim of the model that is reached. Moreover, the efficiency refers to the vocation purpose of the students of Light Vehicle Engineering in gaining experience within the industry that is reached. According to the several studies done, the characteristics of I-WBL model are (1) a strong base on theoretical and empirical foundations, and the ability to be accounted for; (2) Equipped with a validity tested guidance model; (3) Equipped with a validated Lesson Plan; (4) Able to minimize the deficiency of industrial practices which has been done by the SMK; (5) The interaction between the students and the industry is pictured clearly, such as the result of observing students' interaction with the industry; (6) The result of the effectiveness test which stated that I-WBL is better than Industrial Practices that have been done so far; (7) Requires commitment and solidarity from every unsure that takes part in it so that I-WBL will have the opportunity to run as expected.

Privilege of I-WBL

There are several privileges of I-WBL, which are (1) I-WBL model is made with strong bases that include philosophical, theoretical, methodological, and classroom practice foundations, also field observation that is taken from real events; (2) I-WBL model has a model device that includes model guide, lesson plan, and instruments that have been validated by experts of its own field; (3) The effectiveness has been tested, and it is found that the I-WBL model is better than the industrial practice model that has been

applied; (4) This model is comprehensively better seen from the knowledge, behaviour, and skill aspects; (5) In applying I-WBL, a visit to the industry is no longer needed, because people from the industry shall be invited to schools in order to align its perception and interaction with students; (6) This model does not only measure skills, but also behaviour and knowledge.

Weakness of I-WBL

The weakness of I-WBL is that the difference between ATPM (Agen Tunggal Pemegang Merk – Single Agent Brand Holder) and common workshop has not been measured. Moreover, the various types of workshop characteristics more or less influence the applied model.

I-WBL Process Observation Result

The industrial learning process is marked with the school's preparation process and direct interactions with the industry. There are three indicators which become the reference for industry based learning, that include: (1) interactions with instructors; (2) self adjustment to the environment; (3) works based on the work procedures.

Interactions with Instructors

The interactions with instructors become the main principal in conducting the industrial learning. There was an increase within the first four weeks of the interactions with instructors, but upon entering the fifth week, there was a decrease. This is due to the fact that students began to take part in the industry during the fifth week.

This interaction with instructors is in accordance to Brite's (2013, p. 3) idea on WBL development Considerations in the implementation level that includes: (1) supports a diverse delivery system, (2) is accountable with evaluation based on program effectiveness in supporting students' achievement.

As seen from the following picture, there is, indeed, a downfall. Yet it does not reach the zero point. This means that there are still interactions that go on. Particularly, interaction processes take place due to consistent customs and accompaniment.

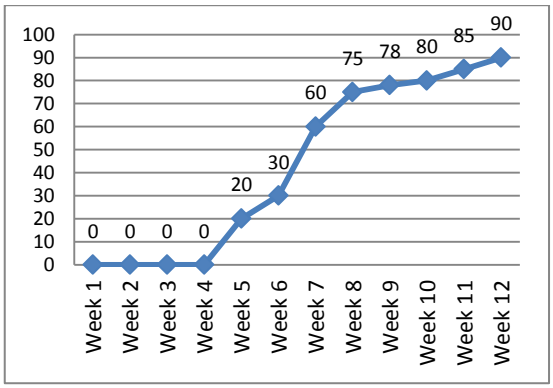

Figure 2. Interactions with Instructors

Self Adjustment to the Environment

The industrial world has a slightly different rules and environment compare to other environments. This environment should be followed in order to be comfortable and accepted by the work place. This self adjustment includes work equipments, work place, employees, friends, and workshop's customers. The data result of self adjustment to the environment observation is taken for two weeks in the school and 10 weeks in the industry. Within the first 2 weeks, there is an adjustment because students are still in their school within that first 2 weeks.

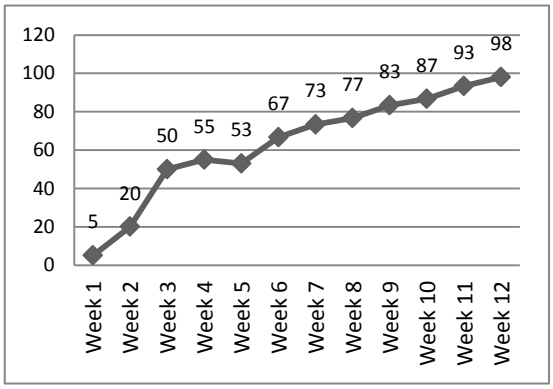

Figure 3. Self Adjustment to the Environment

After the fourth week, the self adjustment experienced uplift until the 16th week that reached 97% of adjustment to the work environment.

Works Based on the Work Procedure

Industries have set the Standard Operational Procedure (SOP). Therefore students are required to be trained based on the agreed SOP. Within the following diagram, there has always been an increase starting from the 1st

to the 16th week. The increase of the 1st week is 10% and the 12th week is 97%. This proves that in the I-WBL process, there is an increase of work based on the work procedure.

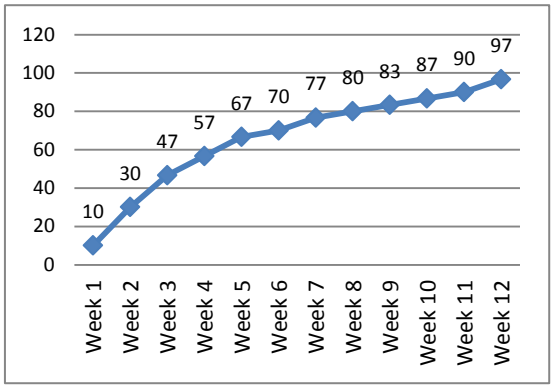

Figure 4. Works Based on the Work Procedure

Response of Students

The students' responses are collected by using questionnaire made to reveal the indicators of (1) motivated by the I-WBL model, (2) agree to the I-WBL model. 11 questions are then made based on this indicator. The result is as shown by Table 2.

Tabel 2. Response of Students

No	Statement	Avrg
I	May be Motivated by I-WBL model	
	Sub average	4.39
II	Agree to I-WBL model	
	Sub average	4.22

Based on the result of the questionnaire, it is seen that within indicator (1) can be motivated by the I-WBL model with the average score of 4.39 which means that the respondents agree that I-WBL is able to motivate students in learning. Moreover, from indicator (2) there is a 4.22 average score for agreement of I-WBL model that shows how many students agree in applying I-WBL to Vocational High School, especially Light Vehicle Engineering competency.

This research accommodates the students' response in their work place. According to Murphy & McCormick (2008, p. 48), "these education and training responses may be seen as a move to generalize aspects of workplace knowledge, to select out from work that knowledge which is commonly needed. At the same time, the move leaves intact other knowledge that is seen as work place specific." This opinion is align with the test result that states the knowledge of work place should be studied in order to prepare the students to be ready in facing the real work world.

Primary Hypothesis Test

Multivariate test aims to acknowledge the effects of using learning model in knowledge, behaviour, and skill generally/ completely, or in other words used to test the primary hypothesis.

There is one primary hypothesis within this experimental research. In order to be able to be tested, the primary hypothesis is formulated as: zero hypothesis (Ho) and alternative hypothesis (Ha).

Ho: There is no difference in students' competency between the I-WBL model and the PI of SMK's Civil Engineering Expertise Program.

Ha: There is a difference in students' competency between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

The competency mentioned within the hypothesis has three variables, which are: knowledge, behaviour, and skill aspects competency. The three variables are interval or continued data type of dependent variables, while the independent variable is categorical type of learning model. Therefore it requires multivariate analysis if all variables were to be arranged in one analysis model. The multivariate analysis model refers to Multivariate Analysis of Variants (MANOVA).

After the sample is declared to come from a normal distributed population, has a homogenise variants between groups, and has the same co-variants matrix, MANOVA may be applied. This experimental research requires two testing which is collected in MANOVA that includes: Multivariate Test and Test of Between-Subject Effect). The primary hypothesis, particularly, is used for multivariate test, while test of between-subject effect is used for secondary hypothesis which will be explained after this discussion.

There are four statistical methods of multivariate test that includes: Pillai's Trace, Wilk's Lambda, Hotelling's trace, and Roy's Largest Root. The four methods are disembogued on the usage of F test statistic, and the chance for a tolerated mistake (alpha, α), often

called as the level of significance, is 0.05 (5%) or in other words has a level of confidence of 95%. The criteria for decision making related to the hypothesis is: If Sig > 0.05, accepts Ho which means opposes Ha. Conversely, if Sig. ≤ 0.05 opposes Ho which means accepts Ha.

The four statistic methods to gain the value of F are not accumulated manually, but by using the SPSS program package. Table 3 is a summary of SPSS output for Multivariate Test.

Tabel 3. Multivariate Test

Methods	Value	Sig.
Pillai's Trace	0,835	0,000
Wilks' Lambda	0,165	0,000
Hotelling's Trace	5,066	0,000
Roy's Largest Root	5,066	0,000

As seen within Table 3, Multivariate effect test has a value of F = 56,000 (Sig = 0.000 ≤ 0.05) and turns out to be the same for each statistic method (Pillai's Trace, Wilk's Lambda, Hotelling's Trace, and Roy's Largest Root), in which the decision that can be made is opposing Ho and accepting Ha. This means that within the level of confidence at 95%, there is a significant difference of students' competency between the I-WBL model and the PI SMK's Civil Engineering Expertise Program. Keeping in mind that the I-WBL group generally experiences a bigger average score increase of 24.41 compared to PI of only 11.44. Therefore it may be concluded that the I-WBL model is more effective than PI in enhancing the students' competency of SMK's Civil Engineering Expertise Program.

Yet, this result is still not able to prove whether the I-WBL model is really more effective than PI, especially in increasing each variable that includes the competency of knowledge, behaviour, and skill aspects. Therefore it should be followed with a secondary hypothesis test to prove it.

Secondary Hypothesis Test

There are three secondary hypothesis of this research; each of them consisted of zero hypothesis (Ho) and alternative hypothesis (Ha), in order for the hypothesis to be tested. More than one Ha may be written as H_1, H_2, H_3, etc. Moreover, the secondary hypothesis is formulated as follows.

Ho: There is no difference in competency of students' behavioural aspect between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

H_1: There is a difference in competency of students' knowledge aspect between the I-WBL model and PI SMK's Civil Engineering Expertise program.

Ho: There is no difference in competency of students' behavioural aspect between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

H_2: There is a difference in competency of students' behavioural aspect between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

Ho: There is no difference in competency of students' skill aspect between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

H_3: There is a difference in competency of students' skill aspect between the I-WBL model and the PI SMK's Civil Engineering Expertise Program.

The three hypotheses are then tested with Test of Between-Subject Effect which is a series of multivariate variant analysis. The statistic test that is used is F which is gained by dividing the Mean Square (MS) of differences in the score increase of each learning model applications by its Error. Mean Square (MS) is acquired by dividing the Sum of Square (SS) by the Degree of Freedom (DF). The F value that is obtained has a probability (p) or F significance (Sig.).

The calculation to obtain the value of F is not done manually, but by using the SPSS program package. Table 4 is a summary of SPSS output for Test of Between-Subject Effect.

Tabel 4. Test of between Subject Effect

Source	Dependent Variable	F	Sig.
Learning Model	Knowledge Gain	22,853	0,000
	Behavior Gain	69,708	0,000
	Skill Gain	100,377	0,000
Error	Knowledge Gain		
	Behavior Gain		
	Skill Gain		
Corrected Total	Knowledge Gain		
	Behavior Gain		
	Skill Gain		

The Difference of Knowledge Aspect Competency between I-WBL Model and PI

The variable of knowledge aspect is valued as F = 22.853 (Sig. = 0.000 ≤ 0.005). Therefore, it may be concluded that it opposes Ho, so that it may accept H_1. This shows that there is a 95% significant difference of students'knowledge competency between I-WBL model and PI SMK's Civil Engineering Expertise Program. Keeping in mind that the I-WBL group possesses higher score increase average, which is 23.33, compared to PI, which is 11.08, it is found that the I-WBL model is more effective than PI in increasing students' knowledge aspect competency. Here are the differences of behaviour aspects in each variable:

Tabel 5. The average difference of behaviour indicator

Code	Behavior Indicator	Learning Model	Average	Average Difference
A	Motivation in working	I-WBL	21,40	9,43
		PI	11,97	
B	Responsibility	I-WBL	24,73	12,80
		PI	11,93	
C	Cooperation ability	I-WBL	19,60	8,77
		PI	10,83	
D	Disciplinary	I-WBL	22,97	13,93
		PI	9,03	
E	Initiative	I-WBL	23,13	9,93
		PI	13,20	
F	Creativity	I-WBL	24,83	12,87
		PI	11,97	
G	Individual independence	I-WBL	21,77	13,40
		PI	8,37	
H	Problem solving ability	I-WBL	25,17	15,20
		PI	9,97	

According to Table 5, the increase in motivation indicator in working is acquired from a I-WBL average score of 21.40 and PI 11.97, I-WBL responsibility indicator for 24.73 and PI for 11.93, I-WBL cooperation ability for 19.60 and PI for 10.83, I-WBL disciplinary for 22.97 and PI for 9.03, I-WBL initiative for 23.13 and PI for 13.20, I-WBL creativity for 24.83 and PI for 11.97, I-WBL individual independence for 21.77 and PI for 8.73, and I-WBL problem solving ability for 25.17 and PI for 9.97.

The Difference of Behaviour Aspect Competency between I-WBL Model and PI

Based on the hypothesis test, the variable of behaviour aspect scores F = 69.708 (Sig. = 0.000 ≤ 0.05), and the decision that may be made is to oppose Ho in order to be able to accept H_2. This means that within 95% level of confidence, there is a significant difference of students' behaviour aspect competency between I-WBL model and PI SMK's Civil Engineering Expertise Program. Keeping in mind that the I-WBL group owns higher average score increase for 24.41 compared to PI with an average increase for 11.44. Therefore it is found that I-WBL model is more effective than PI in enhancing students of SMK's Civil Engineering Expertise Program's behaviour competency.

The Difference of Skill Aspect Competency between I-WBL Model and PI

The skill variable scores F = 22.853 (Sig. = 0.000 ≤ 0.05), and the decision that is taken is to oppose Ho in order to accept H_3. This means that at within 95% level of confidence, there is a significant difference of students' skill competency between the I-WBL model and PI SMK's Civil Engineering Expertise Program. Keeping in mind that the I-WBL group owns higher average score increase for 26.95 compared to PI fro 12.32, it is found that the I-WBL model is more effective than the PI in enhancing students of SMK's Civil Engineering Expertise Program's skill competency.

Generally, the I-WBL model is more effective than PI in enhancing the competencies of students of SMK's Civil Engineering Expertise Program. Specifically, the I-WBL model is also more effective than PI in enhancing the knowledge, behaviour, and skill competencies of students of SMK's Civil Engineering Expertise Program. According to Dittrich (2009, p. 17), teachers are expected to become a social worker, psychologist, mediator, communicator, team worker, knowledge networker, and an expert. Yet it is obvious that teachers need to be supported by the students with motivation and learning model fidelity that is delivered in classes. I-WBL has become one of the models that are able to facilitate teachers and instructors within fulfilling the expectance. Moreover, Wibawa (2005,

p. 265) believes that Competency is a basic characteristic consists of knowledge, behaviour, skill, and other personality attributes that may differentiate one's performance from others in conducting tasks within certain work field. With the research on I-WBL development, students may be considered to be competent for mastering competencies that include behaviour, knowledge, and skill aspects.

The result of the primary hypothesis test shows that there is a difference between I-WBL model and PI in enhancing SMK students of Civil Engineering Expertise Program's competency. The difference refers to the possession of better quality seen from the average result of knowledge, behaviour, and skill aspects compared to PI. The knowledge aspect is seen from 11 indicators, which is in understanding the whole material of light vehicle engineering, and behaviour aspect is seen from eight indicators proposed by the industry and school.

The second secondary hypothesis stated that there is a difference in I-WBL model and PI in enhancing SMK students of Civil Engineering Expertise Program. Within the average data increase and the difference of skill aspect competency, the gain average increase is better than the knowledge and behaviour aspects. This is the indicator that the learning in the industry is mainly acquired from the students' skill aspect.

The industry's response on applying the I-WBL is considered high. This shows how much I-WBL model is accepted in the industry and gaining a positive response. The school's response is also positive, which is shown through their interest in the I-WBL model. The school appreciates the application of I-WBL by always communicating with the people from the industry. The students' response is also considered high. They are enthusiast in applying the I-WBL because interactions with the industry are indeed always preserved and monitored by the school and industry.

With the integration of inviting people from the industry to the school, the quality of I-WBL learning becomes so much better. For 2 weeks, students are accompanied by instructors and teachers at school, and they were accompanied individually and in group more intensively at the industry for 10 weeks. Hence, the students experience many interactions with the instructors who become their mentor in the industry. This is also align with the research result that states "partnership model of vocational education with the business sector in civil engineering expertise program of vocational secondary schools in Bali involves several components, such as key stakeholders, the underlying principle of partnership, orientation/common goal, the management of educational resources (teachers and facilities), curriculum development, implementation of learning/ training and work practices, competency test of graduates, distribution of learning outcomes/ output, as well as monitoring, evaluation and feedback of partnership program" (Sandika, Slamet, & Usman, 2017, p. 247.

The learning experience provided in this model is highly structured; starting from the learning at school which is accompanied by teachers and industry instructors for one month, then the learning that takes place in the industry which is accompanied by instructors, until various experiences with mechanics in the industry. Besides being acquainted to Light Vehicle Engineering, students are also acquainted to the industry's environment such as the employees, managers, and the situation within the industry.

In conducting the wide scale test, the school asked for more students to be included in the research than only including the already pointed students. However, the request was declined due to the lack of staff and time. This shows that the school's interest on I-WBL is quite good. Hence, this becomes the researcher's suggestion; in which this research needs to be continued in a larger sample amount. Moreover, it should also be applied to other expertise competencies, such as motorcycle, heavy appliances, body paint, and muscular engineering.

The questionnaire result of the students' response on the I-WBL model is that they agree that I-WBL does motivate them in studying. The guide that is always related to the industry motivates the students that the I-WBL processes describe the jobs that may be done after graduation. The students also believe that the competency may be enhanced within the I-WBL processes based on what is needed by the industry that includes knowledge, behaviour, and skill aspects of the students. The students also agree if the I-WBL

model is to be applied to Vocational High School, especially Light Vehicle Engineering competency.

The questionnaire result of the model usage states that the model is easy and clear to be applied. Indeed, the industry has been seeking a model that will provide benefits for both the school and the industry itself. As seen from the beginning, I-WBL model has invited the people from the industry to align their perception on what should be learned until the students' dream may help the industry's activity processes in the workshop. The next one is the cooperation between the school and industry in which both agree that by applying I-WBL model, the relationship between the school and industry will be maintained. Therefore it is hoped that the industry will continue be willing to allow the next practices from the school. Overall, the industry agrees in applying the I-WBL model to the Vocational School, especially Light Vehicle Engineering. In other words, the I-WBL model may be used in SMK of TKR competency.

CONCLUSION

Based on the research result, it may be concluded that (1) the implementation of current learning model of industrial work practice have several weaknesses, as follows (a) the school's lack of preparation for industrial work practice from the program, place, competency, and competency agreement with the industry, (b) the school has never invited people from the industry to school in order to align their competency with things that will be learned in the industry, (c) not all schools are equipped with structured industrial work practice. The school only measures competency from the skill aspect in return from the industry, (2) conceptual model development through philosophical level, theoretical level, methodological level, and classroom practice, (3) after conducting a validation test by 12 experts on guidebook model, it is shown that the average number is above 4, which means that the guidebook model is valid to be used in I-WBL learning for SMK's Light Vehicle Engineering competency, (4) the effectiveness of Integrated Work Based Learning (Work Based Learning-Terintegrasi), when compared to PI (Industrial Practice) costs F = 56.000 (Sig. = $0.000 \leq 0.05$) that can only mean that of 95% confidence level, there is a significant difference in enhancing students of Civil Engineering Expertise Program of SMK's competency. The I-WBL group is more effective than PI in enhancing the competency of students of SMK's Civil Engineering Expertise.

The suggestions that may be provided for this research are as follow: (1) the I-WBL products that are gained may be made as the alternative of industrial work practice development in SMK to enhance students' competency from the students' knowledge, behaviour, and skill aspects, (2) for teachers and instructors from the industry, the research product in the form of guidance may be used as the basic and reference in providing guidance for the students during their industrial work practice program in school, (3) the basic and development concepts of the model may be used for a further research on work based learning.

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THE IMPACT OF PARENTS' EDUCATION AND ATTENDING VOCATIONAL HIGH SCHOOL TO COLLEGE ENTRANCE

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Abstract

Using IFLS data 2007 and 2014, this study aims to examine the impact of parents' education and attending vocational high school to the probability of children attending tertiary education. This study is motivated by the government plan in increasing the proportion of vocational high school graduates compare to general high school graduates. Multinomial-Logit model is used to examine the senior high school types, Logit and Probit are used to examine the decision on pursuing tertiary education. The main conclusions are (1) parents' education has significant impact on the children's senior high school preference and college enrollment, (2) children who attended vocational senior high school have a lower probability to enrol in tertiary education compared to those who attended general senior high school or MA

Keywords: *social mobility, vocational high school, college entrance*

INTRODUCTION

The discussion about general versus vocational secondary education recently is become a popular research topic in the educational study. This subject is soaring along with the emerging of vocational expansion policies, especially in developing countries including Indonesia.

The modern debate is about the comparison return on education between general and vocational secondary education. Return in labor market and income is researched by Bennell (1996), Mane (1998), Chen (2009), Newhouse & Suryadarma (2011), Sohn (2013), Mahirda & Wahyuni (2016), Hanushek, et al. (2017). Few who study the comparison in academic performance and college entry, Chen (2009) compares Indonesia vocational and general graduates in college entrance, and Loyalka et al. (2015) compare working skill and academic performance of general and vocational students of China senior secondary. Another unpopular study is the determinant of selecting general over vocational secondary education and vice versa as we know, in Indonesia only researched by Chen (2009) and Newhouse & Suryadarma (2011) using Indonesia data.

The study about the comparison between academic and vocational is relevance in Indonesia. Since Government of Indonesia plans to expand vocational education in secondary and tertiary level. The Ministry of Education formalized vocational education expansion planning in its Strategic Planning document year 2005-2009. (Ministry of National Education, 2006). This plan was established in President Susilo Bambang Yudhoyono administration era and continued in Joko Widodo era.

Moreover the government also sets an ambitious target in the vocational education expansion. The government targets in 2015 the proportion of vocational high school student to general high school student is 70 by 30 percent. As information, in 2004 only 30 percent of students who enrolled in the vocational senior high school and the rest, 70 percent enrolled in general senior high school. Government plans to increase the number of vocational school or convert the general high school into vocational high school. (Ministry of National Education, 2006).

The government planning needs to deal with the parents' preferences. The parents' preferences will determine the children senior high school choice between vocational or general high school. Since people is a rational creature. Breen & Goldthorpe (1997) try to explain the difference in educational choice among people using rational action theory. According to their theory, people will rationally act when they are deciding an educational track. Individuals in this case parent and children are assumed to know about the cost, benefit, and consequences for every choice. Modify an option later is costly. Therefore, in choosing two alternatives, they need to compare the cost and benefit of every decision, assessing the success possible, and measure the available source to finance the choice.

Green & Goldthorpe (1997) explain that the family's social class also affects children educational decision. Effect of family's social class raises class differential in the educational decision. The class differential can be derived from three primary mechanisms: relative risk aversion, differences in ability and expectations of success, and differences in the resources. Chernichovsky and Meesok said that "the relatively wealthy and well-educated (parents) shun vocational training…" (Chernichovsky & Meesok, 1985: iii), sending their children to a tertiary education is the reason why wealthy parent avoid vocational training because they presume attending vocational education will reduce the probability to be accepted in higher education. Foster (1965) in (Ziderman, 1997) stated the reason why parents in Ghana avoided to send their children to vocational high school. According to Foster, the reason is the expectation of benefit from academic secondary schools. "Academic education was seen as pre-eminently vocational in providing access to stable, well-paid clerical and administrative jobs within the growing public sector; at the same time the demand for technical skills was growing slowly." (Ziderman 1997, p. 356).

Some studies find that attending vocational high school is detrimenal to the children's education advancement. Chen's (2009) finding, using data from Indonesia Family Life Survey 2000 she found students who attended vocational senior secondary school in Indonesia get a lower final exam score compared to the general senior secondary stu-

dents. Because the academic skill is essential for pursuing tertiary education, Chen concluded that attending vocational high school decrease the students probability to continue to higher education. This finding is supported by Loyalka et al. (2015). Using China data, Loyalka et al. (2015) find that attending in computing vocational education does not improve student computing ability, moreover attending vocational education reduce their academic skill especially math.

According to Corak (2004, p. 3) "the relationship between the socio-economic status of parents and the status and income their children will attain in adulthood." is the indication of generational mobility. Stronger the relationship between parent social status and children social status is an indication of low generational mobility. Low generational mobility has implication to the intergenerational inequality. Children whom born from low socio-economic status family will get low socio-economic status when they are adult and vice versa. From our finding, we can conclude that there is low generational mobility in term of education. Because children whom born in the high education parent tend to get high education as well and vice versa.

This paper tries to determine the existence of social mobility and intergenerational inequality by examining people educational choice. The intergenerational inequality only happens when the parents's education have significant impact in the children's high school choice and in children college entrance. This paper also examine the impact of attending vocational high school to the college entrance.

This study is important in determining whether the government plan in expanding vocational education will lead to the inequality or not. When attending vocational high school significantly reduce the probability of children attending tertiary education, it means that expanding vocational high school will lead reducing tertiary education enrolment rate in the future.

This study is motivated by the vocational education expansion planning in senior secondary and tertiary education. Another motivation for this study is a prediction of demographic bonus that will happen in 2020-2030. This study will examine the individual respond to the vocational expansion plan and measure the ability of vocational secondary as a milestone in higher education. The focus is comparing between general and vocational senior high school. This research tries to answer the research questions below.

Do parents' education significantly affect senior high school tracks decision and tertiary education entry?

Do schools availability affect students' choice of senior high school types? (we use school availability as a proxy of vocational secondary school expansion)

Do vocational graduates have a lower probability to continue to college?

To investigate those research questions, we will use data from Indonesia Family Life Survey (IFLS) 2007 and 2014 with following the track of junior high school graduates who graduated in 2002 to 2010. In this study, we will use three primary variables, individual characteristics variables, family characteristics variables and educational facility availability variables. We will use category school types as Newhouse & Suryadarma by dividing senior high school type into general public school, general private school, vocational public school and vocational private, and we add Madrasah Aliyah (MA/religious senior high school). Different from Newhouse & Suryadarma, in this research paper, we will use final exam score as the variable of individual ability instead of the grade repetitions. And also we use school availability as a variable of interest and a control variable to avoid heterogeneity.

RESEARCH METHODOLOGY

In this research, I will propose two main models, the first model is related to the people choice after graduating from junior high school and the second model is related to the people choice after graduating from senior high school.

The first model is multinomial logit. This model is developed from the combination model which are used by Newhouse & Suryadarma (2011) and Chen (2009). Newhouse & Suryadarma use multinomial logit to examine the senior secondary school choice. Newhouse & Suryadarma include non-senior secondary, general public, vocational public, private general and private vocational as school choice, while Chen only

divides into vocational and general senior secondary school, so Chen uses probit model. In term of explanatory variables, Newhouse and Suryadarma only consider parent education for family characteristics variables, while Chen also consider family income. In term of personal characteristics Chen chooses earlier score, while Newhouse & Suryadarma choose repeated grade in a junior secondary to measure personal ability. The distribution of senior secondary schools in Indonesia is not even, some sub-districts have all the school types, but other sub-districts only have one type of senior secondary school. Children in the sub-district that only have one type of senior secondary school or even no senior secondary school, only have limited alternatives in term of education choice. Therefore, in this model, we combine Chen's model and Newhouse and Suryadarma's model, and add school availability as control variables. The specification of the model used in this research as follow:

$$Education\ Choice = \alpha_0 + \alpha_1 Female + \alpha_2 JHS\ Score + \alpha_3 Age + \alpha_4 Father\ Education + \alpha_5 Mother\ Education + \alpha_6 LnHousehold\ Income + \alpha_7 Rural + \alpha_8 Proportion\ of\ Vocational\ School + \alpha_9 Proportion\ of\ Private\ School + \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.1)$$

The second model tries to capture the choice of student after finishing their senior secondary school, this model tries to compare the choice between vocational and general senior secondary school attendances. This model is adapted from the model used by Chen (2009). The specification of the model is as follow:

$$College = \beta_0 + \beta_1 Female + \beta_2 SHS\ Score + \beta_3 JHS\ Score + \beta_4 Age + \beta_5 Vocational\ SHS + \beta_6 MA + \beta_7 Father\ Education + \beta_8 Mother\ Education + \beta_9 LnHHIncome + \beta_{10} Rural + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.2)$$

This research utilises two main data sources, Indonesia Family Life Survey (IFLS) and Potensi Desa (PODES/Village Potential Survey). IFLS is a survey conducted every seven years in Indonesia by RAND organisation. IFLS is a longitudinal survey with respondent base on the household. The surveyors will survey the same household for every wave. The information in IFLS is divided into two categories: the first information is related to household and the second information is related to community and facility where the household live. IFLS is conducted in 13 provinces in Indonesia. Five provinces in Java island, four provinces in Sumatera island, and several provinces that are not located in both island, they are Bali Province, West Nusa Tenggara Province, South Sulawesi Province, and South Kalimantan Province. IFLS do not cover two main islands in Indonesia, Papua islands and Maluku islands. PODES is a survey conducted every three years to collect the information about the facilities in almost (all) villages in Indonesia.

The data used in this research is the data related to children who graduated from junior high school in period 2002 to 2010, it will include the data about the individual characteristics and ability, the data about household characteristics that will be taken from IFLS 2007 and 2014, and the data about the education facility in location where children live will be taken from PODES 2002, 2005, and 2008. The number of sample is 2,403 pupils who graduated from Junior High School in period 2002 to 2010. The sample are children who sit in junior high school national exam in period 2002 to 2010 and we got 3,857 pupils. Then we select only children who reported their junior high school final exam score and we got 2,854 pupils. In our estimation, we need the family income as explanation variables, and we got 2,403 samples. Base on pupils' residence we divided sample into three regions, Sumatera island, Java island, and another island. The distribution of sample base on their regions are 519 (21.60 percent) pupils lived in Sumatera, 1,338 (55.68 percent) lived in Java, and 546 (22.72 percent) lived in other islands. In term of educational choice, we divided into children who did not continue to senior high school and children who continue to senior high school. Then base on the school types, we divided them into general senior high school (General SHS/ SMA), vocational senior high school (SMK) and Islamic senior high school (MA), and also children who do not continue to senior high school their education choice become Junior High School (JHS/ SMP). Further, we also divided into public and private high schools. Base on the education choice the share is 979 (40.74 percent) pupils attended General SHS,

752 (31.29 percent) attended Vocational SHS, 227 (9.45) attended MA, and 445 (18.52) not enrolled in senior high school (JHS). Newhouse & Suryadarma (2011) excluded students who attended senior high school with Islamic curriculum because of the small share, in this paper we still include them even though only 10 percent student who attend the Islamic senior high schools.

RESULT AND ANALYSIS

In this session, we will discuss the regression result of children's educational decision after graduating from junior high school. The children can choose to continue their education to senior high school or enough with junior high school. For those who continue to senior high school, they also need to decide in what type of school they will enrol. The type of schools can be divided into: general senior high school, vocational senior high school, and for Muslim children, they also can choose Madrasah Aliyah (MA/ religious school), thus we have four choices.

The table 1 shows determinant of student attending different senior high school types. the result of multinomial logit model with dependent variables are senior high school types and without considering the difference between public and private senior secondary school institutions. The independent variables are categorized into three characteristics; individual characteristics, family characteristics, and residential characteristics. To get robust estimation, the regression is clustered base on the provincial level to avoid heteroscedasticity effect.

From the regression, we found that junior high school exam score and age when graduated from junior high school have a significant effect on the probability selecting general high school or does not enrol in senior high school. Increase one point junior high school score from the mean will increase the probability attending general high school by 2.66 percent and decrease the likelihood to not enrol in senior high school by 1.72 percent. Increasing one year of children age will decrease the probability enrol to general senior high school by 3.33 percent but increase the probability of drop out by 3.76 percent. Gender is still used as consideration when children choose between general high school and vocational high school, a female child has significant lower probability to attend vocational high school than a male child by 7.45 percent, and female children have higher probability to not enrol in senior high school by 4.68 percent. All individual characteristics variables have influence in consideration for children in deciding to enrol or not enrol in senior high schools.

Parent education have positive and significant effect in the probability selecting general senior high school and have negative and significant effect in the probability to not enrol in senior high school. The probability a child enrol in general high school is increasing by 0.83 percent and the probability a child not enrol in senior high school is decreasing by 1.04 percent when his/her father year of schooling one year higher than the average fathers' year of schooling. The mother education effect in the children decision is bigger than father effect, it can be seen from the marginal effect magnitude.

Household income has positive and significant impact in the children probability in selecting general senior high school, yet has negative and significant impact in the children selecting MA and not attending senior high school. Increasing 1 percent of income from the mean will increase the probability a child enrols in general senior high school by 1.95 percent and decrease the probability a child enrols in MA by 1.16 percent and decrease the probability a child not enrol in senior high school by 3.66 percent.

Rural children have 8.04 percent lower probability to enrol in vocational, have 5.56 percent higher probability to enrol in MA, and have 6.39 percent higher probability to not enrol in senior high school compare to the urban children. The vocational education availability also increases the probability a child to enrol in vocational high school but decrease the probability a child to enrol in MA. The vocational education availability does not significantly affect the probability of a child to enrol in general senior high school. The proportion of private school compare to public school has significant effect in all educational choice, it has significant and negative effect in general senior high school choice, but has positive and significant in other choices.

Table 1. Determinant of Student Selecting High School Types

	Multinomial Logit Marginal Effect			
	General SHS	Vocational SHS	MA	No Senior Secondary
Personal Characteristics		(1)		
JHSScore	2.66	-0.57	-0.37	-1.72
	(2.68)**	(0.64)	(0.7)	(2.72)**
Age When Graduated JHS	-3.33	0.49	-0.91	3.76
	(3.63)**	(0.45)	(0.98)	(3.46)**
Female (dummy)	2.82	-7.45	-0.05	4.68
	(1.24)	(4.37)**	(0.04)	(2.05)*
Family Characteristics				
Father years of schooling	0.83	0.05	0.15	-1.04
	(3.59)**	(0.29)	(1.05)	(7.24)**
Mother years of schooling	1.95	-0.29	-0.25	-1.40
	(5.4)**	(1.15)	(1.54)	(5.28)**
Ln Household Income	3.36	1.45	-1.16	-3.66
	(4.4)**	(1.32)	(2.18)*	(5.03)**
Residence Characteristics				
Rural (dummy)	-3.90	-8.04	5.56	6.39
	(1.33)	(2.05)*	(3.67)**	(3.15)**
Proportion of Vocational High School in district	-22.50	50.01	-37.91	10.41
	(1.38)	(2.62)**	(-3.58)**	(0.96)
Proportion of Private High School in district	-68.48	38.60	11.84	18.03
	(5.3)**	(2.75)**	(2.74)**	(2.38)*
Base Probability	43.34	34.73	8.74	13.19
Number of Obs	2403			
Pseudo R2	0.11			

Notes: * 5% significance; ** 1% significance; the marginal effects are in percent, t-statistics in parentheses, the result is robust from heteroscedasticity, clustered base on province

After graduating the senior high school level, children can directly join the work force by entering labour market or continue their education to the university level. The following regression is used to examines the children decision after graduating from senior secondary schools. In this regression, we use two methods, probit and logit model.

According to the estimation in table 2, we can see that two methods, probit and logit, do not show a different result in term of statistical significance, sign, and pseudo R-square. In term of variables significance, we found that seven out of ten variables show significant result. Only MA dummy, rural dummy and constant do not show significance result. Four out of eight coefficient shows statistically significance.

All individual characteristics variables have a significant effect in the college entry decision except Junior high school score. Junior high school score is used to measure the initial student ability. Senior secondary score as proxy of individual's ability has positive and significant effect to the college entry decision. Increase senior high school score by one point increase the probability a child attends tertiary education by 3.33 percent in probit and 3.53 in logit model. While, age shows the opposite sign. It means that older children have lower probability to continue their education to tertiary education. With the same characteristics, female children have higher probability to enrol in tertiary education than their male peers about 6 percent. The statistics show significant at 5%

in logit model but do not show significance in probit estimation. Senior secondary types have effect in the college entry decision. General senior high school graduates have significantly higher probability to enrol in university than the vocational senior high school graduates. But there is no significant difference in probability to enrol in tertiary education between MA graduates and general secondary school graduates. From three types of senior secondary education, we can see that vocational secondary graduates have the lowest probability to enrol in tertiary education, and general secondary graduates have the highest probability to enrol in tertiary education. Attending vocational senior high school will decrease the probability a child enrols tertiary education about 28 percent compare to attending general high school.

Family characteristics also have an effect in tertiary enrolment decision. Parent education and family income have a positive and significant effect to the probability a child enrol in tertiary education. Increasing father/mother's year of schooling by one year will increase the probability a child enrols in tertiary education about 1.7 percent. Household income also has positive and significant effect in the decision of children tertiary education enrolment. Increasing the family income by one percent will increase the probability a child enrols in tertiary education by 5 percent. There is no significant different between urban and rural children in tertiary education enrolment.

Table 2. The Likelihood in College Entrance

	Probit: College entry	Logit: College entry
Personal Characteristics	(3)	(4)
SHS Score	3.33	3.53
	(2.99)**	(2.91)**
JHS Score	2.02	2.01
	(1.28)	(1.23)
Age When Graduated JHS	-4.62	-4.97
	(2.41)**	(2.35)*
Female (dummy)	6.19	6.59
	(1.91)	(1.98)*
Senior secondary types		
Vocational SHS (dummy)	-27.60	-27.80
	(12.45)**	(12.46)**
MA (Islamic School) (dummy)	-1.23	-1.42
	(0.2)	(0.23)
Parent Characteristics		
Father years of schooling	1.70	1.72
	(9.6)**	(9.08)**
Mother years of schooling	1.68	1.69
	(3.67)**	(3.69)**
Ln Household Income	5.18	5.32
	(5.18)**	(5.49)**
Rural	-1.67	-1.76
	(0.53)	(0.53)
Base probability	32.27	31.18
Observations	1,564	1,564
Pseudo R-Square	0.194	0.196

Notes: * 5% significance; ** 1% significance; the marginal effects are in percent, t-statistics in parentheses, the result is robust from heteroscedasticity, clustered base on province

Analysis

According to our prediction, parent educational attainment has significant effect in children senior secondary education decision. Our hypothesis is "parent with higher educational attainment will tend to send their children to academic secondary over the vocational high schools." From the regression our, we found that father and mother education have positive and significant effect in the probability of children to enrol in general senior high school. From the marginal effect magnitude, we can see that the parent education shows bigger magnitude in the public and private general senior high schools compare to the magnitude of public and private vocational high schools. It means parent with higher educational attainment will tend to send their children to the general high schools than to send their children to vocational high schools. This finding is in line with Chen (2009) and Newhouse & Suryadarma (2011) finding. The finding concords with Chernichovsky & Meesok, (1985) suggestion. According to Chernichovsky & Meesok well-educated parent tend to avoid sending their children to vocational education.

Another finding is related to the impact of school availability to student educational choice. From the regression, we found that the proportion of vocational school to total senior high school has positive and significant effect to the probability attending vocational education. Higher the proportion of vocational schools in the children district, the probability of the children attending vocational education become higher. This finding is almost similar with Chen (2009) finding, she measures this kind of effect using the share of vocational graduates in the community where the children live. We use the proportion of the number vocational school to the total senior high school to give more insight about the effect of government policy in vocational education expansion to the educational choice. School provision is a real proof of government commitment in the vocational education expansion. The vocational education expansion might have bad effect to the senior secondary enrolment. Higher the proportion of vocational school higher probability the children in the district do not continue to the senior high school. As we discuss in chapter 3, attending the vocational senior high school is relatively more expensive than attending the general senior high school. Cost of attending education can be a reason for children to not enrol in senior high school. This finding is also supported by the effect of proportion of private school to the children enrolment. We found that higher share private education institutions in a district, higher the probability children in that district enrol in senior secondary school. Increase the proportion by hundred percent will decrease senior high school enrolment by 19.18 percent. As we know, that private education institutions are tuition driven, they will charge higher fee than the public education institutions. We suspect that cost of attending senior high school become a barrier for children to attend senior high school.

As we expected, the parent year of schooling has a positive and significant effect to the probability a child enrols in tertiary education. Chen (2009) and Ogawaa & Iimuraa (2010) have a similar finding with us. They find that head of households' education have a positive and significant effect to the probability of the children pursuing tertiary education. This empirical finding is supported by some theories such as rational action theory by Breen and Goldthorpe (1997) or with subjective expected utilities by Esser (1999) or "intergenerational class maintenance (Becker 2003). In the rational action theory Breen and Goldthorpe also explain about the relative risk aversion. Relative risk aversion explains the relationship between parents' education and their children's education. According relative risk aversion, parents expect their children social-economic status not lower than the parents' social-economic status include the educational attainment.

According to Corak (2004:3) "the relationship between the socio-economic status of parents and the status and income their children will attain in adulthood." is the indication of generational mobility. Stronger the relationship between parent social status and children social status is an indication of low generational mobility. Low generational mobility has implication to the intergenerational inequality. Children whom born from low socio-economic status family will get low socio-economic status when they are adult and vice versa. From our finding, we can conclude that there is low generational mobility in term

of education. Because children whom born in the high education parent tend to get high education as well and vice versa.

We also examined the effect of attending vocational high school to the probability attending tertiary education. We found children who attend vocational secondary school have a lower probability to enrol to the tertiary education compare to their peers from the others secondary school types. This finding is the same with Chen (2009) finding. According to Chen, attending the vocational high school does not have effect to the probability attending tertiary education when it is controlled with the senior high school final exam score, but it has effect when it is not controlled with the senior high school final exam score. In our paper, we already control the regression with senior high school exam score at beginning, even we add junior high school exam score as the initial score. We found that both variables, senior high school final exam score and attending vocational high school, have a significant effect to the probability of enrolling in tertiary education with an opposite sign. Attending vocational high school gained negative sign, while senior high school exam score gained positive sign.

From the regression about senior high school decision, we found that children from low education parents tend to attend vocational high school than attending general high schools. And we also know that parents with low education have a low probability to send their children tertiary education. From those finding we suggest that the vocational high school is the choice for those who do not have intention in pursuing tertiary education, especially for those who come from low education family.

Our conclusion is in line with Breen and Goldthorpe (1997) assumption. Breen and Goldthorpe assumed that decision of entering an n level of education is affected by the expectation of gaining access to level n+1. Therefore, for those who attending general senior high school expect to get access to tertiary education, and for those who attending vocational senior high school expect to get direct access to the labour market.

CONCLUSION

This study has three goals, first goal is examining the relationship between parents' education attainment and children educational decision, the first decision related with children decision after graduating junior high school and the second decision is after graduating senior high school. The second goal is examining the role of educational expansion through educational facilities provision to children decision. And the last goal is finding the relationship between children decision in senior secondary education to college entry.

In addressing that three goals, we conduct two regressions. The first regression is multinomial logit model to examines the impact of parental educational attainment and educational provision to senior secondary enrolment decision. The second regression is logit/probit model to examines the impact of parental educational attainment and senior secondary types to college enrolment decision.

From the analysis in chapter 5, we can conclude that: (1) Parents' education have a positive and significant effect in promoting their children to enrol in general high school, especially in attending general public high school. Well-educated parents tend to avoid sending their children to vocational education. (2) The education availability has a significant effect in influencing children educational decision. The increase in the proportion of vocational high school to general senior high school facilities increase the probability a child to enrol in vocational high school, yet it also increases the probability a child does not enrol in senior high school. The proportion of private school also has the same impact as the proportion of vocational high school. Increasing proportion of private senior high school to public senior high school also increases the probability a child to enrol in private senior high school. Increase in the proportion of private to public senior high school will significantly decrease the probability a child enrols to senior high school. (3) Parents' education also has a positive and significant effect to the probability a child attends tertiary education. (4) Attending vocational senior high school decreases the probability a child attends tertiary education.

From the policy perspective, increasing the share of vocational senior high school could be an effective way to increase the share of vocational senior high school enrolment. But the government needs to consider the side effect of increasing the proportion of vocatio-

nal senior high school, the first it may increase the probability a child not attending senior high school. It is still debatable because according to Pittman (1991) there is no evidence that attending vocational high school could reduce the drop out rate. The second it will decrease the probability senior high school graduates attending tertiary education. Our finding indicates attending vocational high school can reduce the probability a child to enrol in tertiary education. The government also needs to consider the people taste or preference in educational choice, from the regression we can see that high education parents still prefer academic senior high school for their children than vocational senior high school.

We still witnessed a class differentials in the children educational choices. The more educated parents with senior high school education or college degree education tend to send their children to the more academic senior high schools. Parents with junior high school and elementary education see general and vocational high school indifferently. We also found that higher parents' education is lower the probability their children do not continue to senior high school. For policy perspective, the government needs to give incentives and support to the children from low educated parents to continue their education to the highest level.

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THE EFFECT OF PROBLEM-BASED E-LEARNING CONTENT ON THE LEARNING ACHIEVEMENT IN BASIC COMPUTER SYSTEM COURSE (DSK) OF THE STUDENT OF INFORMATICS ENGINEERING EDUCATION DEPARTMENT

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Abstract

This study was aimed at finding out the difference in learning achievement in basic computer system course (DSK) between the students who learned from content e-problem-based learning in experiment class and those who learned from conventional model in control class in learning basic computer system course. This study used quasi-experimental non-equivalent Pretest Post-test Control Group Design. There were three variables involved in this study. Two of them were independent variable and dependent variable. The independent variable was e-problem-based learning and the dependent variable was learning achievement. Another variable which functioned as covariate was students'prior learning achievement. The population consisted of all students of the first semester in Informatics Engineering Education Department. The sample was selected by using simple group random sampling technique. An essay test was used to know the students'basic computer system learning achievement (DSK). The hypothesis was tested by one-way analysis of co-variance (ANACOVA). The results showed that the mean score in the learning achievement of the students who learned from content e-problem-based learning was higher than that of those who learned from using conventional model. Content e-problem-based learning plays the role in improving students' learning achievement.

Keywords: *content e-problem-based learning, basic computer system course.*

INTRODUCTION

Efforts at Improving the quality of education has to be made, and one of the most promising ways is through the use of information technology. At present, the use of information technology such as e-learning is on the increase. The existing e-learning at Ganesha University of Education (*Universitas Pendidikan Ganesha*/Undiksha) has not been used optimally, although it has supported the learning and assessment processes. The Undiksha's e-learning uses the most popular LMS (Learning Management System) Open Source which is also called Moodle. In terms of the use of the system, Moodle is very good, but it needs to be supported by content we want the learning process to run well. At Informatics Engineering Education Department (PTI), there are many types of courses that need content development to support innovative learning. One of the courses that is suitable to be taught by using the innovative learning is Basic Computer System course (DSK).

DSK is a stage in learning computer science that introduces the students to computer, the basics of computer science, programming, information system, and artificial intelligence. The coverage of the science is very dense in this course, making it difficult for the students to learn the materials. The density of the materials can be seen in the syllabus that covers the development of hardware, software, the use of computer, classification of computers, input equipment, processing equipment, output equipment, external storage, numerical system encode, data communication system and network, basic concepts in structured program development, software, information system, database, method of data processing, and artificial intelligence. The learning process in DSK course will be facilitated with the use of an innovative learning process which can develop further creative thinking ability and critical thinking ability and can attract students to solve learning problems.

According to Santyasa (2011), one of the learning environments which can accommodate the development of problem solving ability of the learners is problem-based learning (PBL). PBL is a learning model which is based on John Dewey's philosophy according to which teachers should encourage students to be involved in the task oriented to problems related to the world of the learners, and the learners should be active in the learning activity. PBL is a learning model that makes problems as the basis of learning. PBL is a model of learning that uses real world problems which are ill-structured as ones of the context for them to learn about critical thinking skills and problem solving skill, and to acquire essential knowledge and concepts for learning materials.

The previous study related to the content development of e-learning for DSK has produced a product in the form of basic computer system learning materials designed by using e-learning media at Undiksha. The results of the e-learning content development in DSK study was then implemented in the classroom to find out differences in learning achievement in DSK between the students who learned by the content e-problem-based learning in the experiment class and those who learned by the conventional model in the control class. This study was motivated by the fact that Informatics Engineering Education Department students who learned basic computer system course in the academic year 2016/2017 had low learning achievements. Thus, this study was conducted to find out a way to improve the situation.

E-learning which was implemented in this study also functioned as a discussion forum between the lecturer and the students, and could also be used as online quizes, so that all activities in the learning process become very effective. Atmanegara (2016) in his study shows that the use of e-learning in the learning process is very effective, because with the availability of the media, the students can access various materials easily. Beside Atmanegara's study, a study conducted by Wijaya (2012) shows that web-based e-learning following e-pedagogy principles enhance the students' ability in understanding the material in economics better as shown by an increase in learning achievement.

The present study in the development of e-learning content based on problems for DSK was designed by using eight steps in problem-based learning approach. The eight steps were: (1) finding a problem; (2) defining problem; (3) collecting text; (4) making tentative assumption; (5) investigating; (6) im-

proving problem that has been defined; (7) concluding alternative to solve problem collaboratively; and (8) testing solutions to the problems. Based on the eight steps, the lecturer plays the role in posing real problems, giving encouragement, motivating, and providing learning material and facilities needed by the students to solve problems. By implementing problem-based e-learning, it is expected that the students use their thinking skill in analyzing problems presented to dig up new information and to use their prior knowledge in solving problems.

Content e problem-based learning for DSK was implemented online. E-problem-based learning was designed with a simple requirement, is personal, and speedy. The simple system will facilitate the students in using the technology and the existing menu, with the practicality in the panel provided, it will reduce the introduction of the e-learning system itself. The personal requirement means the lecturer can interact well like in the real communication between the lecturer and the students in the classroom. The more personal approach and interaction applied in e-problem-based learning helps the lecturer to assess the progress in the students' learning, in analyzing and solving problems. Quick response given by the lecturer to students' complaints and their needs is needed to help in making the learning process run well.

METHODS

This study used quasi-experimental design because not all the variables and condition in the experiment could be managed and controlled tightly, thus this study belongs to a quasi-experimental study type. The design of study was non-equivalent Pretest Post-tes Control Group Design. This design helps in checking the level of similarity between the groups, since the pretest score are closely related to the dependent variable, learning achievement.

The population of the study consisted of all first semester students at Informatics Engineering Education Department in the academic year 2017/2018. The sample was selected through group random sampling technique, that is by selecting the sample randomly. This technique was used as the technique for taking a sample because the individuals of the population had been distributed to classes so that it was impossible to do the random sampling of the individual of the population. The sample used in this study consisted of two classes, namely class 1A and class 1C, with 35 students each at Informatics Engineering Education Department. The variables in this study consisted of an independent variable, in this case, the content e-problem-based learning, and a dependent variable, in this case, learning achievement. Another variable which functioned as covariate was students' prior knowledge.

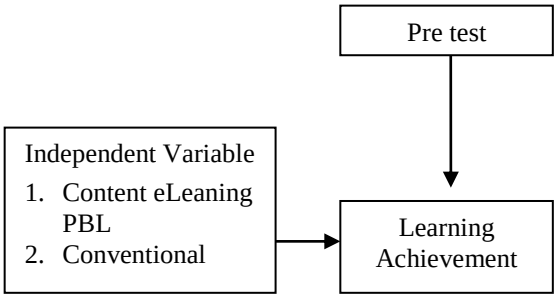

Figure 1. The Relation between Variables in the Study

The steps in this study that were implemented consisted of : (1) orientation and observation of the design and its implementation in the class; (2) designing lesson plans for DSK with content e-problem-based learning in the experimental class and with the conventional model in the control class; (3) doing a try-out test of learning achievement in DSK to make it viable for the study; (4) administering the pre test to each group both the one who would learn from content e-problem-based learning and another one who would learn from conventional model; (5) implementing content e-problem-based learning in the experimental class and conventional model in control class; (6) administering post test to each learning groups both the one learning from content e-problem-based learning and another one learning from conventional model; (7) analyzing data of learning achievement to test whether the hypothesis of the study could be accepted or rejected. The stages of the study conducted can be seen in figure 2 as follows.

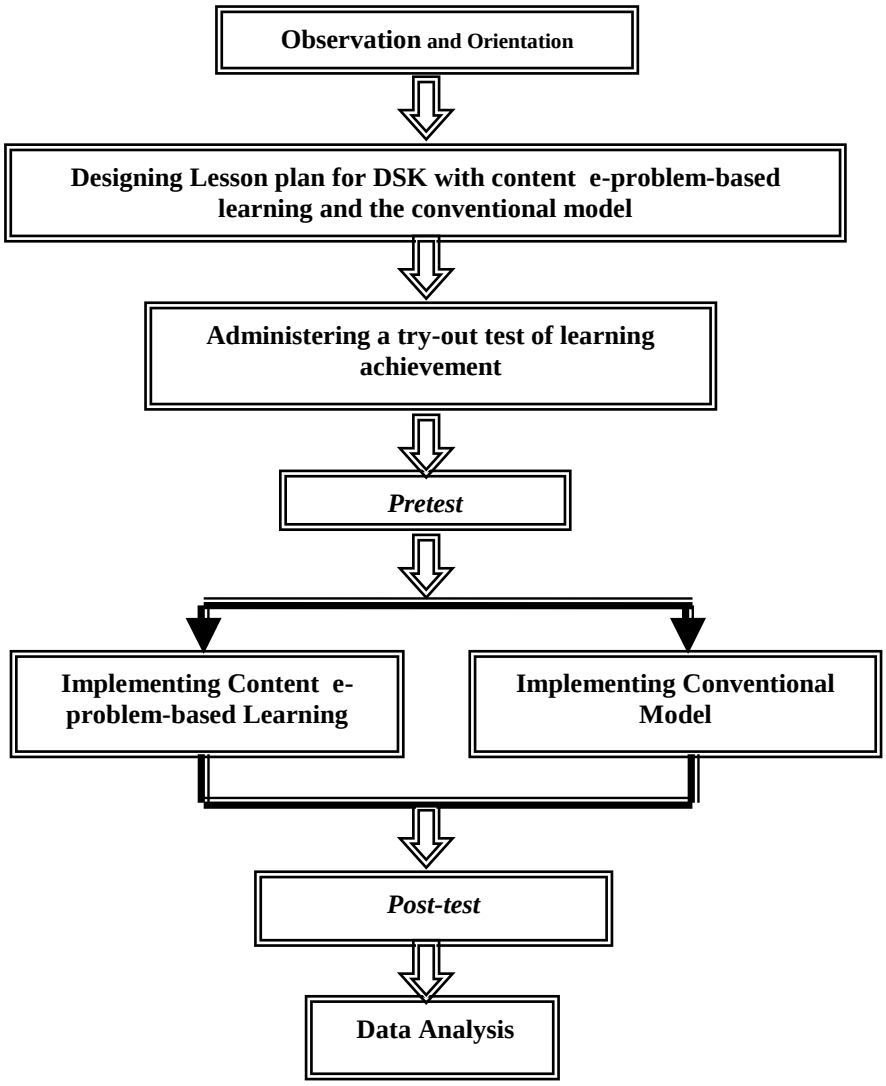

Figure 2. Stages of Study

Before it was used in the study, the instrument was tried-out first. The instrument used in this study was a learning achievement test. The learning achievement test for DSK used was in the form of an essay test. The try-out of the test was aimed at checking the content validity according to content experts and research design experts considerations. The instrument try-out was aimed to check the content validity and describe the degree of estimation specified by item validity and internal reliability. The validation of the test included content validity, construct validity, and item validity. Content validity and construct validity were found by judging the test and in this case two judges or experts were involved. Item validity was done by using 4 statistical tests, consisting of item internal consistency, test reliability, test discriminating index and test difficulty level. To find out the item validity, correlation formula was used. The correlation formula used to test item validity was product moment corelation formula.

Based on the result of the try-out analysis of the instrument, eight out of twenty items were selected and tried-out, in which the variable to be measured through the test in this study was the students' learning achievement problem solution that consisted of application (C3) analysis (C4), synthesis (C5), and evaluation (C6). The data analysis techniques used in this study were descriptive statistics and co-variant analysis (one-way ANACOVA). The descriptive analysis was used to describe the mean score and standard deviation. The mean score and standard deviation described consisted of mean score and standard deviation in the students' learning

achievement and the students' learning achievement in pre test.

The normality test for data distribution was meant to ascertain that the sample really came from a normally distributed population, so that hypothesis testing could be performed. The normality testing of data distribution was tested by using Kolmogorov-Smirnov statistics test or Shapiro-Wilks test (Candiasa, 2006, p. 2). The criteria for testing the data is that the data was normally distributed if the the level of significance produced was more than 0.05 and in this case the data were not normally distributed.

Variance homogeneity test between groups was also performed to make sure that the difference that occurred in the hypothesis testing was only caused by the difference in the group. To test the variance homogeneity between groups Levene's test of equality or error variance was used (Candiasa, 2004). The criteria for testing included: the data had the same variance (homogeneous) if the level of significant produced more than 0.05 otherwise the variance of the sample was not the same (not homogeneous). For testing the hypothesis, the hypothesis in this study were divided into null hypothesis (Ho) and alternative hypothesis (H1). The hypothesis to be tested are as follows.

H_0 : There was not any difference in learning achievement between the students in the group who learned from content e-problem-based learning and the group of students who learned from conventional model.

H_1 : There was a difference in learning achievement between the students in the group who learned from content e-problem-based learning and the group of students who learned from conventional model.

The hypothesis testing used F test through one-way co-variate analysis (ANACOVA). The level of significance of F variance statistics was subjected to co-variate testing or the testing of the inter-subject effect (Candiasa, 2004). If the level of significance smaller than 0.05, it means that Ho was rejected.

RESULTS AND DISCUSSION

Problem-based learning implemented in DSK course was designed to develop the students' critical thinking ability in solving problems. The lecturer as facilitator gave the opportunity to the students to solve problems given in a systematical and logical way. Students-centered learning process by implementing problem-based learning was expected to improve the students' learning achievement, especially in DSK. The result of content e-problem-based learning in DSK course has passed the stage of expert judgment and field testing has been carried out in some sample members, which was then continued with the testing of the effect of content e-learning of DSK course of the students' learning achievement. The mean score for the pretest that was given to the students of the Informatics Engineering Education Department in the first semester in 2017 was used as the basis in finding out the level of students' understanding of DSK materials.

In this study, the learning process used content e-problem-based learning in the experimental class and the conventional model in the control class in which the learning achievements were shown to be different for the experimental class and the control class. This finding was obtained based on the result of pretest analysis with the students' mean score in the group who learned from content e-problem-based learning in the experimental class of 7.40 falling into insufficient classification. While the ean score of the students in the group who learned from the conventional model in the control group was 8.11, falling into insufficient classification. The low mean score of the students in the pretest indicated that the students have got the high ability to solve the problems but it still fell into a low category, because the students have not yet understood the whole materials in DSK. The knowledge that has been acquired by the students was limited to the knowledge that they got from daily experiences.

Based on the result of post test analysis (the students' learning achievement) the mean score of the students in the group who learned from content e-problem-based learning in the experimental class was 14.57 falling into sufficient classification while the group who learned from the conventional model in the

control class was 12.14, falling into insufficient classification. The difference in the mean score in post test in the two groups was caused by the fact that in the group who learned from content e-problem-based learning in the experimental class, the learning process that was implied related the concept learned more to the realistic context or the students' daily experiences, so that the students found it easier to solve problems given by the lecturer. On the other hand, the group who learned from the conventional model in the control class, the learning process presented academic problems that refer to problems in the textbook that contain objects and events unrelated to the reality in the students' daily life, so that it could not motivate the students to think critically and creatively in solving problems. The mean score and the standard deviation in the post test in each unit analyzed are presented in Table 1.

Table 1. Mean Score and Standard Deviation in Post Test result

Group	Mean	Standard Deviation
Content e-Problem-Based Learning	14.57	3.28
Conventional Model	12.14	12.14
Total	26.71	15.42

Before the testing of hypothesis was performed, requirement tests were done first. The requirement tests that had to be done were: (1) test of data normality; (2) tets of inter-group variance homogeneity. The test of normality of the data was done to all data of the post test results both from the group of students who learned from content e-problem-based learning in the experiment group class and those who learned through conventional model in the control class. The recap of the normality test result can be seen in Table 2.

Table 2 shows that the group who learn through e-content problem-based learning in the experiment class and the conventional model in the control class were normally distributed with Shapiro-Wilk showing a level of significance greater han 0.05. As the whole the data in the group who learned from content e-problem-based learning in the experimental class and the conventional model in control class were normally distributed.

Table 2. The Recap of the Data Normality Testing

Model	*Kolmogorov-Smirnov*			*Shapiro-Wilk*		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Content e-problem-based learning	0.152	35	0.039	0.969	35	0.502
Conventional Model	0.132	35	0.129	0.960	35	0.360

This homogeneity test of variance was done to all data of the post test result based on the grouping of learning model implemented. To test inter-group homogeneity variance Levene's test of Quality of Error Variance. was used.

Table 3. Recap of Test of Homogeneity of Variance

		Levene's Statistic	*df1*	*df2*	*Sig*
Learning achievement	*Base on Mean*	2.457	1	68	0.122
	Based on Median	2.358	1	68	0.129
	Based on Median and with adjusted df	2.358	1	57.762	0.130
	Based on trimmed mean	2.509	1	68	0.118

Based on Table 3, the result of the test of homogeneity of variance of the data obtained shows that the level of significance was above 0.05 which means that the inter-group variance was homogeneous.

Based on univariate analysis result, it was obtained that the effect of pretest on the score in learning achievement, F statistic value = 18.401 at sig. = 0.001. This level of significance is lower than 0.05, which means that there is the effect of pretest on the students' learning achievement. Therefore, the co-variate selected in this study was appropriate. While, for the effect of the content e-problem-based learning in DSK course on learning achievement was obtained F statistic value =12.928 at sig. = 0.001. This level of significance is smaller than 0.05, which means that there is the difference in the mean score of learning achievement in the group who learned from content e-problem-based learning and the group who learned from conventional model in DSK course. The recap of ANACOVA result is presented in Table 4.

Table 4. Recap of ANACOVA Test Result

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	188.067	2	94.034	13.560	.000
Intercept	240.550	1	240.550	34.687	.000
Model	89.653	1	89.653	12.928	.001
Learning Achievement	127.610	1	127.610	18.401	.000
Error	464.633	67	6.935		
Total	13035.000	70			
Corrected Total	652.700	69			

The finding in this study is in line with the result of the previous studies done by Sindu, Santyasa, & Warpala (2013) that shows that the learning achievement of the students who learned from e-problem-based learning is higher than that of the group who learned from direct instruc-tion model and Sugandi (2013) which shows that the autonomy in students' learning in Mathematics by using problem-based ap-proach with jigsaw type cooperative setting is better than that of those who used conventional learning model. Assriyanto, Sukardjo, & Saputro (2014) also shows that the students' cognitive and affec-tive learning achievement who use problem-based learning model and guided inquiry method is higher that that of those who learn through experiment method. Theoretically this can also be explained through problems in DSK course which used problems that con-sisted of objects or elements that consisted of software, hardware, and brain ware often found in the students' everyday life in which problem solving stressed the application of concepts of DSK course. In learning by using content problem-based or problem-based learning, the students did not only memorize the theory but also related the problem with their daily life so that the learning became more meaningful and could develop students motivation to learn. Students in general will be more interested to solve problems with problem-base learning because they feel the problem are related to daily life. therefore the use of the problem in the lecture will make the information conveyed in the lecturer more organized in students' cognitive structure, in which it makes the students memory of the concept became stronger. A better mastery of concept and higher motivation in solving a certain problem will have a positive impact to the students' high level thinking competence. The tendency of students to learn and memo-rize will cause their weaknesses in a concept and theories which come from the principals and concepts in DSK. This of course will influence the mastery of concept possessed by the students about the element which consist of software, hardware and brain ware.

Although content e-problem-based learning in the experiment class empirically gave a better score than in the conventional model in the control class, content e-problem-based learning was not been able to make the students achieve a satisfactory learning achievement. There were some factors which assumed to have caused the less than optimal content e-problem-based learning effect in which the students have not been able to achieve very good category (85%-100%).

First, the problems presented in the learning process which were usually done by giving the conventional model so that the students have the habit of solving problems by using the conventional model and were not yet used to solving problems presented in the form of problem-based learning. Problem based learning used in this study contained real life problem related to the students' real life differ very much from the problems they found in DSK course before. Before they solved the problem, they had to decide on some points: (1) reviewing and presenting problems; 2) organizing strategies; (3) imple-menting strategies; and (4) discussing and evaluating result. Thus, the existing problem solving in the e-learning requires hard work to find information that can be used to solve

problem given. On the other hand, in the conventional model, there was a tendency to require students only to use basic computer system theories that are appropriate to solve the problems so that the students will be motivated only to memorize the theories without understanding them. Thus, conventional model is less helpful for the students in developing their reasoning and their critical and creative thinking competence.

Secondly, the students were not yet used to the essay test used in this study. In evaluation, they had been used to using objective test which only required them to choose one answer given without giving a scientific reason of why they chose it. While in this study the students had to explain their answer by relating the concept in DSK. This could have caused them to feel that they were given very difficult problems without considering the meaning that was intended to be given through the problems.

Thirdly, the level of difficulty of the test given in this study. Based on the result of analysis of the instrument try-out, then eight items selected from twenty items tried-out, in which the variable that was meant to be measured through the test in this study was the one which covered the aspects of application (C3), analysis (C4), synthesis (C5), and evaluation (C6). While the test that was used to be given in DSK before only covered the aspects of knowledge, understanding, application, and analysis, so that the students had problems in doing the test given to determine the students' learning achievement. Thus, in general, the test used in this study needed more complex problem solving to answer all the items given.

Fourthly, the learning system conducted at the Informatics Engineering Education Department in Undiksha still used conventional system in which the students only listen to the explanation given by the lecturers.

Efforts made to solve the problems above include: first to give exercises in solving problems based on contextual problem or types of problems related to the students' daily experience. At every meeting in the process of learning, to give a description of problem that is easy to understand, and to give a realistic explanation to every question asked by the students or material that has not been understood by the students. Secondly, to give a guide to each group at the time of discussion activity in cooperative group, so that the discussion activity in the group can run more optimally.

The result of this study is n line with the result of the study conducted by Raharjo & Soenarto (2015) that problem-based learning model is very effective in improving students' learning achievement for the students with low level of creativity. Based on the result of the students conducted by Nafiah & Suyanto (2014), problem-based learning can improve students critical thinking skill. The result of study is related to the one done by Sofyan & Komariah (2016) that problem based learning can also be implemented both for simple and complex material and can support the implementation of the 2013 Curriculum. The finding of this study has the following implications: first, the mean score of students who learned from content e-problem-based learning was higher than that of the students who learned from the conventional model. Thus, the use of problem solving in learning process results in a better learning achievement. Secondly, the means of the students' learning achievement of those who learned from content e-problem-based learning falls into a higher category than the mean score of the group learning from the group learning from the conventional model. Therefore, problem-based learning model plays a role in improving students learning achievement.

CONCLUSION

Based on the result of the study and discussion, it can be concluded as follows. There is a significant difference in learning achievement between the group of students who learned from content e-problem-based learning in the experimental class and the group of students who learned from the conventional model in the control class. The mean score of the group of students who learned from e-problem-based learning in the experimental class is higher than that of the group of the students who learned from the conventional model in the control class. Thus, problem-based learning model plays the role in improving students' learning achievement.

Based on the result and discussion, some suggestions can be made to improve the

quality of learning. Since content e-problem-based learning is able to create a more conducive and meaningful learning atmosphere, and able to lead students in improving their learning achievement, then it is suggested to the lecturers to adopt content problem-based learning and use it in learning activities in the classroom. In addition to learning through the use of learning model, there are still other variables which influence the students' learning achievement, thus it is suggested that the practitioners should always consider and find other factors that can influence the level of earning achievement, for example, learning motivation.

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SYSTEM REQUIREMENT ANALYSIS FOR E-LEARNING MATERIALS TO SUPPORT ACADEMIC WRITING SKILLS FOR ENGINEERING STUDENTS OF VOCATIONAL HIGHER EDUCATION

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Abstract

This paper outlines a system requirement of proposed e-learning design for English course particularly in academic writing. However, the system requirement is focused on functional requirement. Therefore, it is necessary to carry out an intensive interaction involving systems analysts and end-users to obtain the appropriate learning materials needed by the engineering students. The instrument of this research is interview and questionnaire. The former was elaborated by the English teachers, while the latter was collected through questioners involving 32 engineering students at Politeknik Kota Malang, including the alumni. The data collection is analyzed using Kano's method. The research findings indicates that the functional requirement consists of 3 parts: (1) academic writing, (2) quizzes, and (3) writing template. The academic writing is focused on how to write abstract. Meanwhile, the quizzes cover grammar, paraphrasing, and abstract organization. This application comes with an abstract template as well, which can be downloaded and printed as required affiliation.

Keywords: *system requirement, e-learning, academic writing, kano*

INTRODUCTION

The curriculum of education in Indonesia sets the English course taught since elementary school . However, the students' proficiency is still far. Writing is considered as the lowest level of proficiency. As a matter of fact, the students' ability tends to low although they are formally taught writing skills earlier in lower education level of schools (Waloyo, 2017, p. 72). Some findings of the either researches or observation indicate that students' ability in writing skill including their critical thinking through writing is poor (Setiyaningsih, 2008, p. 98).

Language learners who study English have been given writing skills as one of the cores of curriculum. Because it is one of the four skills that should be accomplished (Yamin, 2013, p. 334). The difficulties are possible to be overcome to achieve the competency. But it is different from non-English learners. Moreover, the scholars who are not English learners experience the difficulties in writing English essay, i.e. engineering students (Xiou & Chen, 2015, p. 13). The research which encompassed the engineering students as the object of the research found that their writing skills are the lowest than other three English skills; listening, speaking and reading (Xu, 2012). However, the ability of academic writing in English language must be acquired by all students at any field of studies. Hence, their final assignments such as, thesis or dissertation could reach the wider scope of readers. Some efforts should be contended to increase the ability of academic writing among the Indonesian scholars that could be potential as the future researchers.

The ability of academic writing in Indonesia tends to be low, thus, the international publication shows very small number. Actually, the Indonesian scholars and researchers could write the publication in national as well as international level (Saubani, 2016, p. 3). Some factors affecting the low number of Indonesian contribution in global publication are likely the low level of English academic writing in terms of standardized English as well as the ungrammatical tenses (Adnan & Zifirdaus, 2005, p. 10)

Poor academic writing is credited to the most students' opinion that learning to writing academically is very difficult (Susanti, 2013, p. 2). It is more difficult and challenging than other skills like listening, writing and reading. According to Oshima and Hogue, academic writing is difficult, indeed (Oshima & Hogue, 1999)

The preliminary survey on engineering students at Diploma program at vocational education indicated that almost 90% of the students said that when writing abstract for their final assignment, they need to intensively consult to those good at English. The lecturers become the first person they need. So, English lectures were voted by 38% of students, followed by their final assignments' supervisor (31.5%). In addition, they need to have consultation 3 times to have a good abstract. This raises a problem for lectures and supervisors since they must facilitate their students to give more time and efforts on top of their main duty as teachers at college such as preparing teaching, carrying out research, etc.

This research investigates the system requirement, focusing on the functional requirement of e-learning for engineering students at diploma 3 program. E-learning is a process of applying activities of communication, education, and exercises through electronic media that can be accessed anytime. E-learning enhances the quality of learning through collaborative study involving humans and technology (Sunnah & Sukoco, 2014, p. 149). E-learning is likely to help the lectures' duty in guiding their students to write their academic writing. Therefore, it could lessen the lectures' time and work particular in writing abstract in order to do other duties such as, doing research, developing and evaluating the teaching materials, etc. This is used as a learning media to increase their ability in academic writing

METHOD

Data Collection

It requires having a depth needs analysis on functional requirement from the users before designing and building the soft-ware application for e-learning. Therefore, the application will meet the demand of the users'. Direct interview with the users may obtain the detailed information related to their specific needs. The data collection of this

research was done through interview and questionnaire.

A preliminary survey was carried out to determine the functional system requirement serving as a starting point of this research. The survey aims to seek the real problems faced by the engineering students in academic writing, particularly writing abstract for their final assignment. The sampling method used in this survey is purposive sampling method. The survey questionnaires were distributed to engineering students at Politeknik Kota Malang and the alumni. These students were writing abstract in English language for final project and the alumni had left school for 2 years maximum that writing abstract in English language for the last final project before graduated. The research shared 83 questionnaires however only 35 respondents filled and submitted them. Nevertheless, 32 of filled questionnaire are considered as a valid data, but the rest of them remained invalid. The result of the survey becomes the secondary data supporting the process of the interview.

The interview was elaborated by the English lecturers based on the result of the previous survey. The result of the interview is an outline of general frame work to overcome the students' problem from the lecturers' point of view. These are a fundamental source of data to determine the functional system requirement.

Those system requirement data are analyzed to achieve the best result meeting the demands of the users. The Kano method is specifically applied to this research since this method has been widely used in research needs analysis.

Kano Method

Kano method was developed by Noriko Kano from Tokyo Riko University in 1984. This method is a model to classify the attributes of the products as well as the services. The classification is based on how well the products or services meet the customers' satisfaction (Berger et al., 1993, pp. 3–36).

See the relationship between customers' satisfaction and services or products proposed by Kano in figure 1.

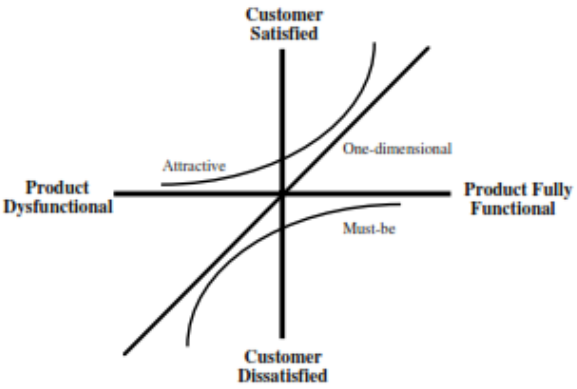

Figure 1. Kano's Diagram

The attributes are classified into several categories.

1) *Attractive* (*excitement needs*)
The greater the attributes work, the greater the level of customers' satisfaction. However, the lower attributes do not mean that they lessen the customers' satisfaction.

2) *One dimensional* (*performance needs*),
The greater the attributes work, the greater the level of customers' satisfaction. In contrast, the lower the attributes, the lower the customers' satisfaction.

3) *Must be (basic needs)*
The customers are dissatisfied if the attributes are low, but they are never beyond the neutral. Even though, the working of the attributes are high, the customers are still disappointed. This category is the basic needs that should be fulfilled by the providers to their customers. If the providers want to increase the performance of this category, ironically, it will never significantly make the customers' satisfaction.

4) *Indifferent*
The products or services are never influence the customers' satisfaction, whether there are the products/services or not.

5) *Reverse*
This category is opposite with the *one* dimensional; i.e. the level of customers' satisfaction is higher if the services or products are not the way they are.

6) *Questionable*
This category occurs when the customers are satisfied or dissatisfied sometimes if there are/ not services or products

The questionnaire of this research is adapted from Kano method. The questions consist of optional criteria covering like, must be, neutral, live with, and dislike. Each question is positive and negative. The responses are combined with the table of Kano evaluation as seen in Table 1, hence there is appropriateness between functional and customer requirements.

From the Table 1, it could be concluded that each of question is counted in one of the following criteria:

A = *Attractive*
M = *Must-Be*
O = *One-Dimensional*
R = *Reverse*
Q = *Questionable*
I = *Indifferent*

The result of the Kano evaluation table will determine Kano categorization in every attribute using the following formula.

1. If (*one dimensional* + *attractive* + *must be*) > (*indifferent* + *reserve* + *questionable*), the maximum grade is (*one dimensional, attractive, must be*).
2. If (*one dimensional* + *attractive* +*must be*) < (*indifferent* + *reserve* +*questionable*), the maximum grade is (*indifferent, reserve, questionable*)

After determining the Kano categorization, it subsequently seeks the value of *better* and *worse*. *Better* indicates how high the customers' satisfaction is if the features are provided (A&O). Conversely, *Worse* indicates how low the customers' satisfactions is if the features are not provided. To obtain the value of *Better* and *Worse*, the following formula is used:

$$Better = \frac{A + O}{A + O + M + I}$$

$$Worse = \frac{O + M}{A + O + M + I}$$

FINDINGS AND DISCUSSION

Data Collection

The preliminary survey found that the problem faced by most of the engineering students in writing abstract is composing the abstract particularly constructing the words into sentences as well as the abstract structure (70%). The following problem is grammar (15.7%) and vocabulary (14.3%).

Those data help the interview process involving English lecturers. After interview, the system requirements of e-learning can be concluded:

1. The system provides the learning materials of academic writing.
2. The system provides the exercises as well as the quizzes to drill the grammar.
3. The system provides the exercises and quizzes to practice constructing the sentences and paraphrasing using their own words.
4. The system provides the template for constructing abstract aiming to help the students in composing the structure abstract.
5. The system provides printing menu to print the document, which has been displayed in template
6. The system provides the security system with the login menu for every user

Table 1. Table of Kano Evaluation

Customer Requirements		Dysfunctional				
		1 like	2 Must-be	3 neutral	4 Live with	5 dislike
Functional	1. like	Q	A	A	A	O
	2. must-be	R	I	I	I	M
	3. neutral	R	I	I	I	M
	4. live with	R	I	I	I	M
	5. dislike	R	R	R	R	Q

The functional needs mentioned above are the main questions in the survey distributed to the engineering students. The objective of distributing the survey is to obtain the functional system between the system requirements and the users. The list of the questions in survey refers to Kano method.

Determining of Kano categorization

The data collection from the questionnaire is analyzed using table of Kano evaluation. This table determines Kano categorization. The result of data analysis can be seen in Table 2, Table 3, Table 4, Table 5, Table 6 and Table 7.

Table 2. Table of Kano Evaluation on Functional Requirement 1

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	4	1	0	3	7
2 (must be)	0	0	2	0	9
3 (neutral)	0	1	2	1	0
4 (live with)	0	0	0	1	1
5 (dislike)	0	0	0	0	0

Table 3. Table of Kano Evaluation on Functional Requirement 2

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	2	1	4	0	12
2 (must be)	1	0	0	3	5
3 (neutral)	0	0	1	0	0
4 (live with)	0	0	0	2	1
5 (dislike)	0	0	0	0	0

Table 4. Table of Kano Evaluation on Functional Requirement 3

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	2	0	3	3	11
2 (must be)	1	0	0	0	3
3 (neutral)	1	0	0	0	0
4 (live with)	0	1	2	2	3
5 (dislike)	0	0	0	0	0

Table 5. Table of Kano Evaluation on Functional Requirement 4

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	1	0	2	2	11
2 (must be)	1	0	0	0	7
3 (neutral)	0	0	3	0	0
4 (live with)	0	0	0	0	3
5 (dislike)	0	1	1	0	0

Table 6. Table of Kano Evaluation on Functional Requirement 5

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	2	1	0	3	7
2 (must be)	0	0	0	2	4
3 (neutral)	0	0	9	0	1
4 (live with)	0	0	1	1	1
5 (dislike)	0	0	0	0	0

Table 7. Table of Kano Evaluation on Functional Requirement 6

	Dysfunctional				
	1	2	3	4	5
Functional	(like)	(must be)	(neutral)	(live with)	(dislike)
1 (like)	1	0	3	1	7
2 (must be)	0	1	0	1	6
3 (neutral)	0	0	3	0	0
4 (live with)	0	0	1	2	4
5 (dislike)	2	0	0	0	0

The result of Kano evaluation then used for determining the Kano categorization on each attribute. These can be seen in Table 8.

The result of determining Kano categorization indicates that functional requirement is on the *One dimensional* and *Must be*. The *One dimensional* indicates that the higher the customers' satisfaction, the higher the functional requirement attributes in the system. In contrast, the lower the customers' satisfaction, the lower the functional requirement attributes in the system. This means that the available and the better attributes increase the better customers' satisfaction and vise verse. *One dimensional* is clearly indicated by the functional requirement no. 2, 3, 4, and 5.

Table 8. Result of Kano Categorization Determiner

Functional Requirements	A	M	R	O	Q	I	O+A+M	I+R+Q	Total	Kano Categorization
1	4	10	0	7	4	7	21	11	32	M
2	5	6	1	12	2	6	23	9	32	O
3	6	6	2	11	2	5	23	9	32	O
4	4	10	3	11	1	3	25	7	32	O
5	4	6	0	7	2	13	17	15	32	O
6	4	10	2	7	1	8	21	11	32	M

Meanwhile, *Must be* indicates that the customers are dissatisfied if the events of system attributes are low. Surprisingly, the customers' satisfaction is not beyond the neutral although the events of the system attributes reach higher. *Must be* is indicated by functional requirement no 1 and 6.

Measurement of Kano Method

The result of determiner Kano categorization is then calculated obtaining the value of *better* and *worse*. *Better* indicates how high the customers' satisfaction is if the features (A&O) are provided. Whereas, Worse indicates how low the customers' satisfaction is if those features (O&M) are not provided. The value of better and worse are seen in the Table 9.

Table 9. Measurement Kano Method

Functional Requirement	A	M	O	I	Better	Worse
1	4	10	7	7	0.39	0.61
2	5	6	12	6	0.59	0.62
3	6	6	11	5	0.61	0.61
4	4	10	11	3	0.54	0.75
5	4	6	7	13	0.37	0.43
6	4	10	7	8	0.38	0.59

The measurement of Kano method in Table 9 indicates that the highest value of better is on the attributes no 3. This means that the available of the third attributes considerably makes the customers feel satisfied. On the other hand, the highest value of worse is on the no. 4. This highlights that the customers will be extremely dissatisfied.

CONCLUSION

Based on the result of system functional requirement of e-learning using Kano method, it is found that system functional requirement meets the users' need.

In Kano categorization, users demand that the systems cover quizzes/exercise on grammar, paraphrase, template for composing abstract, and print menu to print the file of abstract which has been composed. If these four attributes are not provided, the customers are greatly dissatisfied. Nevertheless, if the two attributes of this system; theory on how to write abstract along with the security system of login, which are even needed by the users are not provided, they will not make the users disappointed. In other words, these attributes may be or may not be provided, they will not be a big deal for the users.

The value better and worse indicates that the quizzes or exercises to drill the paraphrasing makes the users greatly satisfied. On the contrary, if the attributes of template for composing abstract is not provided, the users will be extremely dissatisfied.

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THE LINK AND MATCH OF THE DEMAND AND SUPPLY FOR PRODUCTIVE VOCATIONAL SCHOOL TEACHERS WITH REGARD TO SPECTRUM OF VOCATIONAL SKILLS IN THE PERSPECTIVE OF EDUCATION DECENTRALIZATION

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Abstract

The purpose of this study was to describe the pattern of link and match of the demand and supply for productive vocational school teachers which should be carried out in the future. This study is descriptive qualitative with the grounded theory approach. The unit of analysis consisted of: policy makers at central level; policy makers at local level; productive vocational school teachers; Teacher Education Institutes (LPTK), and Non-Teacher Education Institutes (Non-LPTK). The data were analyzed using the three phases: open coding, axial coding, and selective coding. The research results are as follows. (1) The pattern of the demand for productive vocational school teachers has been fulfilled through such programs as Three Year Diploma for Vocational Teacher of Engineering, Bond-based Remuneration for Bachelor's Level, Civil Servant Recruitment, Regional Civil Servant Recruitment, and Non-permanent Teachers. (2) Productive vocational school teachers supplied included LPTK graduates majoring in 22 vocational skills training programs and Non-LPTK graduates majoring in 45 vocational skills training programs out of 48 programs. (3) Productive vocational school teachers were distributed in three types of programs. (4) A system of vocational teacher education was conducted by increasing and refining. (5) Link and Match pattern of demand and supply for productive vocational school teachers involved integration of supply for LPTK graduates and that of Non-LPTK graduates, the distribution of such supply, and the pattern of implementation of vocational teacher education.

Keywords: *link and match, demand, supply.*

INTRODUCTION

National development wil achieve its great success if qualified human resources are available in optimizing and maximizing the improvement of all development dimensions. Qualified resources can be attempted through education, either formal or nonformal. One of educational units in formal sector which is intended to prepare the graduates particularly to achieve excellence in the world of work is vocational high school (*Sekolah Menengah Kejuruan*/SMK).

Article 13 and 15 of Law on the National Education System *(Undang-Undang Sistem Pendidikan Nasional)* No. 20 of 2003 define the SMK as "a vocational educational unit which serves as the continuation of primary level education and is intended to prepare learners for certain fields of work." Meanwhile, Djojonegoro (1998, p. 34). Suggested SMK graduates to be closer to a world of work In short, SMK was designed to prepare learners or graduates to enter the world of work ,and to be able to improve professional attitudes in certain fields of work. For SMK graduates, the top priority is the world of work.

The current improvement is marked by several achievements in advances in science and technology. All countries will directly get involved in an era of global competition. The increasing global competition will occur in the 21st century, a century of rapid advances in science (Tilaar, 2004, p. 39). The presence of the era of global competition requires the SMK to develop and keep pace with development in the world of work. Therefore, it is important for SMK to competencies held to remain relevant with demands of the world of business and industry in the era of global competition. One of attempts made by Directorate of Guidance of SMK as a work unit of Ministry of National Education responsible for the existence of SMK was shown with the issuance of vocational skills training programs. The development of SMK as the main institution aiming at the improvement of human resources is of importance since it is related to two concomitant, or complementary things: (1) policies regarding local autonomy and central-local balance financial relationship which require supports of qualified technical/ production skills and reliable managerial skills to revive national economy, and (2) more strict and sharper demands and problems of globalization era, particularly in the field of industrialization and information technology, which lead to rapid change in science and technology. Such condition, on the one hand, provides opportunities to accelerate development rate, and on the other hand, brings about challenges on the improvement of human resource quality (Team of YPPTI, 2010).

The spectrum of vocational skills was first stipulated in Decision of the General Directorate of the Ministry of Primary and Secondary Education No. 251/C/MN/2008 dated August 27, 2008 and enacted in early Academic Year 2008/ 2009 to grade X students. Meanwhile, the implementation to grade XI and XII students remained to refer to Letter of the General Directorate of the Minister of Primary and Secondary Education No. 925/C.C5./KP/07 dated February 28, 2007 concerning the Adjustment of Vocational Programs based on SMK curriculum on 1999 and 2004 editions. Then, the Decision on Spectrum of Vocational Skills was updated to the Letter of General Directorate of Secondary Education Decision No. 7013/D/KP/2013 dated December 4, 2013 regarding Spectrum of Vocational Skills. Then, it was updated to the Letter of General Directorate of Primary and Secondary Education No. 4678/D/KEP/ MK/2016 dated September 2, 2016 on Spectrum of Vocational Skills. In reference to the updated decision regarding spectrum of vocational skills, the education program of SMK was divided into 9 fields of skills, 48 vocational skills training programs, and 142 vocational competencies. The names of skills training program and vocational competencies held by SMK were adjusted to the latest spectrum of vocational skills.

Beside structuring vocational competencies, the Ministry of National Education also made a change in ratio of Senior High School (*Sekolah Menengah Atas*/SMA) and SMK to be 30:70, in accordance with government's intention to increase the number of SMK and achieve ratio of SMK:SM 70%:30%. The number of SMK will increase. Up to 2008, 100 SMA and 341 SMK under local excellence basis had been developed. The ratio of the number of SMK students: SMA students were increasing from 30:70 in

2004 to 49:51 according to tentative count in the end of September 2009 (Ministry of National Education, 2010, p. 23). In term of the ratio of the number of government SMK and government SMA, the latest data indicates 67:33 (Bona, 2016).

The structuring of vocational competencies and the issuance of spectrum of skills and the development of ratio of the number of SMA:SMK (30:70) result in the fulfillment of productive vocational school teachers. The change in composition is predicted to exert an influence on the increase in demand for productive vocational school teachers which is limited in number (Jenner, 2010).

Teacher Education Institutes (LPTK) have provided the supply for vocational school teachers. However, vocational LPTK could only supply some based on spectrum of vocational skills. In fact, LPTK have not been able to fulfill the demand for productive teachers for all vocational skills programs and unable to follow a rapid change in differentiated advances in science (Tilaar, 2004, p. 42). After a pilot study conducted in several vocational LPTK and Directorate of Guidance of SMK, demand for productive vocational school teachers based on spectrum of vocational skills were compared to the availability of study programs held by vocational LPTK. The findings revealed that out of 9 fields of skills, LPTK were only able to provide productive voca-tional school teachers in 2 fields of skills including Business and Management, as well as Tourism. Vocational LPTK have not been able to fulfill the demand for productive vocational school teachers in the other 7 fields, particularly in the field of Energy and Mining, Health and Social Work, and Maritimeness.

Policies of the structuring of spectrum of vocational skills and the limited number of LPTK graduates to fulfill the demand for productive vocational school teachers according to spectrum of skills will influence the shortage of productive vocational school teachers. A presurvey carried out in SMKN2 and SMKN 5 Surakarta revealed that the teacher shortage occurred in all vocational competencies. The shortage was caused by the mismatch in degree certificates and the subjects handled, the absence of new formation in recruitment of productive teachers, and the number of teachers entering retirement or pre-retirement (pilot study conducted in SMKN 1 and SMKN 2, August-September 2011). In addition, Director of Directorate of Guidance of SMK (Dit PSMK) of Ministry of Education and Culture, Mustaghfirin Amin (Bona, 2016) pointed out that the teacher shortage presents as a problem in developing SMK. In reference to data of Ministry of Education and Culture, the number of productive vocational school teachers is 80,000 of total number of government SMK teachers of 278,000. The results of survey and the latest data indicate the lack of a sufficient number of productive vocational school teachers. Furthermore, government's program to enhance the quality of educated workforce through SMK Inpres leads to reduced the shortage or productive vocational school teachers.

Attempts to fulfill the demand for productive vocational school teachers have been made by the Ministry of Education and Culture through Directorate of Guidance of SMK and Directorate of Guidance of secondary education Educators and Education Personnel (P2TK). However they seem to be in short run and add-hock in fulfilling the demand for productive vocational school teachers with regards to spectrum of vocational skills and the supply for teachers in perspective of education decentralization. Such attempts cannot be continuously made in a long run due to their vulnerability to tentative policies without references derived from comprehensive and in-depth scientific studies to be legal product for foundation of the policies.

Clearly, several problems encountered by productive vocational school teachers include: the issuance of the structuring of vocational skills, the limited number of LPTK graduates majoring in spectrum of vocational skills, the teacher shortage, the change in authority of recruitment of productive teachers in perspective of education decentralization, and unclear foundation of attempts to deal with the demand for productive vocational school teachers. Problems encountered by productive vocational school teachers seem to be excessive and complicate the world of Indonesian education. A clear pattern based on comprehensive and in-depth scientific study to present as legal product underlying attempts to fulfill the demand for productive vocational school teachers is required. For that reason, a research on the effective link and match of demand and supply for pro-

ductive vocational school teachers based on the spectrum of vocational skills in perspective of education decentralization is required.

Such problems appear to vary and be complicated. To guarantee in-depth results of research, the research focused on: (1) the overview of the fulfillment of demand for productive vocational school teachers which was carried out by central and local governments; and (2) the overview of the pattern of link and match of the demand and supply for vocational school teachers with regards to the spectrum of vocational skills for vocational skills training programs which have not been held by government vocational LPTK, but rather have held by government non-LPTK.

Based on the focus of problem, the research question is: How is the pattern of link and mach of the demand and supply for productive vocational school teachers which should be carried out in the future?

The purpose of the present research was to answer research question, particularly to describe the link and match pattern of the demand and supply for productive vocational school teachers which should be carried out in the future.

The benefits of the research are: (1) for government, in this case Ministry of Education and Culture, to link and match demand and supply for productive vocational high school teachers, (2) for higher education institutions, either Teacher Education Institutes or Non-Teacher Education Institutes, to work together for the link and match of demand and supply for vocational school teachers; (3) for government at provincial level, to construct policies regarding recruitment of productive vocational school teachers; (4) for SMK, to overcome problem of the lack of productive school teachers; (5) for other researchers, to conduct further study, or to refine the results of the present research.

RESEARCH METHOD

The present research sought to examine and reveal actual phenomenon/symptom occurring in SMK: the shortage and scarcity of productive teachers for certain vocational training skills programs. Furthermore, in reference to the examined and revealed phenomenon, the research provided an overview of the pattern of fulfillment of productive vocational school teachers carried out by center and local governments and found out the overview of link and match pattern of supply and demand for productive vocational school teachers with regards to vocational skills training programs in the perspective of education decentralization.

Therefore, the type of the research is descriptive qualitative with grounded theory approach. Grounded Theory is a research method that prescribes systematic guidelines for data collection and analysis with the purpose of inductively building a framework explaining the collected data (Charmaz, 2006).

The research had been carried out for 1 year through several stages: (1) pilot study (3 months), (2) data collection (3 months); and (3) data analysis and report making (6 months). It was conducted in 2 locations: (1) main locations: Directorate of Guidance of SMK and Directorate of Guidance of Secondary Education Teachers of Ministry of Education and Culture, the Department of Youth Education and Sports of Surakarta, the Department of Education of Central Java province, Regional Civil Service Bureau of Surakarta, SMK Negeri 2 and SMK Negeri 5 of Surakarta, Faculty of Technology and Vocational Education of Universitas Pendidikan Indonesia, Faculty of Agriculture of Universitas Sebelas Maret Surakarta (UNS), Politeknik Negeri Semarang, and Institut Seni Indonesia of Surakarta; and (2) supporting location: Study Program of Vocational Technical Education of Faculty of Teacher Training and Education of UNS.

Units of analysis involve certain units regarded as research subjects, or anything related to the focus of research/ the examined components. They were determined by the researchers themselves to maintain the validity and reliability of the research.

The units of analysis were divided into 2 parts: (1) components of demand which include: (a) components of demand for which units of analysis cover: (a) policy makers at central level regarding vocational school teachers (Code K1) comprising, Directorate of Guidance of SMK (Code K1A), Directorate of Guidance of Secondary Education Teachers (Code K1B), and documents of Spectrum of Vocational Skills (b) policy makers at local level regarding vocational school teachers (Code K2), consisting of Department of Edu-

cation of Surakarta (K2A), Department of Education of Central Java province (K2B), and Regional Civil Service Bureau of Surakarta (Code K2C); (c) users of productive vocational school teachers (Code K3), including SMKN 2 Surakarta (Code K3A), SMKN 5 Surakarta (Code K3B); and (2) components of supply with such units of analysis as: (a) institutes supplying productive vocational school teachers, Vocational LPTK (Code P1), including Faculty of Technology and Vocational Education of Universitas Pendidikan Indonesia (P1A), Study Program of Vocational Technical Education of Faculty of Teacher Training and Education of UNS (P1B) , and documents of higher education institutions; (b) Non-LPTK supplying graduates relevant to demand for SMK (Code P2), comprising Faculty of Agriculture of UNS (Code P2A), Politeknik Negeri Semarang (Code P2B), Institut Seni Indonesia Surakarta (Kode P2C), and documents of higher education institutions.

The main instruments of data collection are the researchers themselves. Several techniques of data collection were used to support the data collection. They include: (1) structured interview, used to explore data on experiences, thoughts, and perspectives of sources of primary data using interview guidelines related to the pattern of demand for productive teachers which has been fulfilled and the pattern of link and match of demand and supply for productive vocational school teachers; (2) document, used to explore documents derived from secondary data sources through guidelines of document review related to policies and regulations to fulfill the demand for productive subject teachers, both for the pattern of demand for productive teachers which has been fulfilled, and that of link and match of the demand and supply for productive vocational school teachers; (3) member check, used to recheck through discussions with informants to describe the pattern of fulfillment of supply for productive subject teachers which has been conducted, as well as the pattern of the link and match of the demand and supply for productive vocational school teachers based on documents and interview.

In order to maintain data validity, data triangulation technique was applied. It is a technique underlaid by multiperspective thinking patterns, meaning that a number of perspectives are required to draw a conclusion. Data (source) triangulation was used since data sources comprised documents, informants/ respondents with different levels, as well as member check. It leads the researcher to collect data using different data sources to test the data validity.

Data were analyzed using Miles & Hubermen's (1992, pp. 16-20), interactive model in qualitative research consisting of: (1) data reduction; (2) data display; and (3) conclusion drawing and data verification. Data analysis is done when data are being collected, and after data has been collected in certain periods (Sugiyono, 2009, p. 246). Interactive analysis is defined as analysis of which activities can be done through interaction of the components, or with data collection process during activities of data collection.

The collected data included those related to the pattern of demand for productive vocational school teachers which has been fulfilled by central and local governments, as well as those associated with the link and match pattern of demand and supply for productive vocational school teachers with regards to spectrum of vocational skills in perspective of education decentralization. After data collection, the researchers moved along the components of analysis. The process of data analysis was carried out in three consecutive components: data reduction, data display, and conclusion drawing.

Data reduction covered the process of selecting in which attention is centered to simplification and transformation of rough data obtained from interviews and documents, either primary or secondary data. Data display was done when organizing data; it involved systematic construction of information obtained from data reduction. Meanwhile, conclusion drawing was gradually conducted to get high degree of reliability in data/source triangulation and member check on the resulted findings consisting of the pattern of demand for productive vocational school teachers which has been fulfilled, as well as the link and match pattern of demand and supply for productive vocational school teachers with regards to spectrum of vocational skills in perspective of education decentralization. Therefore, data were analyzed since presurvey activities.

The implementation of such interactive analysis was done in two parts: data analysis

of pattern of demand for productive vocational school teachers which has been fulfilled by government, and the link and match pattern of the demand and supply for productive vocational school teachers with regards to spectrum of vocational skills in perspective of education decentralization. Stages in the analysis referred to analysis with grounded theory approach through three phases of coding: open coding, axial coding, and selective coding (Cresswell, 2015, pp. 272-273).

Data analysis of pattern of demand for productive vocational school teachers which has been fulfilled. Data analysis of fulfillment of productive vocational school teachers was carried out through: (1) data collection using interviews to informants from DITPSMK of Ministry of Education and Culture, DITPGPM of Ministry of Education and Culture, Dikpora of Surakarta and of Central Java province, BKD of Surakarta, SMK Negeri 2 and SMK Negeri 5 of Surakarta, as well as relevant documents; (2) making of inference in the form of abstract conclusion drawing from analysis of interview data and documents. The abstraction of while understanding of data was synchronized with theory as foundation of analysis description; (3) analysis using qualitative study with conceptual scope which is to realize abstraction to become a concept of the pattern of demand for productive vocational school teachers which has been fulfilled. The realization of the abstraction was carried out in a row through three phases of coding in grounded theory: open coding, axial coding, and selective coding (Cresswell, 2015, pp. 272-273). The former involves describing categories and selecting a category as the center of phenomenon, the middle covers reviewing to understand the phenomenon, while the latter includes displaying information obtained from axial coding as the results of interpretation, and determining as research findings in the form of visual model; (4) member check to ensure the validity of the overview of pattern to obtain a pattern which is in accordance with the actual condition; (5) description of pattern of demand for productive vocational school teachers which has been fulfilled by government. Figure 1 describes the conducted analysis process.

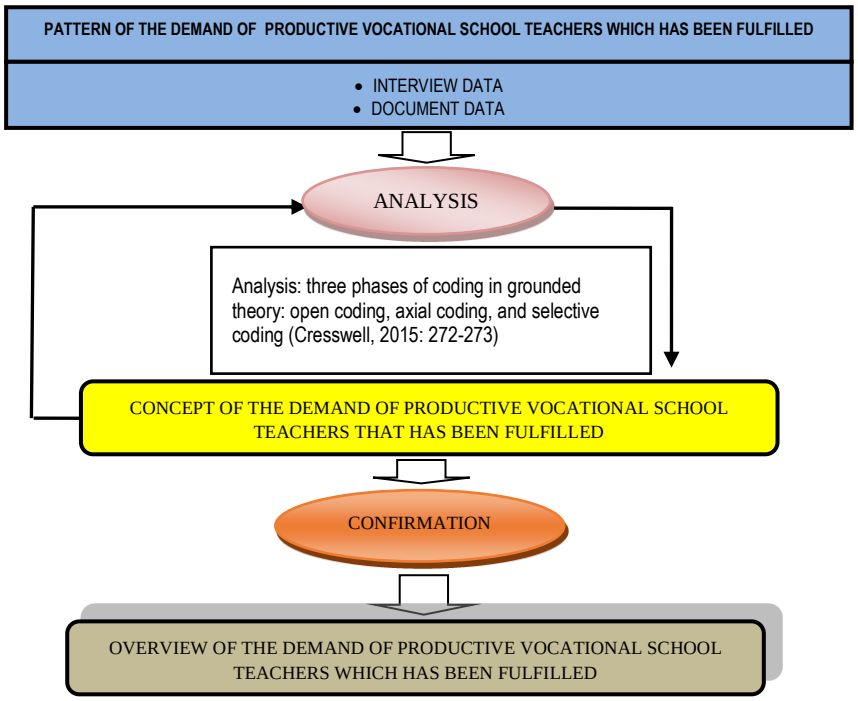

Figure 1. Analysis Process Pattern of Demand for Productive Vocational School Teachers which has been Fulfilled

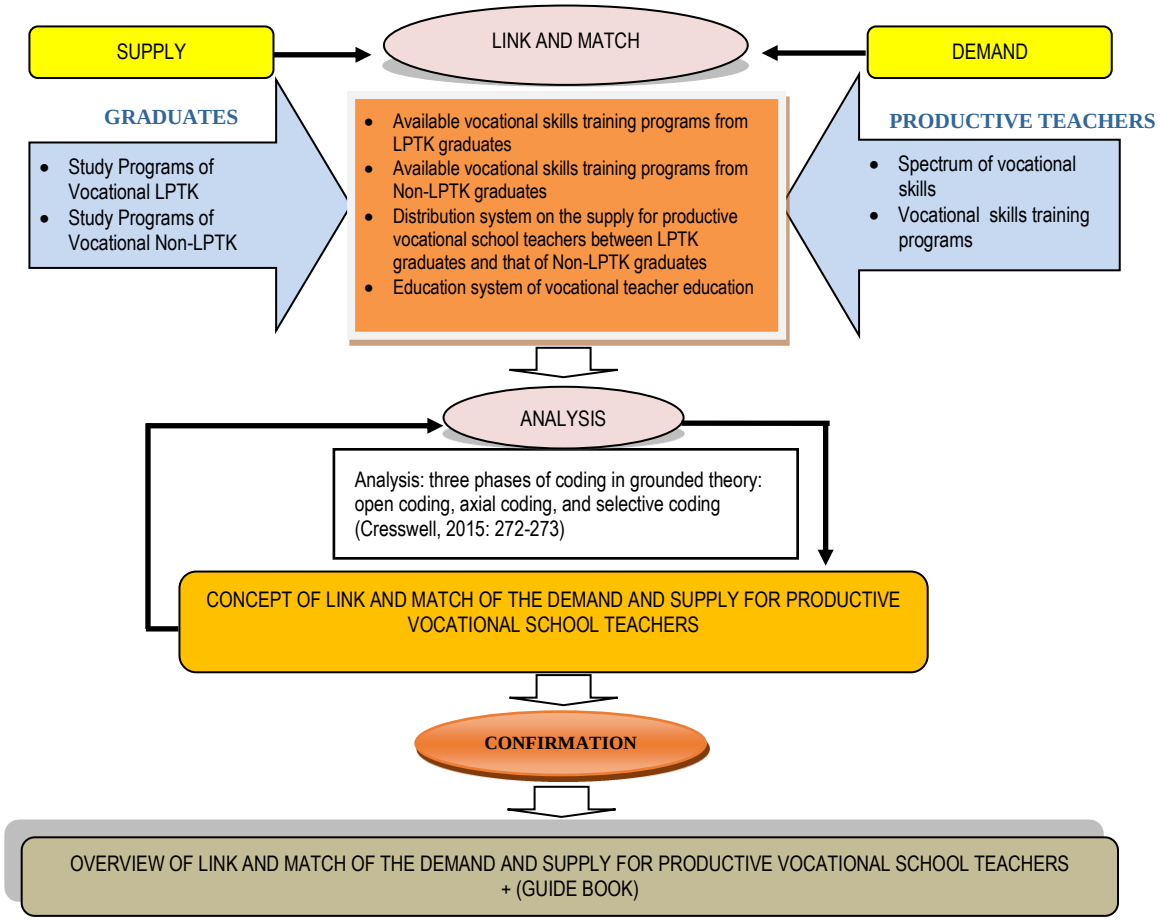

Figure 2. Analysis Process Link and Match of the Demand and Supply for Productive Vocational School Teachers

Data analysis of link and match pattern of the demand and supply for productive vocational school teachers with regard to spectrum of vocational skills in perspective of Education Decentralization

Data analysis of link and match pattern of demand and supply for productive vocational school teachers with regard to the spectrum of vocational skills in the perspective of Education Decentralization was conducted by as follows (1) collecting data through interviews with informants from DITPSMK of Ministry of Education and Culture, DITPGPM of Ministry of Education and Culture, Department of Education of Central Java province, Dikpora of Surakarta, BKD of Surakarta, SMK Negeri 2 and SMK Negeri 5 Surakarta; (2) collecting data through documents of spectrum of vocational skills, documents of the availability of study programs at vocational LPTK, documents of the availability of study programs at Non-LPTK, teacher professional profession documents, Teacher Professional Education documents (PPG), and link and match documents; (3) Comparing documents of spectrum of vocational skills and documents of the availability of study programs at Vocational LPTK and Non-LPTK, and in-depth review of the teacher's professional authority documents, teacher education documents, and link and match documents; (4) Making inference in the form of abstract conclusion drawing from analysis of interview data and documents. Abstraction derived from whole understanding of data was synchronized with theory as the foundation of the analysis description; (5) conducting analysis using qualitative study with the conceptual realm, that embodies the abstraction into concept of link and match pattern of the demand and supply for productive vocational school teachers with regard to spectrum of vocational skills in perspective of education decentralization The realization of abstraction

into concept was done consecutively through three coding phases in grounded theory, i.e. open coding, axial coding, and selective coding (Cresswell, 2015, pp. 272-273). The former involves describing categories and selecting a category as the center of phenomenon, the middle covers reviewing to understand the phenomenon, while the latter includes displaying information obtained from axial coding as the results of interpretation, and determining as research findings in the form of visual model. At these stages, an overview of the supply for teachers from LPTK graduates and non-LPTK graduates based on the demand for vocational skills training programs in vocational school. Distribution system on the supply for productive vocational school teachers between LPTK graduates and that for Non-LPTK graduates, education system of vocational teacher education from LPTK graduates and that for Non-LPTK graduates, and overview of the link and match pattern of the demand and supply for productive vocational school teachers with regard to spectrum of vocational skills in perspective of education decentralization; (6) doing member check/ confirmation to check the validity of the research findings, so that the research findings generated can be in accordance with data analysis of interviews and documents; (7) determining link and match pattern of the demand and supply for productive vocational school teachers with regard to the spectrum of vocational skills in perspective of decentralization as the result of research findings; (8) making summary used as guideline for the link and match pattern of the demand and supply for productive vocational school teachers with regard to spectrum of vocational skills in perspective of education decentralization. The process of conducted analysis can be clarified in Figure 2.

RESEARCH RESULT AND DISCUSSION

Pattern of Demand of Productive Vocational School Teachers which has been Fulfilled

Pattern of demand of productive vocational school teachers which has been fulfilled was divided into two parts, namely the pattern of demand of productive vocational school teachers in the era of centralization and decentralization. The demand of productive vocational school teachers was fulfilled in the era of centralization through such programs as Three Years Diploma for Vocational Teacher of Engineering, Bond-based Remuneration for Bachelor's Level, Civil Servant Recruitment. The fulfillment of productive vocational school teachers in the era of decentralization includes Regional Civil Servant Recruitment, and Non-permanent Teachers.

Illustration of the supply for productive vocational school teachers from LPTK graduates and that Non-LPTK graduates based on the demand for vocational skills training program as can be shown in Table 1.

From the description in the Table 1, based on the 2016 demand for vocational training program on spectrum of vocational skills, productive vocational school teachers supplied included LPTK graduates majoring in 22 vocational skills training programs, while 26 vocational skills training programs were not available. The supply for Non-LPTK graduates was available in 45 vocational skills training programs, meanwhile three programs are not available.

Distribution System on the Supply for Productive Vocational School Teachers from LPTK Graduates and from Non-LPTK Graduates

The availability of Productive vocational school teachers from LPTK graduates and Non-LPTK graduates was distributed in three types of programs, namely: (a) vocational skills training programs provided and fulfilled by LPTK graduates; (b) vocational skills training programs provided and filled by both LPTK and Non-LPTK graduates; and (c) vocational skills training programs pro-vided and fulfilled by Non-LPTK graduates. Table 2 presents such distribution system.

Table 1. The Supply for Teachers from LPTK Graduates and from Non-LPTK Graduates

No.	Vocational Skills Training Program	Teacher Availability	
		LPTK	Non-LPTK
Expertise Field of Technology and Engineering			
1.	Construction and Property Technology	Available	Available
2.	Geomatics and Geospatial Techniques	Available	Available
3.	Electricity Engineering	Available	Available
4.	Mechanical Engineering	Available	Available
5.	Aircraft Technology	Not Available	Available
6.	Graphics Engineering	Not Available	Available
7.	Industrial Instrumentation Technique	Not Available	Available
8.	Industrial Engineering	Not Available	Available
9.	Textile Technology	Not Available	Available
10.	Chemical Engineering	Not Available	Available
11.	Automotive Engineering	Available	Available
12.	Shipping Technique	Not Available	Available
13.	Electrical engineering	Available	Available
Expertise Field of Energy and Mining Expertise			
1.	Petroleum Engineering	Not Available	Available
2.	Mining Geology	Not Available	Available
3.	Renewable Energy Engineering	Not Available	Available
Expertise Field of Information and Communication Technology			
1`	Computer and Informatics Engineering	Available	Available
2.	Telecommunications engineering	Not Available	Available
Expertise Field of Health and Social Work			
1.	Nursing	Not Available	Available
2.	Dental health	Not Available	Available
3.	Medical Laboratory Technology	Not Available	Available
4.	Pharmacy	Not Available	Available
5.	Social Work	Not Available	Available
Expertise Field of Agribusiness and Agrotechnology			
1.	Agribusiness Plant	Available	Available
2.	Livestock Agribusiness	Not Available	Available
3.	Animal Health	Not Available	Available
4.	Agribusiness Processing of Agricultural Products	Available	Available
5.	Agricultural Engineering	Available	Available
6.	Forestry	Not Available	Available
Expertise Field of Maritime			
1.	Sailing Fishing Vessel	Not Available	Available
2.	Shipping Commercial Ship	Not Available	Available
3.	Fishery	Not Available	Available
4.	Processing of Fishery Products	Not Available	Available
Expertise Field of Business and Management			
1.	Business and Marketing	Available	Available
2.	Office management	Available	Available
3.	Accounting and Finance	Available	Available
Expertise Field of Tourism			
1.	Hospitality and Tourism Services	Available	Available
2.	Culinary	Available	Not Available
3.	Tata Beauty	Available	Not Available
4.	Fashion	Available	Not Available
Expertise Field of Arts and Creative Industries			
1.	Art	Available	Available
2.	Creative Design and Creative Products	Available	Available
3.	Music Art	Available	Available
4.	Dance Arts	Available	Available
5.	Karawitan Art	Available	Available
6.	The Art of Pedalangan	Not Available	Available
7.	Theater Arts	Not Available	Available
8.	Art Broadcasting and Film	Not Available	Available

Table 2. Distribution System for the Supply for Productive Vocational School Teachers

No.	Vocational Training Program	Availability	
		LPTK	Non-LPTK
Expertise Field of Technology and Engineering			
1.	Construction and Property Technology	√	-
2.	Geomatics and Geospatial Techniques	√	-
3.	Electricity Engineering	√	-
4.	Mechanical Engineering	√	-
5.	Aircraft Technology	-	√
6.	Graphics Engineering	-	√
7.	Industrial Instrumentation Technique	-	√
8.	Industrial Engineering	-	√
9.	Textile Technology	-	√
10.	Chemical Engineering	-	√
11.	Automotive Engineering	√	-
12.	Shipping Technique	-	√
13.	Electrical engineering	√	
Expertise Field of Energy and Mining Expertise			
1.	Petroleum Engineering	-	√
2.	Mining Geology	-	√
3.	Renewable Energy Engineering	-	√
Expertise Field of Information and Communication Technology			
1`	Computer and Informatics Engineering	√	-
2.	Telecommunications engineering	-	√
Expertise Field of Health and Social Work			
1.	Nursing	-	√
2.	Dental health	-	√
3.	Medical Laboratory Technology	-	√
4.	Pharmacy	-	√
5.	Social Work	-	√
Expertise Field of Agribusiness and Agrotechnology			
1.	Agribusiness Plant	√	√
2.	Livestock Agribusiness	-	√
3.	Animal Health	-	√
4.	Agribusiness Processing of Agricultural Products	√	√
5.	Agricultural Engineering	√	√
6.	Forestry	-	√
Expertise Field of Maritime			
1.	Sailing Fishing Vessel	-	√
2.	Shipping Commercial Ship	-	√
3.	Fishery	-	√
4.	Processing of Fishery Products	-	√
Expertise Field of Business and Management			
1.	Business and Marketing	√	-
2.	Office management	√	-
3.	Accounting and Finance	√	-
Expertise Field of Tourism			
1.	Hospitality and Tourism Services	√	-
2.	Culinary	√	-
3.	Tata Beauty	√	-
4.	Fashion	√	-
Expertise Field of Arts and Creative Industries			
1.	Art	√	-
2.	Creative Design and Creative Products	√	-
3.	Music Art	√	-
4.	Dance Arts	√	-
5.	Karawitan Art	√	-
6.	The Art of Puppetry	-	√
7.	Theater Arts	-	√
8.	Art Broadcasting and Film	-	√

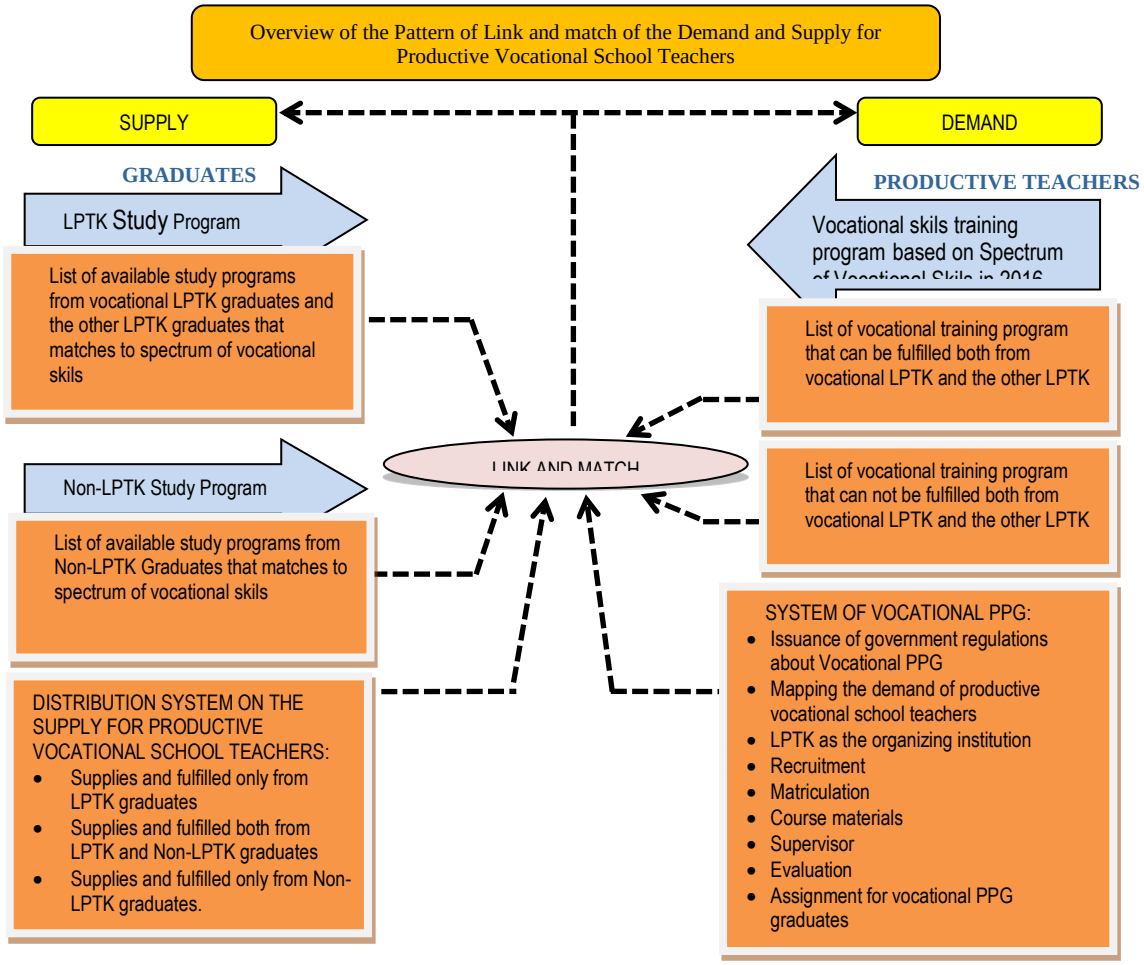

Figure 3. Overview of the Pattern of Link and match of the Demand and Supply for Productive Vocational School Teachers

System of Vocational Teacher Professionalism Training Program (PPG)

The system carried out in the implementation of Vocational Teacher Professionalism Training Program (PPG) remain referred to the stages of PPG that has been implemented by increasing and refining. The added organizational systems are: (1) Issuance of government regulations binding on the provision of Vocational PPG; (2) Mapping the demand for productive vocational school teachers; (3) Assignment for vocational PPG graduates. The enhanced systems are (1) LPTK as the organizing institution; (2) Recruitment; (3) Matriculation; (4) Course materials; (5) Supervisor; and (6) Evaluation. Based on this explanation, the pattern of Vocational PPG consists of the following phases: (1) Issuance of government regulations binding on the provision of Vocational PPG; (2) Mapping the demand for productive vocational school teachers; (3) LPTK as the organizing institution; (4) Recruitment; (5) Matriculation; (6) Course materials; (7) Supervisor; (8) Evaluation; and (9) Assignment for vocational PPG graduates. All activities mentioned above are a series that become one unity.

Overview of the Link and Match Pattern of the Demand and Supply for Productive Vocational School Teachers

The link and match pattern of the demand and supply for productive vocational school teachers is the integration between the demand for LPTK graduates and that for Non-LPTK graduates, its distribution, and the pattern of Vocational PPG which should synergize to each other in fulfilling the demand for vocational productive teachers based on expertise spectrum in vocational high school. The synergy is divided into three parts, namely the demand side, the supply side, and the

link and match. Each side has an important role and must be done together to achieve the same goal.

The integration of these three parts can be described as follows: (a) Demand: the productive vocational school teachers were based on the spectrum of skills by 2016; (b) Supply: vocational training program in vocational high school based on the spectrum of vocational skills can be provided by LPTK graduates and non-LPTK graduates; (c) Link and match side: a pattern for aligning employment with the demand for productive vocational school teachers consisted of the distribution system on the supply for productive vocational school teachers between LPTK Graduates and that of Non-LPTK Graduates; the system of Vocational PPG from LPTK graduates and non-LPTK graduates; consisting of issuance of government regulations about Vocational PPG; mapping the demand for productive vocational school teachers; LPTK as the organizing institution; Recruitment; Matriculation; Course materials; Supervisor; Evaluation; and Assignment for vocational PPG graduates.

Figure 3 shows clearly the intent of the conclusions resulting from the description of the pattern of the link and match between demand and supply for productive vocational school teacher that is the integration of demand, supply, and link and match.

CONCLUSIONS

Based on the results of research and discussion, the conclusions resulting from this study are as follows:

The pattern of fulfillment of demand for SMK productive teacher's requests was divided into two eras, namely: (a) Centralization era with the pattern of fulfillment of SMK productive teacher demand through Diploma III of Technical Vocational Teacher (GKT) program, S1 Academic Officer Benefit (TID) program, and selection program of Civil Servants Candidate (CPNS); (b) Decentralization era with the pattern of fulfillment of SMK productive teacher demand through the selection program of Civil Servant Candidate in certain area (CPNSD) and Non-Permanent Teacher (GTT) program.

LPTK graduates for productive teachers' demand on vocational skills training programs in vocational schools fulfilled to 22 programs, while Non-LPTK graduates fulfilled 45 from a total of 48 skill programs.

The distribution system of SMK productive teachers' availability of graduates from the vocational LPTK and non-LPTK graduates consists of three categories. They are vocational skills program provided and fulfilled (a) only from LPTK graduates totaling 19 skill programs; (b) by LPTK and non-LPTK graduates amount to 3 skill programs, and (c) only from Non-LPTK graduates totaling 26 skill programs.

The system of vocational Teacher Professionalism Training Program (PPG) from vocational LPTK graduates and from non-LPTK graduates remain refers to the PPG stage that has been implemented with the addition and refinement.

The link and match pattern of demand and supply for SMK productive teachers is based on the spectrum of vocational skills in the perspective of education decentralization is an integral part of the availability of graduates from LPTK and Non-LPTK, the distribution of graduates from LPTK and Non-LPTK, and the pattern of Vocational PPG provision. All of which must synergize each other in fulfilling the demand for SMK productive teachers based on the spectrum of SMK expertise.

With regard to the conclusions of this study, it is suggested to:

The government, in this case, the Ministry of Education and Culture, to immediately implement a link and match pattern of demand and supply for productive vocational school teachers which has been discussed in this study. The crucial thing to do is to issue a government regulation as a binding regulation for the implementation of Vocational PPG as one of the important elements from the link and match pattern generated in this study.

Higher education institutions, both LPTK and non-LPTK, to establish cooperation and synergize in the availability of graduates to fulfill the demand for productive vocational school teachers and to no longer prioritize the dichotomy between LPTK and non-LPTK to achieve the common goal of balancing the demand and supply for productive vocational school teachers.

Government at provincial level as vocational education manager in the area, to immediately formulate policies related to the

fulfillment of SMK productive teacher demand. The urgent thing that must be done is to map the demand for vocational teachers who are valid and reliable in their respective provinces.

Vocational high schools as direct users of productive teachers, to immediately make an actual mapping about the condition of productive teachers in SMK. That mapping is absolutely necessary for the link and match of demand with productive teachers' supply in SMK.

Other researchers are necessary to be able to conduct further research or research that refines the results of this study. It may be in the form of a research involving universities, Directorate General of Teachers and Education Personnel, and Local Government. It can be used as a material for preparing the road map of SMK productive teachers recruitment.

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DEVELOPMENT OF YOUTUBE INTEGRATED GOOGLE CLASSROOM BASED E-LEARNING MEDIA FOR THE LIGHT-WEIGHT VEHICLE ENGINEERING VOCATIONAL HIGH SCHOOL

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Abstract

The purpose of this research is to produce the e-learning media for the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject. The type of this research is the research and development. The procedure applied in this research is the ADDIE model. Construct testing by the expert is done by curriculum expert, practitioner and teaching media expert. Construct testing and content testing were also conducted to 23 students as the user. Qualitative data were analyzed using an iterative step that is reading/memoing, describing, and classifying. Quantitative data were analyzed with descriptive statistics. The research result shows that YouTube Integrated Google Classroom Based E-Learning Media has been produced and tested for Light-Weight Vehicle Chassis and Powertrain Maintenance subjects. The construct testing shows that this e-learning media is "feasible" based on an expert's judgment, and based on the user response shows that the reliability of the construct is "good". The content testing shows that students who use the YouTube Integrated Google Classroom Based E-Learning Media have significantly greater learning outcomes compared with students who use the internet to access the website without control.

Keywords: *the 2013 curriculum, learning media, e-learning, google classroom, youtube*

INTRODUCTION

Electronic learning or e-learning is a general term that is used to demonstrate learning process by utilizing electronic technology including information and communication technology. E-learning content can be text, image, video, and audio. Nichols (2008, p. 2) explained that "E-learning is learning that is enabled or supported by the use of digital tools and content. It typically involves some form of interactivity, which may include online interaction between the student and their teacher or peers".

The purpose of e-learning is to shorten the schedule of learning time targets and also save the cost to be incurred by an educational program. The development of e-learning, however, can also be more expensive than traditional face-to-face learning, especially when using an excellent interactive multimedia method, but actually, the cost of network services and technical support can be cheaper than the class facilities, time spent, and the cost of travel used during conventional classroom learning sessions.

The 2013 Curriculum prioritizes e-learning. This curriculum instructs online learning so that students are able and accustomed to look for information independently through the utilization of information technology and internet communications. Regulation of Indonesia's Minister of Education and Culture number 70 in 2013 in Rational Development of 2013 Curriculum, Improvement of Mindset section number 3 explains that, in the 2013 Curriculum, the previously isolated learning scheme becomes a networking learning by utilizing internet technology (Menteri Pendidikan dan Kebudayaan Republik Indonesia, 2013).

Students can obtain learning materials from any learning source and from anywhere through the internet, but this does not rule out the possibility that students will get learning materials from the untrustworthy resources on the internet if teachers do not organize the structured and reliable learning materials according to the syllabus on the internet to support the process of guided learning (instructor-led) as well as self-paced learning. Even though the internet is a very important and indispensable source for students, the issue of whether the referenced source is trustworthy and/or credible, has been raised. This is because there is no control on any particular piece of information published through the web.

Many of the sites on the internet enable anybody to submit any kind of information without being controlled, and many of the sites known as reliable are restricted to open access for commercial purposes or security requirements (IP restriction, membership). This limits the accessibility for students and deprives them of these sites. Because of these constraints, information resources used by students are generally untrustworthy or students have been inaccurately forwarded.

Work by Sahin, Balta, & Ercan (2010, p. 241) has shown that the students use more accessible and less secure internet sites in courses because of their careless, and consequently get low marks for term projects and home-works. The result demonstrates that resources which are easily accessible are not those which provide reliable information. Accessibility into highly reliable and credible resources is only possible with some constraints, so that it is very difficult to use these resources efficiently.

Similar conclusions have been noted by other researcher. Kriscautzky & Ferreiro (2014, p. 932) have noted that evaluating the credibility of information on the internet is a challenge for students, even at higher education level. Even when they have criteria for selecting credible information on the declarative level, when in action these criteria can compete with practical requirements or unique motivations.

The research conducted by Arnanto & Triyono (2014, p. 331) shows that the result of the analysis of teacher learning strategy in Vocational High School which has utilized the internet in teaching and learning has average 150,52, which is in "good" category with percentage 53,29%. It is clear that the teacher learning strategies have a positive and significant influence on the effectiveness of internet-assisted learning. These results indicate that it is necessary to design teaching activities that promote the development of one of the tasks of the current reader to distinguish what information is credible in contexts of internet search with several purposes, particularly with study ones.

Based on the author's observations and direct experience in the Professional Training Program at SMK Negeri 6 Bandung on the Light-Weight Vehicle Chassis and Powertrain Maintenance subject, the problems faced by students is the difficulty in obtaining learning materials from the internet that is true/valid according to the syllabus in the implementation of instruction given by the teacher. Because of this difficulty, many students suggest the teachers to use the conventional learning method in which teachers provide learning materials directly.

The interview conducted by the author to the Professional Training Program participants (temporary teacher) from Universitas Pendidikan Indonesia (UPI) in SMK Negeri 6 Bandung Department of Light-Weight Vehicle Engineering showed that seven out of sixteen (43.75%) participants found that students facing difficulties in obtaining valid (according to syllabus) learning materials from the internet, six out of sixteen (37.5%) participants say that students need guidance but not facing major difficulties in obtaining valid learning material from the internet, while the other rest of the participants are unsure.

Successful learning is directly related to the ability to discriminate between reliable and unreliable sources. It is a great need for a network-based e-learning media that can be utilized by teachers to overcome the problems faced by students. Organizing valid and structured online learning materials in e-learning media is useful in supporting the process of guided learning and independent learning conducted by students so that students have no difficulty in obtaining the valid learning materials according to the syllabus. Learning materials are published in the announcement, assignment, or question posts given online to eliminate the difficulties faced by students in finding online learning materials, so that students have a correct understanding of learning materials in accordance with the achievement of targeted competencies.

Google Classroom and YouTube are the sites on the internet that can be used as e-learning media authorware. Google Classroom is a network-based platform that integrates a G Suite for Education account with all G Suite services like Google Docs, Gmail, and Calendar. Teachers can create a virtual classroom with Google Classroom as an online learning medium. With Google Classroom, teachers are able to share study materials, announcements, quizzes or questions, tasks and task assessments and feedback for students online. The use of Google Classroom in learning enables teachers to be more effective in presenting content or online learning materials for students, controlling online learning assignments to be more organized, and facilitating indirect communication with students. All content in the form of text, images, audio or video presented by teachers in the Google Classroom virtual classroom is under the control and organization of teachers and virtual class administrators, so that only valid learning materials will be learned by students.

Google Classroom can be integrated with YouTube to be used as the primary authorware in e-learning media. A set of learning materials presented in a web presentation format in Google Classroom, and the element of learning video content on YouTube embedded into the Google Classroom platform as the main content. Documents, images, and audio can be uploaded and shared with students in the Google Classroom virtual classroom to deliver a learning topic, while videos uploaded to YouTube are attached to posts published by teachers to students on the main page of the virtual classroom for guided and independent learning materials.

YouTube is a database platform on the internet that can be used by users to upload, share and watch videos. In education, YouTube can be used as an e-learning platform that allows teachers and students to publish videos that demonstrate an understanding of a topic, thereby creating a social and digital community that specializes in a skill. Watching an educational video on YouTube allows the flexibility to learn things procedurally, which will increase students' understanding of the knowledge and skills that are being learned. Snyder & Burke (2008) found that students who watch learning videos on YouTube will improve their understanding of the subject matter.

Online learning with the valid and structured material is important for students in the achievement of learning objectives, especially if the learning content is presented in the form of video in addition to text, images, and audio because it can create a more interesting learning atmosphere and support the

learning process as a whole. Based on the problem that needs to be solved through research and development, the purpose of this research is to produce a YouTube Integrated Google Classroom Based E-Learning Media for the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject.

Ghirardini (2011, p. 21) explains that there are several sequences of activities that can develop e-learning, such as the ADDIE model which contains five stages: Analysis, Design, Development, Implementation, and Evaluation. In this research and development, the analysis stage is done at the beginning of e-learning development to find the gap and also identifying general learning objectives. The design stage involves the activity of formulating a set of learning objectives, determining the sequence of steps in the goal acquisition effort, and selecting lesson materials, media, evaluation, and delivery strategies. The result of the design stage is the blueprint used as a reference for the development stage. The e-learning content is produced in the development stage. The development of interactive multimedia content consists of content development, storyboard development, and courseware development. Lessons are delivered to students at the implementation stage, courseware is installed on the server to be accessible to students. This stage also includes managing the activities of students in the process of guided learning. E-learning is then evaluated for a specific purpose. The evaluation focused on the reactions of students, the achievement of learning objectives, as well as the completion of the delivery of knowledge and skills.

RESEARCH METHOD

The type of this study is research and development (R&D). The resulting product will then be field-tested and revised until a certain level of effectiveness is obtained. In this study, the authors develop and test the product (YouTube Integrated Google Classroom Based E-Learning Media) for the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject. The procedure applied in this research is the ADDIE model which contains five stages: Analysis, Design, Development, Implementation, and Evaluation.

Analysis stage consists of needs analysis, target audience analysis, and task and topic analysis. Design stage consists of designing objectives, sequencing, instructional, delivery, and evaluation strategy, and initial product design. Development stage consists of content development, storyboard development, courseware development, first-stage product testing, and the first-stage product revision. Implementation stage consists of installation and distribution, student activity management, second-stage product testing, second-stage product revision, and third-stage product testing. Evaluation stage consists of evaluating reliability in terms of construct and content.

Participants in the test in terms of constructs is the Vice Principal of Curriculum at SMK Negeri 6 Bandung as a curriculum expert to assess the appropriateness of learning objectives, sequencing, instructional, delivery, and evaluation strategy; the Light-Weight Vehicle Chassis and Powertrain Maintenance teacher at SMK Negeri 6 Bandung as a practitioner to assess the appropriateness of needs analysis, target audience analysis, and task and topic analysis results; lecturer of Learning Media course at Universitas Pendidikan Indonesia as an expert of learning media to assess the appropriateness of content, storyboard, and courseware, including the elements of interoperability, compatibility, performance, navigability, structure, security, and usability of developed e-learning media. Research subject in construct and content test of e-learning media are 23 students of Toyota Technical Education Program (T-TEP) eleventh grade of Light-Weight Vehicle Engineering in SMK Negeri 6 Bandung as users.

Testing stages are as follows: (1) first stage product testing, i.e. testing in terms of constructs by experts; (2) first stage product revision; (3) second stage product testing, to determine the reliability of the construct based on the response of students as users of the product; (4) second stage product revision; (5) third stage product testing, to determine the reliability of the content based on the test that passed by the student as a product user; (6) evaluation of product reliability in terms of content and construct; (7) product improvements.

The data collection instruments used in this research are Structured Formal Interview One-on-one Interviews type, User Experience Questionnaire (UEQ), and Posttest-Only. Structured formal interviews are conducted as

a test of the construct by the curriculum expert, practitioner, and learning media expert to obtain qualitative data on product reliability in terms of construct and improvement or development recommendations. User Experience Questionnaire is used to obtain quantitative data on product reliability in terms of constructs based on the response of students as users of the product. Posttest-Only is used to obtain quantitative data on product reliability in terms of content based on the tests that the student passes as a product user.

The qualitative data of Structured Formal Interview results were analyzed by iterative reading/memoing, describing, and classifying. Quantitative data from User Experience Questionnaire were analyzed using UEQ Data Analysis Tool developed by Laugwitz, Held, & Schrepp (2008, pp. 63–76), while Posttest-Only quantitative data were analyzed using SPSS 16.0 to compute data. These computations include descriptive statistics, normality tests, homogeneity tests, and independent-samples t-test (two-sample t-test) to compare the mean of one variable for two groups.

FINDINGS AND DISCUSSION

Analysis

The analysis conducted at the start of the development by direct observation method. This process is outlined in the following steps: (1) select a site (school and particular classroom) to be observed, (2) ease into the site, getting a general sense of the site, and taking initial notes, (3) identification of who, what, when, and how long to observe, (4) conduct multiple observations over time to obtain the best understanding of the site and the individuals, (5) record descriptive and reflective fieldnotes. Findings and discussion of analysis stage are described in the needs analysis, target audience analysis, and task and topic analysis section below.

Needs Analysis

The problems faced by students is the difficulty in getting true/valid (according to the syllabus) learning materials from the internet. Based on the observation, students merely place a search term in Google, enter the first result, copy and paste it, almost without reading what they have selected and without considering any questions about the validity of the information obtained.

Students of those ages seem to be unwilling, under certain conditions, to consider the complex problematics concerning the credibility of information, even though they get low marks for their works. Consequently, it seems appropriate to maintain the distinction between the credible and uncredible information (learning materials). It can be done by organizing accurate and structured online learning materials in e-learning media, so that students have an exact understanding of learning materials in accordance with the achievement of targeted competencies according to the syllabus.

Target Audience Analysis

Target audience analysis is another crucial step. The design and delivery of e-learning will be influenced by key characteristics of the learners (e.g. their previous knowledge and skills, geographical provenience, learning context and access to technology).

Based on the observation, knowledge and skills that have been obtained by students prior to learning the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject are included in the Basic Skills Program Subjects (C2), consist of Automotive Engineering Drawing, Basic Automotive Technology, and Basic Works of Automotive Engineering.

Student's computer technical skills and competence prior to the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject online learning is covered in the Basic Subject of Expertise (C1), students have taken Digital Simulation subject as a basic subject in the field of expertise.

Locations of students will participate in e-learning is in the classroom in guided learning, and outside of the classroom in self-paced learning. Students can access the internet in guided learning in the classroom using mobile phones, smartphones, or laptops by utilizing Wi-Fi connection or personal internet data. Whereas in the independent learning outside the classroom, students can also use mobile phones, smartphones, or laptops utilizing Wi-fi connections if students are in the school's Wi-fi zone, or by using school computers in the computer lab or in the Self Access Study (SAS) room.

From these findings, it can be concluded that the students as target audience have enough potential as prospective users of e-learning media that will be developed.

Task and Topic Analysis

According to the syllabus and the lesson plan, the main task of students in the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject is to apply the understanding of component, component function, and how the vehicle chassis and powertrain system work to provide basic knowledge of skills in vehicle periodic maintenance. Basically, this task consists of applying the knowledge and skills of vehicle chassis and powertrain maintenance that is consists of a series of components starting from the clutch, manual transmission, propeller shaft, differential, axle shaft, wheel and tire, brake system, suspension system, and steering system.

Furthermore, these task and topic as the findings on this step will be considered in the design stage. These findings will be used to define content for job-oriented learning courses that aim to develop or reinforce job-related skills, as well as to provide information or achieve educational objectives.

Design

Learning Objectives

The overall interpretation of the learning outcome objective from the specific learning objectives is done by reviewing the tasks and content elements identified in the previous task and topic analysis. Target learning outcomes of the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject is the achievement of basic knowledge (cognitive) up to the level of "applying", and the achievement of basic skill (psychomotor) up to the level of "manipulation".

Sequencing

The result of sequencing is a learning structure, each element in accordance with the objectives of the learning outcomes and contribute to the achievement of overall learning objectives. The learning sequencing diagram of the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject is shown in Figure 1.

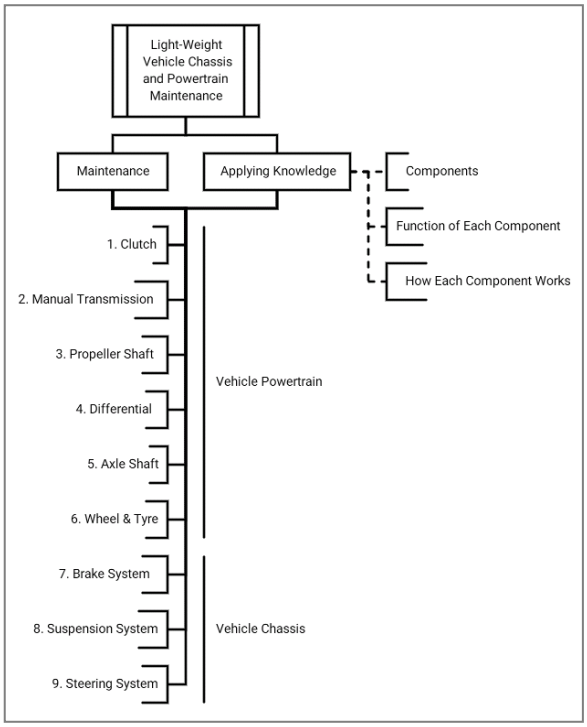

Figure 1. Learning Sequencing Diagram.

Instructional, Delivery, and Evaluation Strategy

The design of learning strategy in this e-learning media uses the expositive method which includes presentation and demonstration. The delivery of learning materials in the form of presentations and demonstrations in e-learning media is done through the recorded video, then uploaded to YouTube for further embedment in the post that is sent to Google Classroom. An online quiz is published in the form of a post that contains multiple choice or written answers questions. Quiz questions in this post require the cognitive domain in implementation level answers of students that are accommodated by the reference answers from the previous posts that contain presentation or demonstration videos.

Assessment of learning is done by assessing the video summary papers that is done by students in the form of .docx or .pdf submitted through the related assignment post, as well as assessing the quiz answers that are sent by the student through the relevant question posts.

Initial Product Design

The main pages of the YouTube Integrated Google Classroom Based E-Learning

Media is the Stream page, Students page, and About page. Figure 2 shows the structure of this e-learning media design.

Development

Content Development

Content in the YouTube Integrated Google Classroom Based E-Learning Media containing information and knowledge is developed in two ways: (1) Content is produced and uploaded, and (2) existing content or learning materials are reused (uploaded).

Storyboard Development

The storyboard describes all components of the YouTube Integrated Google Classroom Based E-Learning Media interactive product for the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject, including text, images, interactions, and assessments. In this e-learning media, the developed storyboard consist of: web structure, references, courses, competencies, author, screen, post, topic, screen type, screen heading & screen subheading, body text, media description and notes to the programmer.

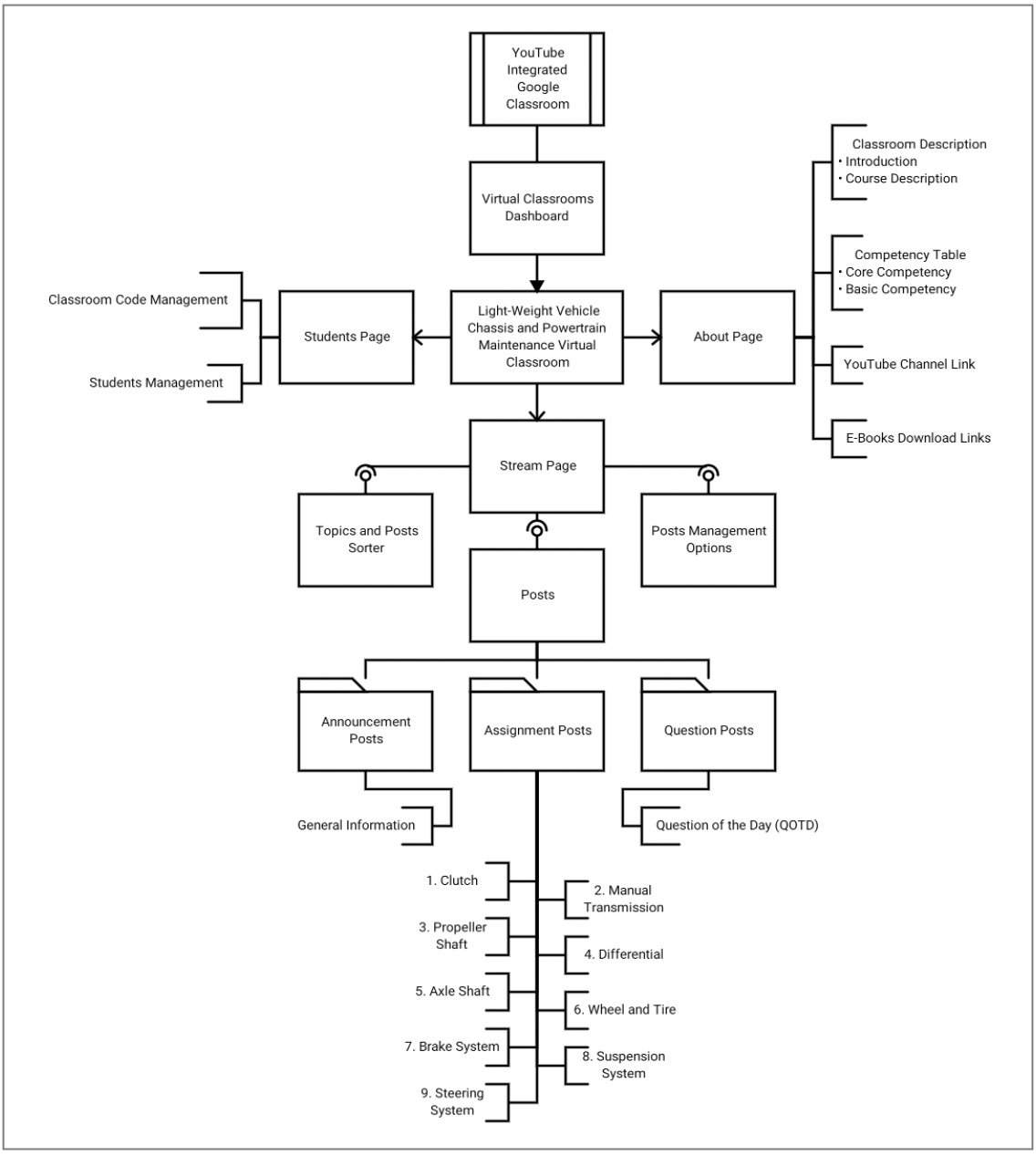

Figure 2. E-Learning Media Structure Design

Courseware Development

Elements that build the integration of e-learning media such as text, images, audio, and video were assembled in courseware, this process is done by utilizing authoring tools or authorware that have been created specifically to develop e-learning without the need for in-depth programming. Google Classroom and YouTube serve as the primary authorware in this developed e-learning media, a set of learning materials presented in a web pre-sentation format in Google Classroom, and the elements of learning video content on YouTube are integrated into the Google Classroom platform by embedding as the main content.

The arrangement that is implemented in the YouTube Integrated Google Classroom Based E-Learning Media is a timeline-based in which online learning is implemented in steps from one learning post to the next learning post on the Stream page. Lessons start from assignment post access which contains YouTube presentation and demonstration video and instructions of summary paper assignments with video reference in the assignment post package, then access proceeds to the Question of the Day (QOTD) question post with the same learning topic as the previous assignment.

First-stage Product Testing

Structured formal interviews including checkpoints in the interviews are given to curriculum expert, practitioner, and learning media expert to obtain qualitative data on product appropriateness as well as product improvement recommendations.

Table 1. Interview Checklist for Curriculum Expert.

	Not Feasible	Quite Feasible	Feasible
Learning Objectives			√
Sequencing			√
Instructional Strategy			√
Delivery Strategy		√	
Evaluation Strategy			√

According to the interview result, which was also stated on the Table 1, curriculum expert judges that the learning objectives of the Light-Weight Vehicle Chassis and Power-train Maintenance Subject with the use of developed e-learning media have been feasible and appropriate to complement the learning needs in the application of the 2013 Curriculum. The distribution of content posts and sequencing of materials in the achievement of the learning objective according to curriculum expert has also been feasible as it corresponds to the core material in basic competence. This is in accordance with Ghirardini's (2011, p. 14) explanation which says that e-learning quality can be better if e-learning content is fragmented to facilitate the reception of new knowledge and enable flexible scheduling. The curriculum expert also considers that the exposure method in e-learning media that includes pre-sentations and demonstrations with this video has been feasible. This is in line with research that says watching video learning content from YouTube will increase students' understanding of the knowledge and skills being learned (Lee & Lehto, 2013, pp. 193–208).

Table 2. Interview Checklist for Practitioner

	Not Feasible	Quite Feasible	Feasible
Needs Analysis			√
Target Audience Analysis			√
Task and Topic Analysis			√

According to the interview result, which was also stated on the Table 2, practitioner judges that the developed e-learning media is feasible and useful in the implementation of the 2013 Curriculum, where the instruction is given by teachers for students to learn with learning material resources from the internet in guided and independent learning. He also considered that the set of lessons developed in this developed e-learning media has been feasible as it corresponds to the core material in the basic competence of knowledge and skills of the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject. According to Ghirardini (2011, p. 14) which says that the quality of e-learning can be better by considering relevant and specific learning for the needs and roles of students, including skills, knowledge, and information.

Table 3. Interview Checklist for Learning Media Expert

	Not Feasible	Quite Feasible	Feasible
Content Development		√	
Storyboard		√	
Courseware		√	
Interoperability		√	
Compatibility		√	
Performance		√	
Navigability		√	
Structure			√
Security		√	
Usability		√	

According to the interview result, which was also stated on the Table 3, the learning media expert judges that the content in the developed e-learning media is feasible. He recommends organizing content to be separate from one subject to another with different web navigation pages, and this element has been revised as shown in the first-stage product revision explanation. The compiled storyboards have been quite feasible in describing all components of interactive e-learning media. The courseware structure is also considered feasible and other courseware aspects of interoperability, compatibility, navigation, security, and usability are considered quite feasible by the expert.

However, he recommends to enrich courseware with other courseware and consider alternative connectivity if online access cannot be arranged. Implementation of the media expert's recommendation corresponds with Ghirardini (2011, p. 128) that explains "Solutions for low-cost Internet connectivity can be considered, such as LAN-based LMS, offline players, and mobile-learning technologies".

First-Stage Product Revision

In this stage of product (e-learning media) revison, some virtual classrooms page that organizes each Competency Skills Subject (C3) are added. Other than that, the alternative offline video connectivity that is previously produced, organized in a folder, and then distributed to the students in soft copy form is prepared.

Implementation

Installation and Distribution

Google Classroom and YouTube have been installed on Google servers. Design and development have been done at the design and development stage. Access distribution is done by distributing virtual classroom code to students. This class code is used as a password for students to be able to enter the virtual classroom of the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject.

Management of Student Activities

The YouTube Integrated Google Classroom Based E-Learning Media for the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject was self-paced accessed by students outside the classroom (home, computer lab, or SAS) after the guided learning in classroom with the teacher, and continued with the lab workshop at the next meeting.

In this research, the implementation planning with the divided study time in each meeting for two semesters cannot be fully implemented due to the limited research time. Consequently, the YouTube Integrated Google Classroom Based E-Learning Media was only accessed by students at the end of the overall guided learning in the classroom in the second semester as a guided learning review supplement for the students, as well as a supplement before the lab workshop at the next meeting.

Second-Stage Product Testing

Figure 3 shows that the response of students presented by UEQ on 26 aspects of assessment in the YouTube Integrated Google Classroom Based E-Learning Media utilization generally resulted in a positive value. Attractiveness (point 1, 12, 14, 16, 24, and 25), Perspicuity (points 2, 4, 13, and 21), Efficiency (points 9, 20, 22, and 23), Dependability (points 8, 11, 17 and 19), Stimulation (points 5, 6, 7, and 18), and Novelty (3, 10, 15, and 26) are positive with details of 26 items of positive values, 0 items of neutral values, and 0 item of negative value.

Schrepp (2015, p. 5) explains that the standard interpretation of the scale means is that values between -0.8 to 0.8 represent a neural evaluation of the corresponding scale, values >0.8 represent a positive evaluation and values <-0.8 represent a negative evalua-

tion. The second-stage product testing shows that the mean value on the Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty scale is >0.8, this positive rating interpretation indicates that the reliability of the YouTube Integrated Google Classroom Based E-Learning Media in terms of construct aspect is considerably "good".

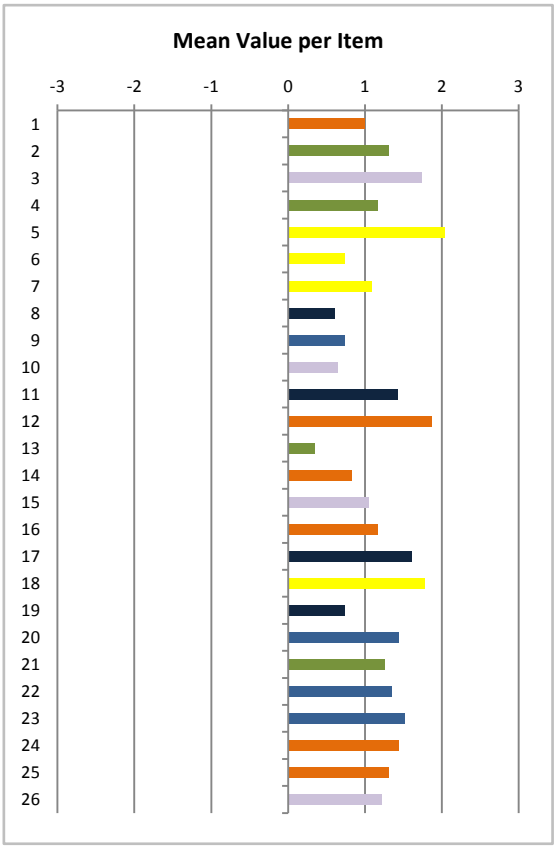

Figure 3. Mean Value per Item

Schrepp (2015, p. 11) also explains that the result is considered "good" (reliable) if the confidence value is <0.5. The result of the second-stage product testing shows that the whole scale confidence value is <0.5, thus it can be inferred that the users rating on the whole scale can be "trusted". Schrepp (2015, p. 9) recommends that the scale Alpha value should > 0.7 to be able to say that the user rated the scale "consistently". The result of the second-stage product testing shows that the Attractiveness, Perspicuity, Dependability, Stimulation, and Novelty has >0.7 Alpha value, it can be concluded that the users rated the scale "relatively consistent". On the other hand, the Efficiency scale has 0.69 Alpha value, therefore it can be said that the users rated this particular scale relatively "less consistent". However, predominantly, user judgments on the whole scale are done "consistently", "not randomly", or "conscientiously".

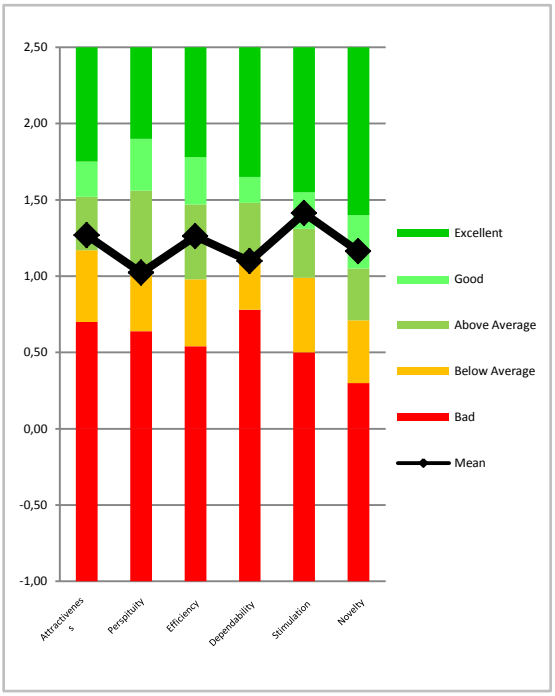

Figure 4. Benchmark Graph

Figure 4 shows a comparison of the YouTube Integrated Google Classroom Based E-Learning Media with other products in benchmark data (Schrepp, 2015, p. 5). The Attractiveness scale result is "above average", Perspicuity scale is "below average", Efficiency scale is "above average", Dependability scale is "below average", while Stimulation and Novelty scales are "good".

The result of the second-stage product testing shows that the reliability of the YouTube Integrated Google Classroom Based E-Learning Media in terms of the construct is predominantly "good". As a learning platform, this e-learning media has provided access to information for students to support the delivery and management of learning through the internet, therefore this media can be utilized in the guided and self-paced learning process in the Light-Weight Vehicle Chassis and Powertrain Maintenance subject. This is in line with the explanation of Ghirardini (2011, p. 118) who says that "Learning platforms are used by organizations and institutions to deliver and manage their learning processes. A learning platform provides students with access to information, tools and

resources to support educational delivery and management".

Second-Stage Product Revision

Based on the second stage test result by the User Experience Questionnaire, the overall user's impression on the product is "good" as described previously in the second-stage product testing section, therefore the second-stage of product revision is not necessary.

Third-Stage Product Testing

The normality test of posttest data on the third stage of product testing shows that the posttest results of both groups are normally distributed. The significance value of student group that uses the YouTube Integrated Google Classroom Based E-Learning Media (YIGC) is 0.495, whereas the student group that uses the internet websites without control (non-YIGC) is 0.531. The homogeneity test of this data shows that the posttest data result has the same variant (homogeneous) with 0.068 significance posttest value. The mean of the YIGC group is 8.25 and the Non-YIGC group is 6.63. The distributed data is normal and homogeneous, independent-samples t-test shows the result that the Sig. (2-tailed) is 0.024. This means that there is a significant difference between the mean of the YIGC and the Non-YIGC group's posttest result.

Evaluation

Reliability of the Construct Aspect

Expert assessments and user responses to the implemented e-learning media are done to find out its reliability in terms of the construct. It was measured using Structured Formal Interviews in the first-stage product testing given to experts and User Experience Questionnaire in the second-stage product testing given to students.

Based on the first-stage product testing, the experts consider that the YouTube Integrated Google Classroom Based E-Learning Media as a whole in terms of the construct is considered "feasible" for the learning process. Recommendations from the learning media expert are: (1) organizing separate content from one subject to another with different web navigation pages, and (2) considering the alternative access connectivity; has been implemented in the first-stage product revision to increase the assessment elements that are "fairly feasible".

Based on the second-stage product testing, Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty scales have positive ratings with reliable and consistent results. Hedonic quality is the highest, indicating that students consider learning by using the YouTube Integrated Google Classroom Based E-Learning Media is relatively "entertaining". It can be concluded based on the results of construct test in the second-stage product testing shows that the reliability of the YouTube Integrated Google Classroom Based E-Learning Media in terms of the construct is considerably "good".

Reliability of the Content Aspect

The test in the third-stage product testing for the YIGC and Non-YIGC student group was done to find out the reliability of the YouTube Integrated Google Classroom Based E-Learning Media in terms of content. It was measured using the posttest-only instrument given to the user to measure the achievement of the learning objectives.

Based on the third-stage product testing, the YIGC group has significantly greater learning outcome based on syllabus compared to the Non-YIGC group. The mean of the YIGC group is 8.25, while the mean of the Non-YIGC group is 6.6364. With 18 items of posttest question by 13.5 (75/100) minimum grade, the posttest results of both student groups have a grade that is still below the minimum grade of completeness. However, it is clear that students who use the YouTube Integrated Google Classroom Based E-Learning Media have significantly greater learning outcomes than students who use the internet to access websites without control.

Product Improvements

The YouTube Integrated Google Classroom Based E-Learning Media was previously designed in Google Classroom that is integrated with G Suite for Education account of UPI, and it would be transferred to G Suite for Education account of SMK Negeri 6 Bandung to make accessible virtual classroom for SMK Negeri 6 Bandung students. However, because SMK Negeri 6 Bandung does not have a G Suite for Education account, then the transfer can not be done.

Figure 5. Preview of Stream Page

Based on these constraints, in this research and development the authors apply for the early access' Google Classroom for personal access to Google, so that authors can use Google Classroom with Google personal accounts. All of the YouTube Integrated Google Classroom Based E-Learning Media contents in the G Suite for Education account is redirected to Google's personal account. Along with it, Google finally opens Google Classroom access for all users of Google's personal account. Thus, at the implementation stage, all students can access the YouTube Integrated Google Classroom Based E-Learning Media using their personal Google account.

Final Product

The improvement of the YouTube Integrated Google Classroom Based E-Learning Media has been done on the first-stage product revision, second-stage product revision, and product improvement process. There is no content or construct that were significantly changed at the switching process from the G Suite for Education account to Google personal account except the interface language (English into Indonesian) and the customized background image of virtual classroom main pages. Figure 5 shows a final preview of the YouTube Integrated Google Classroom Based E-Learning Media on the Stream page.

CONCLUSION

Conclusion

The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) stages have been implemented in this research and development. The educational product result of this research is the YouTube Integrated Google Classroom Based E-Learning Media which contains the Light-Weight Vehicle Chassis and Powertrain Maintenance Subject. The learning material presented in this e-learning media is the material that is taught in the eleventh grade's first and second semester of the Light-Weight Vehicle Engineering Department in SMK Negeri 6 Bandung.

The result of content-test shows that students who use the YouTube Integrated Google Classroom Based E-Learning Media have significantly greater learning outcomes than students who use the internet to access websites without control. Students who use highly accessible internet sites (i.e., Non-YIGC) may give fast results, but the reliability of those results can not be ensured. This does not mean that all of these sites give unreliable information, but that these should be carefully reviewed. Competence of information resources, authors' experience and their academic qualifications should be considered carefully. Furthermore, the Non-YIGC students group must

be disciplined in keeping themselves away from trap websites and entertainment in order to obtain the best achievements in their tasks. Less accessible sites have the major disadvantage of difficult access, because of reviewing information carefully takes more time, this situation makes it difficult for students who use the internet without control to work on tasks within a limited time (e.g., tests in this research).

The negative effects of accessibility in e-learning have been decreased by using the YouTube Integrated Google Classroom Based E-Learning Media. Online learning materials are published by teachers for students on the Stream page as learning materials for instructor-led or self-paced learning. The Stream page contains an Announcement, Assignment, and Question posts that are published by the teacher. Students see information, announcements, tasks to be done, or questions to be answered on the Stream page, Student's Tasks page, or on a Google's virtual calendar. The teacher then examines the students' work, gives an assessment, and comments or feedbacks to the students. The use of YouTube Integrated Google Classroom Based E-Learning Media as trustworthy internet resources takes a vital importance for academic study. In addition to this, easy access opportunities for any students at the school to this media has been supplied by only using personal Google account. By utilizing the YouTube Integrated Google Classroom Based E-Learning Media, students were encouraged to use academic and reliable resources from their teachers in their tasks and homework for successful learning.

Suggestion

Limited time and cost are some of the problems that occurred in this research, therefore the implementation stage of the YouTube Integrated Google Classroom Based E-Learning Media is done limited only in Light Vehicle Engineering Department at SMK Negeri 6 Bandung. The YouTube Integrated Google Classroom Based E-Learning Media is recommended to be developed on other subjects or competency skill programs. More broadly, this e-learning media is also recommended to be developed to other vocational areas with some reasonable adjustments to optimize the implementation of the 2013 Curriculum.

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THE FUTURE ORIENTATION FOR NOVICE TEACHER INDUCTION PROGRAM IN VOCATIONAL EDUCATION

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Abstract

This paper presents the discussion with purpose to identify the orientation of teacher induction program in vocational education that is in line with changing times and future challenges. The problems associated with the teacher induction program in vocational education are whether the program has been oriented towards changes and future challenges. This research was conducted explanatory sequential mixed method approach. This study applies a six-step on research procedure. Respondents consisted of 52 novice teachers, 115 mentors, 15 principals, and 24 school supervisors. The subject of the qualitative research was nine resources persons. The respondents were given a Likert scale questionnaire to gather opinions and to be interviewed about the implementation of induction programs in vocational schools. Data were analyzed using PASW-18 and Atlas.ti software. The results of the study indicate that the future orientation of the induction program for novice vocational teachers involves many aspects in teacher professional development. These aspects include understanding of new target groups, developing job markets, technological developments, business/industry cooperation, regional development, new learning paradigms, and vocational education policy.

Keywords: *novice, teacher induction, future, vocational education*

INTRODUCTION

Improving quality and relevance is one of the priorities of education development. Improving quality is being the main purpose according to the rules that it plays in vocational education. Policies and strategies can be used to empower education and training for vocational teachers. Teachers as learning agent having the meaning that the teachers act as a facilitator, motivator, supporter, learning creator, and the learning inspiration for students. Based on these considerations, teacher as learning agents in vocational education need to be mastered include pedagogic competence, professional competence, personality and social competence.

The transformation of teacher education in the twenty-first-century demand for teachers has always been responsive to any changes in it. Teacher challenges in the 21st century should understand on information literacy and able to develop their knowledge (knowledge building), comprehend media used in the learning process and has a multicultural instinct. Induction program for beginner vocational teacher does not much lead to those understanding. Meanwhile, the core skills of the 21st century and the keys of the student's development characterized by learning and innovation skills, knowledge, information, media and technology, literacy skills, life skills, and citizenship skills (Pacific Policy Research Center. 2010, pp. 7-8). Vocational education needs innovation including skill development and teacher competence, system quality, and learning environment (CERI, 2009, p. 71). The learner society opens insights into learners who can collaborate and share their experiences in order to further integration of 21st-century skills in the classroom. In the future, vocational education teachers are required to improve productivity by adopting any change to respond global challenges (Marsiti, 2011, p. 166). This needs to be done to increase the quality of education.

Induction program for novice teacher in Indonesia is based on the regulation of the Minister of National Education the number 27-year 2010. Based on this regulation, the induction program implementation in vocational education environment has not been adequate when associated with the needs and the education future orientation. It is necessary for developing the induction program model which accommodate the importance of vocational education. According to Markovic & Axmann (2006) that training applied to novice teacher focus on the activity of learning both theoretical and practical in the science field. In addition, teachers need a mastery of methods and the new role, the relevance of the business world and industry, as well as the labour market. Teachers or teacher candidates of vocational schools truly cannot be separaed from the industrialized world. The industrial internship experience is a part of the professional teacher development, even though the experience merely review or directly involved in the process of industry practice (Martawijaya, 2011, p. 108).

Some relevant research related to the need for development programs are delivered in a variety of topic induction by many researchers. Stingu (2013) discuss the needs, the implications and any opportunities to build induction program for a novice teacher. Kemmis & Green (2013) run a cover conception of vocational teachers. Cooper (2013) examine the extent of the support program of induction and mentoring novice teachers. Steele (2013) is emphasized the provision of a certificate as an alternative for the teacher after the induction program. Meanwhile, Chong (2011) reveal the identity of the professional development of teachers.

Based on the description, the future orientation research on induction program for teacher candidates in vocational education needs to be done to find out the urgency. It is important to be understood that induction program become a critical point in the governance for the voted and sort out viable vocational teacher holds his profession.

The problem statement of this research is whether the research programs of vocational education teacher induction has been oriented on changes and challenges of the future? In order to answer this problem statement, the purpose of the research is directed to identify the orientation of teacher induction program of vocational education that is in line with the change and the challenges of the future, particularly teacher education in the 21st century. The teachers require to always respond to global change.

The succeed of future orientation program of the induction teacher for vocational

school will have benefits, whether institutional or interelasional. Further, it can be the basic direction of the vocational teacher professional development program systematically through a comprehensive induction by setting the main steps for a teaching profession. Research results can be used as a consideration for the policy study for decision makers.

RESEARCH METHOD

This research includes descriptive research using mixed methods strategy. Descriptive research is used to describe the topic or phenomenon. Mixed methods research is conducted with the assumption that the collection of various data types can give a comprehensive understanding of the problems (Creswell, 2014, p. 19). For that, the approach used was an explanatory sequential mixed method. The use of mixed methods is to reveal the problem from many perspectives and be able to contextualize the information (Creswell, Klassen, Clark, & Smith, 2011, p. 5)

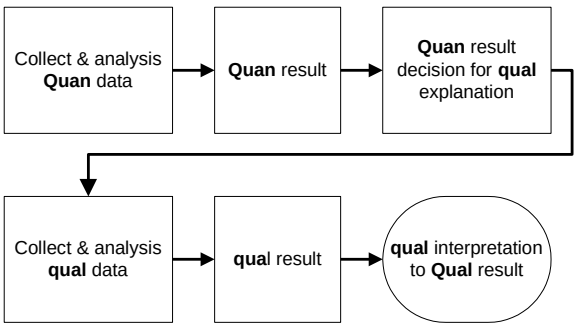
This research was done from December 2015 to August 2016. The implementation of collecting data already completed in nine months, not only data from the survey (quantitative data) and interviews (qualitative data), but also other supporting data. According to the mixed method rules, the first phase implemented is quantitative research. The place of the quantitative research is at a vocational school (SMK) in the special region of Yogyakarta (DIY) which organizes the Engineering and Technology program. The next place of the research is the informants office. There are six places for taking qualitative data, i.e. Dinas Pendidikan Provinsi dan Kota/ Kabupaten DIY, SMK Negeri 2 Yogyakarta, SMK Negeri 2 Magelang, LPMP DIY, Kantor Pembinaan dan Penempatan Kerja (Binapenta) Dinas Tenaga Kerja DIY, and PT Mega Andalan Kalasan (MAK).

The subjects of research or the respondent for quantitative research consists of novice teachers (GPm) in amount 52 people, mentor (GPb) in amount 115 people, principal (KS) in amount 15 people and school supervisors (PS) in amount 24 people. These respondents determined in random sampling refers to the formula Krecjie & Morgan (Isaac & Michael, 1984, p. 162). Novice teacher data related information and mentor retrieved from the page (http://datapokok.ditpsmk.net/).

Nine respondents were used to get qualitative data. Each of them is the principal, the novice teacher who has been appointed as a civil servant, mentor, Widyaiswara from LPMP, vocational education division head in DIY, head of Binapenta labour Department in DIY, and corporate Secretary PT MAK in DIY. The selection of interviewees as respondents in the research used purposive random sampling.

Procedure

This study applies a six-step procedure research of mix method (Ivankova, 2006; Creswell, 2013). The first phase begins with the collection of quantitative data against four groups of respondents using questionnaires, observation and documentation. The results obtained the numerical data. The second phase is the analysis of quantitative data which generates the validity coefficient, reliability, frequency tables and descriptive statistics (mean, median, mode and standard deviation). The third phase is linking the results of quantitative research to qualitative step towards, which are the determination of the informant and the drafting of an interview guide. The fourth phase, the qualitative data collection through interviews (interview) with a semi-structured individual in-depth question. The fifth phase, the qualitative data analysis is used to develop a code and themes producing a Pareto curve and categorization. The final phase is the results integration of the quantitative with qualitative research. Result interpretation being the basic explanation and discussion of the implications. The research procedure is described below.



(Adapted from Ivankova, 2006; Creswell, 2013)

Figure 1. Mixed-method Research Procedure

The research used nominal and audio data. Nominal data came from quantitative research, while the audio data came from qualitative research. Research instrument preparations of quantitative study need considering the structure and determining the focus of observation, as well as data analysis (Scott & Usher, 2011). The questionnaire is used as an instrument in quantitative research to collect the data. Questions and statements in the questionnaire are composed of sosiodemografi and Likert Scale statement that the content is the future orientation of the teacher induction program. The answers are arranged in four alternative options, i.e. "never/disagree" was given a score of 1; "sometimes/less agree" was given a score of 2; "agree" was given a score 3; and "very often/strongly agree" was given a score of 4.

Instruments for qualitative research consist of a question list. Questions are developed from the problem and research objectives which not directly criteria, specific, in terms of research, in-depth, and personal (Flick, 2009). In this case, the researchers will serve more as a research instrument. All rules or procedure in asking questions poured in an interview guide.

Data collection technique includes three devices i.e. questionnaires, observation and interview. Observations were conducted to complement the data before the interview. a voice recorder is used to document the results of the interviews with the respondents. In addition, other devices used include telephone, internet, network and interviews guide.

There are two components in the data analysis. First, the descriptive analysis of quantitative data is done to get the values of each variable frequency distribution research. In addition, this analysis is used to know the inclination of the upper central numerical data, including standard deviation. The software is Predictive Analytics SoftWare Statistics version 18 (PASW® Statistics-18). This analysis was chosen considering the instrument which is a questionnaire with four alternative answers.

Second, a descriptive analysis of the qualitative data is used to compile data transcription of the interview until the conclusion. The analysis includes the presentation, coding, condensation, verification and interpretation of results to make a conclusion (Miles, Huberman, & Saldana, 2014). Descriptive data analysis used the Atlas. ti. Software.

FINDINGS AND DISCUSSION

Data Description

The data described here focused on the respondent's education level. It is a given that education is one of the keys to developing teacher professionalism, including a vocational teacher. The maturity of a thinking way and views also determined by education level. An orientation discussion of the future teacher induction programs need some views and visionary thinking. Based on those reasons, conducting an induction program for novice teachers of vocational education involved many parties, such as mentor, principal, school supervisor, and the Education Office; required to be able to develop the program.

The distribution of the educational level of respondents (Figure 2) shows a fluctuating value. Half of the teacher respondents as much as 26 people got education bachelor degree, then followed by non-educational degree as many as 18 people, seven people got education graduate degree and one person got a non-education graduate degree.

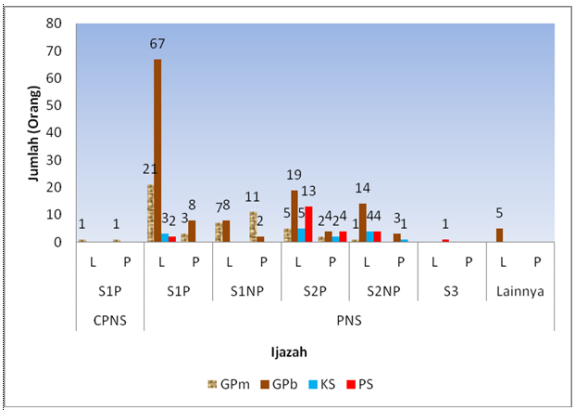


Figure 2. Respondents's Educational Level Distribution

Based on Figure 2, mentor still dominated by education bachelor degree as many as 75 people. This is followed by non-educational bachelor degree as many as 10 people, Master degree as many as 23 people and 17 people non-educational master degree, and five people from undergraduate education level. Principal's education level indicate three people got education bachelor degree, seven people got master of education, and five

people got a non-educational master degree. Meanwhile, for school supervisor education level, 2 people got education bachelor degree, 17 people got an educational master degree, 4 people got a non-educational master degree, and 1 man got a doctoral degree.

Novice Teacher Induction Program Orientation

Novice teacher induction program orientation means the orientation of future induction program for novice teachers of vocational education (INTVE). Quantitative data about the orientation of future vocational teacher induction program is obtained by closed questionnaire consisting of 46 statements for novice teachers, 61 statements for mentor, 56 statements each for the principal and School supervisor. Score for each is 1 for a minimum score and 4 for the maximum score, so the total score is 46-184 for novice teachers, 4-244 for mentor, and each 4-224 for the principal and school supervisor.

The statements for each respondent are arranged with indicators that describe the orientation of future vocational teacher induction programs. The total data collection of a questionnaire for the orientation of future vocational teacher induction programs consists of 12 indicators with descriptions. These are 12 indicators of development-oriented induction program for teacher of vocational education, namely: (1) new target groups, (2) inter-nationalization of teaching materials, (3) regional development, (4) cooperation with the corporate industry, (5) the development of the job fair, (6) vocational education policy/ VET, (7) learning individualization, (8) culture/society change, (9)technological developments, (10) the new learning paradigm, (11) institutional in schools, and (12) educational research.

The orientation of future teachers induction program of vocational education according novice teacher (table 1) can be noted that the indicators of a new target group (average 3.41); the development of job fair (average 3.33); and technological developments (average 3.32); is an important area that needs to be heeded. New target group Indicators can be associated with sub-indicators of student learning needs. Based on those facts, it needs a learning analysis group of students on encouragement, motivation, guidance, and assessment. The cumulative percentage for the third top indicator was recorded by 28%.

Table 1. The Orientation of Future Induction Program Based on the Novice Teacher

No.	Orientation	Mean	Freq. cum	Cum. %
1	New Target Group (1)	3.41	3.41	10%
2	Job Fair Development (5)	3.33	6.74	19%
3	Technology Development (9)	3.32	10.05	28%
4	Cultural/Society Changing (8)	3.28	13.33	38%
5	New Learning Paradigm (10)	3.27	16.60	47%
6	Regional Development (3)	3.26	19.86	56%
7	Learning Individualization (7)	3.24	23.10	65%
8	VET Policy (6)	3.21	26.31	74%
9	Education Research (12)	3.10	29.41	83%
10	Institutional/organizational (11)	3.10	32.51	92%
11	Internationalization (2)	2.93	35.43	100%
	Total score	35.43		

Deepening the labour market opportunity and relevance to the education and training needs to be included in deliberations with the job fair. Other parts of the related technological developments need for adjustment of the material taught in the education and training in accordance with the information technology developments and directions of the industry. In addition, it also needed the understanding of the policies and systems of learning skills in the workplace. Another important indicator according to the orientation of future vocational teacher induction program which needs to be noted is the cultural change with education and training association as well as develop expertise in the collaborative work.

A new learning paradigm which is the idea of the learning development from the business industry for planning the structure of the learning programs, materials, resources and learning media can be a part of the future orientation of the program induction. Regional development indicator needs to strengthen networking between vocational teachers on discussion group or association. One of the Learning individualization Indicators is developing the self-concept of to improve learning. The cumulative percentage of the learning individualization recorded 65%, with the average value equal to and above the average of the total score 3.24.

On the other side related to internationalization that means as the integration of international perspectives in the planning of teaching material for novice teachers do not constitute a serious case for the reoriented as a future program induction. No more attention is also shown in the institutional/organizational and educational research problems.

The orientation of future teachers induction program of vocational education according to the mentor (table 2) which can be noted that the indicators of business/industry cooperation (average 3.43); regional development (average 3.41); and technological developments (average 3.40) is an important area that needs to be heeded. Indicators of business/industry networking can be associated with sub-indicators of industry networking. Therefore need communication with the industry to establish a partnership and the opportunity to be shared. For regional development, indicators need to strengthen networking between vocational teacher a plot in the form of deliberation or the association. The cumulative percentage for the third top indicator was recorded in 26%.

Related to the job fair, deepening market opportunity and relevance to the education and training needs to be a concern. Besides that, the technology development needs adjustment of the material taught in the education and training in accordance with the information technology developments and directions of the industry. In addition, the understanding of the policies and systems of learning skills in the workplace. Another important indicator which is the orientation of future vocational teacher induction program is a new learning paradigm that is the idea of the teaching development from the industry for structure planning of the learning programs, materials, resources and learning media in the future orientation of the program induction. Mentor are also giving attention to the future orientation of teacher induction programs of vocational development education policy which one point is to understand the national and international orientation policies of vocational education to associate the education and training program with vocational education policies. In addition, indicators of learning individualization that one of them is developing the self-concept to improve learning and a new target group. The cumulative percentage indicator to a new target group was recorded of 68%, with a mean value equal to and above the average of the total score 3.30.

Table 2. The Orientation of Future Induction Program According to the Mentor

No.	Orientation	Mean	Freq. cum.	Cum. %
1	Industry Cooperation (4)	3.43	3.43	9%
2	Regional Development (3)	3.41	6.83	17%
3	Technology Development (9)	3.40	10.23	26%
4	Job Fair Development (5)	3.39	13.62	34%
5	New Learning Paradigm (10)	3.36	16.99	43%
6	VET Policy (6)	3.33	20.32	51%
7	Learning Individualization (7)	3.31	23.63	60%
8	New Target Group (1)	3.31	26.94	68%
9	Institutional/organizational (11)	3.22	30.16	76%
10	Education Research (12)	3.21	33.37	84%
11	Cultural/Society Changing (8)	3.20	36.57	92%
12	Internationalization (2)	3.02	39.59	100%
	Total score	39.59		

The other part related to inter-nationalization that is meant as the integration of international perspectives in the learning material planning is not an important orientation in the future program induction for mentor. A little attention is also shown in the institutional/organizational research and education as well as a change of culture/society with human resources management principles.

The future orientation of teachers induction program of vocational education according to the principal (Table 3), it can be noted that a new learning paradigm indicators (average 3.60); the cooperation of the industry (average 3.58); regional development (average 3.56); and technological developments (average 3.55) is an important area that needs to be heeded.

A new learning paradigm indicators with sub-indicators could further emphasize on the learning management. Planning the structure of a learning program on the basis of the development of learning theory, instructional development idea came from the industry for planning the structure of the learning programs, materials, resources and media learning. While the industry cooperation can be associated with sub-indicators of networking. Therefore need communication with the industry to establish a partnership and the opportunity to share the work. Regional devel-

opment indicators need to strengthen networking between a vocational teacher in a group discussion or the association. The cumulative percentage for the third top indicator was recorded in the amount of 26%.

Table 3. The Orientation of Future Induction Program According to the Principal

No.	Orientation	Mean	Freq. cum	Cum. %
1	New Learning Paradigm (10)	3.60	3.60	9%
2	Industry Cooperation (4)	3.58	7.18	17%
3	Regional Development (3)	3.56	10.74	26%
4	Technology Development (9)	3.55	14.29	34%
5	Learning Individualization (7)	3.52	17.81	43%
6	Institutional/organizational (11)	3.50	21.31	51%
7	Job Fair Development (5)	3.47	24.78	60%
8	New Target Group (1)	3.42	28.20	68%
9	VET Policy (6)	3.40	31.60	76%
10	Cultural/Society Changing (8)	3.40	35.00	84%
11	Education Research (12)	3.37	38.37	92%
12	Internationalization (2)	3.13	41.50	100%
	Total skor	41.50		

On the other part of the technology development need for adjustment of the material taught in the education and training in accordance with the information technology developments and directions of the industry. In addition, the individualization of learning indicators develops the value of self-concept to improve learning as well as a new target group.

The principal also looks at institutional/ organizational measures described as the involvement of teachers in institutional networking development and school working management in teamwork that can be oriented in the future induction program for a vocational teacher.

The job fair development is also an important orientation that needs to be deepening market opportunity and relevance to the education and training. In addition also the understanding of the policies and systems of learning skills in the workplace. Cumulative percentage at this job fair development indicators recorded of 60%, with a mean value equal to and above the average of the total score that number 3.47.

Future orientation of vocational education teacher induction program according to School supervisor (Table 4) can be noted that vocational education development policy indicators/VET (average 3.54) is to understand the national policy and international orientation of vocational education to associate the program of education and training policies in the vocational education. With regard to the technology development need for adjusting the material taught in the education and training with the information technology developments and directions of the industry. Regional development indicators need to strengthen networking between a vocational teacher in the form of group discussion or association, and the new paradigm learning (average 3.47) which is an important area that needs to be heeded.

Table 4. The Orientation of Future Induction Program According To School Supervisor

No.	Orientation	Mean	Freq. cum	Cum. %
1	VET Policy (6)	3.54	3.54	9%
2	Technology Development (9)	3.53	7.07	17%
3	Regional Development (3)	3.47	10.55	26%
4	New Learning Paradigm (10)	3.47	14.02	34%
5	Institutional/organizational (11)	3.43	17.45	43%
6	Industry Cooperation (4)	3.42	20.86	51%
7	Education Research (12)	3.41	24.27	59%
8	Job Fair Development (5)	3.40	27.67	68%
9	Learning Individualization (7)	3.39	31.06	76%
10	New Target Group (1)	3.33	34.39	84%
11	Cultural/Society Changing (8)	3.33	37.72	92%
12	Internationalization (2)	3.10	40.81	100%
	Total score	40.81		

A new learning paradigm indicators with sub-indicators could further emphasize the learning management. Structure planning of a learning program on the basis of the learning development theory, the idea of the learning development came from the industry for structure planning of the learning programs, materials, resources and media learning. The cumulative percentage for the fourth top indicator was recorded of 34%.

School Supervisor also looked at institutional as described as teacher involvement in the networking development institutions and the schooling work management in the teamwork that can be used as the future orientation of the program vocational teacher induction. While the industry cooperation can

be associated with industry networking sub-indicators. Communication need with the industry to establish a partnership and the opportunity to share the work. Educational research elements that provide opportunities and research opportunities in the vocational education and training, need to be filled as a part of the orientation of future vocational teacher induction programs according to school supervisor. Cumulative percentage on this educational research indicators recorded in amount 59%, with a mean value equal to and above the average of the total score that number 3.41. On the other hand, with the integration of internationalization is meant as an international perspective in the planning of learning material, which is not taken as a serious case for the reoriented as a future induction program vocational teacher by the School Supervisor. Learning Individualization which is to develop the value of self-concept to improve learning and development, is also an important orientation. The need for deepening market opportunity and relevance to the work of education and training.

Future Orientation Analysis of the INTVE

The orientation of future teacher induction program of vocational education from the novice teacher's perspective, supervising teachers, principals, and school supervisor indicates a different emphasis, but there is the same side for the anticipation in the implementation process. The orientation of future vocational teacher induction programs according to novice teachers put more emphasis on the aspects of a new target group that is described as a learning needs analysis followed by encouragement, motivation and direction as well as an assessment against the learning achievements of students. In addition, an emphasis is placed on work development and the technology development. mentor emphasize on the partnership with the industry, regional development and technology development to fill the future orientation of the program of vocational teacher induction. The principal in the orientation of future vocational teacher induction program has a greater emphasis on learning new paradigms, and cooperation with the industry, as well as regional development. Meanwhile, school supervisor emphasizes on vocational education development policy, technology development and the regional development in the orientation of future vocational teacher induction programs. Aspects of technology development become a staple for the pressure groups of respondents, except the principal. Regional development has also become a staple for the pressure groups of respondents, except the novice teacher. The principal and supervisor also stressed the importance of cooperation with the industry.

At a later stage, the orientation of future vocational teacher induction programs that need to get attention for a new paradigm development is individualization of learning and instruction. It does not mean that the other aspect is not important, but the main point is the aspect which is explained above. The problem of internationalization in the learning planning material, four respondent groups showed the same opinion while this is not yet a major concern of future programs of vocational education teacher induction. In addition, there is a culture/society change, educational research, and institutional/organizational as well as a new target group that gets the same emphasis as internationalization aspects.

According to the theory of Prosser & Quigley (1949, p. 217) associated with vocational education, teachers should be able to convey the lesson that follows the principles of the work environment industry. This understanding is based on the phenomenon that the principle of vocational education will be efficient if the environment in which the learners are trained is an artificial environment where the students will be working. Teachers at vocational education will effectively run the tasks and learn, education and training when it is done in ways, operational tools, and the same tools as used in the industry. According to the induction program theory by Wong (2005), the induction program should be a multi-year comprehensive process of designed to train and adapt to novice teachers in academic standards and vision of the government/local government. Induction programs will be effective if it has three basic principles that be implemented, according to Wong (2005), namely: (1) comprehensive, coherent, (2) and (3) sustainable.

Based on the interviews, respondents pointed out that the learning method development should pay attention to the skills of the 21st century that demands creativity, critical

thinking, communication, and collaboration (4 k). One of the widyaiswara of LPMP YOGYAKARTA gives his opinion that the changes and challenges of the era are more associated with teacher induction program for vocational education implementation.

> *"... the competence of the 21st century, one of which is the aspect of communication means there demands literacy. Literacy IT is very important. So the learning development methods must notice 4K that along with the literacy development. I guess that it supposes to be initial modal to develop a accommodating learning on the dynamics of changes. "*

Supervising teacher see that induction programs for new vocational teacher needs to be given to improving their skills and productive skills. Even the mentor asserted if INTVE given for a period of one year is considered still lacking. The reason given is related to the complexity of the development of technologies that must be mastered by the productive teacher.

> *"Expertise is linked to productive skills. Indeed if in a year for the skills/ competencies I say less. In that year, if it's in a building with complex technological development now once I guess still less ".*

The principal of SMKN in Yogyakarta City and Magelang City looked at how important employment system must be understood by novice teachers in the teacher induction program. Thus his opinion:

> *"... a system of employment need to be conveyed in the teacher induction program, this is important because a teacher would become a reformer. However, this teacher provide insight to their students"*

The school principal said that it is ideal when there is a prolific teacher ever worked in the industry or at least never follow on the job training (OJT) in the industry.

> *"... so it's ideal for the productive teacher had worked in the industry, one that. Ideally, a teacher can provide the latest information, he also has the company, one of them with OJT. School preparing teachers with OJT, working in the industry ".*

When the speaker from PT DIY MAK (industrial) confirmed about the existence of a desire to make OJT as part of teacher induction program agenda of vocational education, it turns out that industry thus provides internship program with some prepared projects.

> *"It is possible with industry.., could prepare the internship program for teachers later we engage in specific projects so that teachers have industrial experience related to their best practice. Implemented in an industry that later can be transmitted by teachers to the students because the teacher already had specific expertise ".*

Novice teacher and mentor need to be given the opportunity to explore experience and knowledge in the industry. The actual experience gained for the learning improvement. School supervisor looked at the industry that it is the most suitable place to deepen the material and professional competence.

> *"... For overall competence analysis, at the school for three years. Competencies which could not be carried out in school will be collected as materials or competencies that are expected of it obtained in the industry".*

CONCLUSION

Summary

The future orientation of INTVE involves many aspects in the professional teacher formation. Important aspects that need to be included in the INTVE are: (1) understanding the new target groups, (2) job fair development, (3) technological develop-ment, (4) the business/industry networking, (5) regional development, (6) a new learning paradigm, and (7) vocational education policy.

Important aspects in implementing INTVE based on the learning theory development. The aspects related to the structure planning of the learning program, the idea of learning development with input from the business/industry for learning materials, resources and learning media. The cooperation of the business/industry is associated with the network of the work, communication with the industry to establish a partnership and the opportunity to share the work. Regional de-

velopment indicators strengthened the need for networking between vocational teachers as group discussion or the association.

Novice teacher and mentor mentioned that technological development is an important aspect that needs to be known in the formation of professional teacher. Adjustment of the material taught in the education and training tailored to the information technology develop-ment and the direction of the work, including an understanding of the policies and systems of learning skills at work.

The main point of vocational education development policy is understanding the national policies and international orientation of vocational education to be able to associate the program of education and training policies.

Recommendations

Communication with the industry need to be constantly maintained to keep the partnership and the opportunity work. Stakeholders need to strengthen networking between vocational teachers in the form of deliberation, association or joint activities to support the regional development. Facilitating a new learning paradigm could be more emphasized on learning management and quality assurance.

Coordination between stakeholders need to be more rigorously because organizing INTVE involve many parties. Each party, as newbie teacher, mentor, principal, school supervisor, and local governments have different roles.

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THE EFFECT OF LECTORA INSPIRE-BASED INTERACTIVE LEARNING MEDIA IN VOCATIONAL HIGH SCHOOL

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Abstract

The objective of research was to reveal: (1) the learning outcome of students in experiment class, (2) the learning outcome of students in control class, (3) the effect of lectora inspire-based interactive learning media on the learning outcome of students. This study was a quasi-experiment research with Pretest-Posttest Control Design with students of SMK Negeri 6 Surakarta being the subject of research. The instruments used in this research were questionnaire and test. The result of research showed that: (1) the learning outcome for experiment class indicated mean posttest value of 84.53, (2) the learning outcome for control class indicated mean posttest value of 71.73, and (3) there was an effect of Lectora Inspire-based interactive learning media on the learning outcome of students, as can be seen from the result of t-test calculation with t statistic 0,000< t table 0.05. The conclusion of research was that there was a difference of effect of lectora inspire-based interactive learning media application on the learning outcome of students between control and experiment classes.

Kata kunci: *interactive learning media, public administration, learning outcome*

INTRODUCTION

Technology era developing today highly affects human life. The activity is formerly manual in nature now changes into the technology-based one. It is well-established if human resource should be able to follow the existing development to compete in global era. Education improvement is one of ways to produce human resource as expected. The government as the forefront guard of Indonesia country always attempts to improve human resource, one of which is the implementation of 2013 Curriculum.

Implementation of 2013 Curriculum inflict the pros and cons. However, the government gave the reason that curriculum changes were made because the previous curriculum was considered to be burdensome to students. Many lesson materials can be learned by the students, thus making it burdened. Implementation 2013 Curriculum is part of the continuing development of Competency Based Curriculum (*Kurikulum Berbasis Kompetensi*/KBK), which was initiated in 2004 by covering the competence of cognitive, affective, and psychmotor in an integrated manner.

The 2013 Curriculum is implemented from primary school to secondary school. The 2013 Curriculum emphasizes on learning process with scientific method in which the learning model used is supported by technology-based learning media. Ogott & Odera's (2012, pp. 792-793) study found that more than 85% of teachers use neither media nor technology resource during the learning, while 80% of them say that integration of media and technology is very helpful in learning realization. Recalling the importance of it, teacher as facilitator in school should be able to apply technology-based learning media.

Formal schools developing within society are required to use the 2013 Curriculum, one of which is Vocational Middle School (*Sekolah Menengah Kejuruan*, thereafter called SMK). SMK is a formal education equivalent to Senior High School/Islamic Senior High School (SMA/MA), but its students are prepared to enter directly into job realm. In addition, Wibisono, Baedowi, & Indrawati's (2017, p. 204) study stated that the competency of SMK students should be improved, recalling the high unemployment rate in SMK graduates. Central Statistic Bureau (BPS) mention Unemployment rate is dominated mostly by SMK graduates. On August 2017 the unemployment rate increases by 10 thousands people to 7.04 million people of total workforce. It is this that underlies the importance of learning media use in SMK. This is an attempt to improve process and learning outcomes.

Media is an important component in learning. Currently the government is concentrate on building infrastructure in order to support learning in the classroom . In-school programs have been carried out on an ongoing basis, these efforts need the support of teachers to implement the learning in school. The media expected is the one that can explain the abstract subject into the concrete one visualized into more meaningful and attractive images.

One subject in the 2013 Curriculum, particularly in office administration major of SMK, is public administration. Public Administration subject is important to conceive as it is the basic of other subjects to be taken in the 11th grade. This subject is theoretical in nature and needs interactive media that can attract the students' attention. Public Administration learning occurs in two ways to enable the students participating actively in the learning because learning is not an end but it is a process toward achieving the objective (Hamalik, 2009, p. 29).

Administration is a function that plays an important role towards the achievement of smooth business activities, as well as activities undertaken by the organization. Administration activities can be regarded as the lifeblood of the organization. Proper understanding of the administration is indispensable for the provision of students in the face of future employment situation.

The result of field observation on SMK Negeri 6 Surakarta shows that public administration learning occurring is still conventional, students tend to be passive, and teachers utilize the existing infrastructure less optimally. Whereas the existing infrastructure at SMK Negeri 6 Surakarta, including complete and in good condition. Teachers must be able to take advantage of this by making innovative learning media.

Teachers only use traditional learning methods, namely by noting what is described.

Teachers use a single source textbooks, and students do not have the book. Not many students who have the textbooks appropriate 2013 Curriculum. This should encourage teachers to seek more learning resources. Reciprocal relationships between teachers and students do not occur. Students receive input from the teacher without giving an opinion. Some students get bored and instead talk to their friends. If this happens on an ongoing basis, the effectiveness of the learning will not be realized.

It impacts on the learning outcome of students, as confirmed with the fact that 51.85% of students still have score below minimum learning passing. It indicates that more than a half of students have not absorbed yet the learning material. This condition is, of course, contrary to the expectation of 2013 Curriculum emphasizing on student centered.

Learning outcome is a form success of teachers in delivering the material to students. According to Rifa'i & Anni (2011, p. 85) learning outcome is obtained students behavior changes after experiencing learning activities. Marks given to the learning outcomes in the form of numbers or letters. Learning outcomes affect the motivation and enthusiasm of students to learn more. After the learning, students were expected to undergo changes towards a more intellectual kind.

Basically, the learning success is not only based on the acquisition of cognitive abilities, but also based on affective and psychomotor ability. Cognitive ability related to the results in the form of knowledge, skills and intellectual skills. Affective ability related to feelings, attitudes, interests, and values. Psychomotor ability related to physical abilities such as motor skills and nerves, object manipulation, and nerve coordination. From this description is a learning process in the classroom is very important to note.

Learning media is a means of delivering learning material more straightly and attractively, thereby generating reciprocal relation between teacher and students. The use of learning media can improve the students' interest and willingness in a subject (Wirawan, Indrawati, & Rahmanto, 2017, p. 79). Students' self-interest can stimulate curiosity, thereby improving learning activity. It is in line with Naz & Akbar (2008, pp. 35-36) stating that learning media increases communication process because students participate more actively. If learning media is designed correctly, learning media affects the learning significantly and positively.

The more rapidly development of technology has allowed media provides a constructivist learning environment in which students can solve problem by means of active participation in learning process. This kind of learning environment causes a person to have more knowledge and become more dynamic. Technology support aims to annihilate students' views reluctance about learning and can make learning more effective. This matter enables the teachers to make innovation in the learning media they use.

One of solutions to improving the learning outcome of public administration is to conduct learning using an interactive learning media. Interactive learning media means media that combines text, graphics, video, animation and sound, to deliver a message and information. Media such as that referred generally to stimulate students to think more deeply. Weigel (2009, pp. 13-15), in his study, revealed that interactive learning media is a factor affectingly strongly the implementation of learning wherever, whenever, and however the learning process runs.

Learning using interactive media offer many advantages both for students and for teachers. Interactive learning media is not difficult to manufacture. A lot of software that can be used, one of which Lectora Inspire. Lectora Inspire is software that has developed within society; this software provides an interactive learning media with understandable and developable feature to beginner users (Minkova, 2016; Çelik, 2012). Lectora Inspire produced and released in 1999 by trivantis corporation founded by Timothy D Loudermilk. In 2011, Lectora obtained 5 awards in innovative E-Learning products, Authoring Tool, best presentation tool, and best e-learning technology (Mas'ud, 2013).

The facilitation presented by Lectora Inspire is a distinctive advantage. The advantages of lectora inspire according to Minkova (2016, p. 2587) was ability to create interactions by using drag and drop, multiple tools for interactions such as lists and dictionaries section, built in themes, recording screen simulation with the possibility of video recording and learning mode, improved sound

editing functions, numerous advantaged features for additing script and variable, ability to direct student to specific learning units based on their assessment. It is in line with Fui-Leow & NeoTheng (2014, p. 101) stating that the media designed using lectora inspire will increase the students' learning motivation in learning process and the teachers' teaching creativity.

Lectora Inspire-based interactive learning media is expected to have a positive impact on learning. Therefore, a study should be conducted on the effect of Lectora Inspire-based interactive learning media to improve the learning outcome of students in SMK Negeri 6 Surakarta.

METHOD

This research was conducted using quasi-experiment method. Quasi experiment is the research comparing the effect of a treatment administration on an object (experiment) and seeing the achievement of learning outcome as the result of its treatment effect.

Population is a generalization region consisting of: objects / subjects that have a certain quantity and characteristics that can be determined by researchers to learn and then drawn conclusions (Sugiyono, 2016, p. 135). The population of research consisted of all students in Office Administration major of SMK Negeri 6 Surakarta, containing 108 students.

The sample is part of the characteristics possessed by the population. For various reasons (example because it is impossible, unnecessary, or unnecessary and impossible) not all things can be explained or need to be researched, so only the sample is checked (Budiyono 2003, p. 34). The sampling technique used was non-probability sampling with purposive sampling technique to select experiment and control classes out of the classes existing with certain criteria (Sugiyono, 2016, p. 68).

Purposive sampling technique was conducted because this technique took the sample with the following criterion: the class has mean score of 68 in previous basic competency. Meanwhile, the classes with similar mean score were the 10th Office Administration 1 and 2 grades, each of which consisted of 30 students.

RESULT AND DISCUSSION

The work procedure of collecting data was as follows: (1) library study involves: identifying standard competency and prior characteristic of students, determining basic competency, selecting material, determining learning model, developing media and organizing the learning process; (2) preparing syllabus and learning implementation plan (RPP); (3) developing an interactive media; (4) learning stage; and (5) evaluation and report writing stage.

Library study involves: identifying standard competency and prior characteristic of students, determining basic competency, selecting material, determining learning model, developing media and organizing the learning process.

Furthermore, a syllabus and learning implementation plan compiled with details as follows:

a. Competence based used is 3.2, 4.2 and 3.3, 4.3 with the material organization and personnel administration
b. Teachers use time is 2 x 45 minutes of each meeting, which consists of four sessions of three meetings to convey the material and one meeting to posttest
c. Learning model that is used not only lecture but with discussion and other learning model which will be delivered through interaktif learning media lectora inspire

Then, developing an interactive media using lectora-inspire software. Media is arranged coherently in accordance with the syllabus and learning implementation plan. Media has passed the test media expert, material expert, linguist, and Practitioners with very good criterion.

In the learning stage, the author conducted pretest in the beginning of meeting in both control and experiment class using the same question. Thereafter, students in experiment class were treated with the learning using a Lectora Inspire-based interactive learning media, while those in control class using conventional method. In the end of learning, posttest was conducted on the two classes using the same question. This research was conducted in 4 meetings.

Technique and Instrument of Collecting Data

There were some instruments used to collect data in this research:

Observation

Observation is an activity focusing on an object by using all the senses. Observation in this research was used to collect and to record important points during the learning and to see the students in the learning process. The type of observation used was systematic one for it used guidelines as observation instrument; direct observation was conducted to confirm information obtained as the attempt of solving problems occurring in the learning.

Interview

Interviews are used by researchers to determine the state of a person in response to the action taken. In this research, interview was conducted in the beginning stage of preliminary study to find out the prior condition of learning process. In addition, interview can also be used by the author as supplemental data. This is in line with the opinions Sugiyono (2012, p. 36) that the interview is not only used as a preliminary study to find problems that must be investigated, but it is also used when the researcher wants to know things that are deeper than the respondent. Interviews were conducted with several respondents and subject teachers concerned.

Test

Test was instrument used to find out the effectiveness of Lectora Inspire-based learning media. The test used has undertaken validity test, reliability test, difficulty level test, and item variance test.

a. Validity test
   Validity test aims to measure the accuracy of instruments that will be used in a research. The validation of question items was conducted using product moment formula; the result of test analysis showed that all question items were valid, so 25 question items can be used, because $t_{statistic} > t_{table.}$
b. Reliability test
   Reliability test is used to determine the consistency of measuring instruments in use. Reliability testing with the categories 0.00 to 0.20 - very low, 0.21 to 0.40 - low, 0.41 to 0.60 - enough, 0.61 to 0.80 - height, 0.80 to 1.00 - very high. Considering the result of test, it could be found the test reliability score of 0.905 with very high category.
c. Variance Test
   Classification of variance test consist: D = 0.00 to 0.20: Ugly, D = 0.20 to 0.40: Enough, D = 0.40 to 0.70: Good, D = 0.70 to 1.00: very good, D = negative, all is not well, so all items with a value of D is not used. Considering the result of variance test on the question, it can be found that 8 items got fair criteria and 17 good criteria; therefore 25 question items were potentially used.
d. Difficulty Level Test
   The classification of the difficulty level tests in this research consisted: P 0.00 - 0.30 is a difficult question, P 0.30 - 0.70 is a medium problem, P 0.70 - 1.00 is a easy problem. The result of difficulty level test showed 4 items with easy criterion and 21 with medium criterion. Considering those criteria, it can be found that all question items were likely used.

All the questions items already eligible validity test, reliability test, Variance Test, and Difficulty Level Test can be used for further research.

Technique of Analyzing Data

Data analysis in this research was conducted using statistic descriptive and t-test. The summary of Pretest and Posttest scores for experiment and Control Classes.

Table 1. Score Pretest and Posttest

Score	Group			
	Experiment		Control	
	Pretest	*Post-test*	*Pretest*	*Post-test*
Highest score	84	96	88	88
Lowest score	52	72	56	52
Mean	68	84.53	68.93	71.60
Percentage	19.56		3.72	

Source: Result of Data Processing in 2017

The table above shows that the mean score of students' learning outcome increases by 19.56% in experiment class and only by 3.72% in control class. The result of pretest-posttest on experiment and control classes was also analyzed using t-test, with analytical prerequisite conducted first including normality and homogeneity tests.

Analytical Prerequisite Test

Analytical prerequisite test was conducted to find out the feasibility of sample data used in effectiveness test. Analytical prerequisite test conducted included normality and homogeneity tests on experiment and control groups. The result of analytical prerequisite test on the pretest value is as follows:

Normality Test

Normality test was conducted to find out whether or not the sample used in this research derives from normally distributed population. *Kolmogrov smirnov* test was conducted with α=0.05 and using IBM SPSS 22 program. H_0 stated that the sample derives from normally distributed population; if significance value of normality test more than α (sig>0.050) and $D_{statistic}<D_{table}$, H_0 is supported. The result of normality test in this research is summarized below.

Table 2. Normality Test of Pretest on Experiment and Control Classes

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Experiment	.121	30	.200*	.923	30	.032
Control	.126	30	.200*	.932	30	.156

Source: Result of Data Processing in 2017

The table shows that significance value of normality test is more than α (sig>0.05): normality test score is 0.200 > 0.05 in experiment class and 0.200 > 0.05 in control class; so that it can be concluded that data of pretest cognitive score are distributed normally in both experiment and control classes.

Table 3. Normality Test of Posttest on Experiment and Control Classes

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Experiment	.126	30	.200*	.913	30	.017
Control	.135	30	.171	.947	30	.144

Source: Result of Data Processing in 2017

It can be seen that significance value of normality test is more than α (sig>0.05): normality test score is 0.200 > 0.05 in experiment class and 0.171 > 0.05 in control class; so that it can be concluded that data of posttest cognitive score are distributed normally in both experiment and control classes.

Homogeneity Test

Homogeneity test was used to find out whether or not the samples compared derive from the same population. The result of homogeneity test using Levene's formula shows α = 0.05 processed using *software* IBM SPSS 22. The result of homogeneity test in this research is described below.

Table 4. Homogeneity test of Pretest on Experiment and Control Classes.

Test of Homogeneity of Variances

Pretest Score			
Levene Statistic	df1	df2	Sig.
.098	1	58	.755

Source: Result of Data Processing in 2017

The table shows that significance score is 0.755. The score is more than 0.05 so that it can be stated that the score of public administration learning outcome in pretest has homogeneous variance between experiment and control classes.

Table 5. Homogeneity test of Posttest on Experiment and Control Classes.

Test of Homogeneity of Variances

Pretest Score			
Levene Statistic	df1	df2	Sig.
.993	1	58	.323

Source: Result of Data Processing in 2017

The table shows that significance score is 0.323. The score is more than 0.05 so that it can be stated that the score of public administration learning outcome in posttest has homogeneous variance between experiment and control classes.

Effectiveness Test

Both effectiveness test and hypothesis test in this research used t-test. Hypothesis testing with t-test is conducted to examine the effectiveness of Lectora Inspire-based interactive learning media. The criterion used in hypothesis formulation is $\alpha = 0.05$. H_a is not supported when the significance of probability (sig) < α (0.050) and if the significance of probability (sig) < α (0.050), H_0 is supported. The result of effectiveness test and hypothesis test in this research is described as follows:

Table 6. T-test of Pretest on Experiment and Control Classes

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Score	Experiment Class	30	68.0000	10.07558	1.83954
	Control Class	30	68.9333	9.55179	1.74391

Source: Result of Data Processing in 2017

From the table above, it can be found that mean score of pretest is 68 in experiment class and 68.93 in control class. It indicates that the score of learning outcome is higher in control class than that in experiment class; but to prove whether there is or not a significant difference of learning outcome between experiment and control classes, t-test is conducted.

Considering t-test in the Table 7 (independent samples test) in pretest between experiment and control classes, it can be found that significance value of t-test is 0.714. The significance value is more than 0.05 meaning that H_0 is supported, with $t_{statistic}$ of -0,368 < t_{table} 2.00172. It indicates that there was no significant difference of mean score of students' learning outcome between experiment and control class during pretest; then experiment class was treated using Lectora Inspire-based interactive learning media, while control class was not.

Interactive learning media was selected so that students can participate actively in learning. Active attitude of students will foster greater interest and impact on learning outcomes for the better.

Experimental class treated differently with additional media-based interactive learning lectora inspire. Teacher expectations that learning outcomes will increase and learning can be more effective using such treatment. It turns out that the treatment has paid off well. The results of t-test post test can be explained as follows Table 8.

Table 7. Independent Samples Test of Pretest on Experiment and Control Classes

Independent Samples 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
Nilai	Equal variances assumed	,098	,755	-,368	58	,714	-,93333	2,53478	-6,00726	4,14059
	Equal variances not assumed			-,368	57,835	,714	-,93333	2,53478	-6,00756	4,14090

Source: Result of Data Processing in 2017

Table 8. T-test of Posttest on Experiment and Control Classes

Group Statistics

	Class	N	Mean	Std. Deviation	Std. Error Mean
Score	Experiment Class	30	84,5333	8,25346	1,50687
	Control Class	30	71,7333	9,79420	1,78817

Source: Result of Data Processing in 2017

The result of posttest scoring shows that mean score of posttest is 84.53 in experiment class and 71.73 in control class. Considering the result, it can be found that the learning outcome score of experiment class is higher than that of control class. These results indicate a significant change.

The score of experiment class is 68 before using Lectora Inspire-based interactive learning media (pretest) and 84.53 after using it (posttest). Considering the increase in the mean score of students' learning outcome in public administration subject from before (pretest) to after (posttest), it can be found that the Lectora Inspire-based interactive learning media improves the students' learning outcome effectively in public administration subject.

The result of t-test in the Table 9 (*independent samples test*) during posttest on experiment and control class shows that significance value of t-test is 0.000. This significance value is less than 0.05 meaning that H_1 is supported and $_{statistic}$ is $5.747 > t_{table}$ 2.00172. It indicates that there is a significant difference of mean score for students' learning outcome between experiment and control class.

This result suggests that experiment class has learning outcome better than the control class does, meaning that experiment class using Lectora Inspire-based interactive learning media obtains mean score of posttest higher than the control class not using it does.

The characteristics of Lectora Inspire-based interactive learning media in public administration subject are: usable and can be installed in laptop set and personal computer, thereby is more accessible. Elena (2013, p. 68) states that "The shift from machine-centered automation to user-centered services and tools is enabling users to be more creative and achieve more". When educators are creative and always provide interactive media, the students will always be interested in the learning (Nazir, 2012). It can improve the learning effectiveness indirectly.

Interactive learning media leads to two way communication between teachers and students, this interaction process will automatically increase student activity and impact on learning outcomes. The findings of this study were supported by previous research results, that the Lectora-Inspire based interactive learning media have significant effects to increase the students learning outcome (Astutik & Rusimamto, 2016; Zuhri & Rizaleni, 2016; Prasetyo, 2015; Faruk, 2014; Wijaya, Slamet, & Said, 2014; Rahmawati & Iroah, 2013).

Table 9. Independent Samples Test of Posttest on Experiment and Control Classes

Independent Samples 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
Nilai	Equal variances assumed	,993	,323	5,747	58	,000	12,80000	2,33842	8,11915	17,48085
	Equal variances not assumed			5,747	56,380	,000	12,80000	2,33842	8,11628	17,48372

Source: Result of Data Processing in 2017

The result of this study shows that there is an increase of student learning outcomes using Lectora-Inspire based interactive learning media rather than those who didn't using the media. Successful learning can be achieved with certain efforts that focus on the objectives set at the beginning of learning (Dirgatama, Siswandari, & Indrawati, 2017, p. 255). This is in line with Trianto (2010, p. 24) states that the effectiveness of learning is a useful outcome in the implementation of learning activities.

CONCLUSION

The Lectora-Inspire based interactive learning media improves the students' learning outcome effectively. The mean score of learning outcome gained shows that the students respond to Lectora-Inspire based interactive learning media positively. This effectiveness builds on the improvement of students' learning outcome, as indicated with the mean score of 68 in pretest and 84.53 in posttest during operational field test. The use of Lectora Inspire-based interactive learning media improves the learning outcome of students effectively, with significance value = 0.000 < 0.05 during effectiveness test on experiment and control class showing a very significant difference, in which the mean score of experiment class is 84.53, while that of control class is 71.73.

Considering the result of research and development on Lectora Inspire-based interactive learning media, the following recommendations can be given. First, to Headmastes. The headmasters are recommended to appeal to and to encourage the teachers to develop creative and innovative learning media in order to improve the quality of school.

Second, to Teachers. Teachers are expected to be willing to learn using technology-based media to develop their ability of delivering learning material, in this case, Lectora Inspire interactive learning media. Third, to further Researchers. This research can be used as the reference for the similar studies by developing Lectora Inspire-based learning media and the wider development can be conducted to provide high-quality learning source.

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REGIONAL-POTENTIAL-BASED PLANTATION VOCATION EDUCATION ANALYSIS IN EAST KALIMANTAN PROVINCE

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Abstract

This study aims do provide plantation vocational education facilities in accordance with the needs of the plantation labor market for several years to come.This was a quantitative analyzing secondary data and setting the plantation vocational education needs by first making a projection of the population comprising the age group of 16-18 years in East Kalimantan Province.The research conclusions show: East Kalimantan Province need plantation vocational Education. The projection of plantation workers in East Kalimantan Province for 5 years to come from 2015 to 2019 on the whole experiences an increase in the needs for plantation workers continuously. In relation to the results of the projection for plantation workers in East Kalimantan Province for 5 years to come, the needs for vocational education in plantation in the province increase continuously.

Keywords: *analysis vocational education planning, regional potentials*

INTRODUCTION

Based on projection released by Central Bureau of Statistics (BPS) in 2014, there is a rapidly growing population for the next twenty five years; 205.1 million population in 2000 becomes 273.2 in 2025. It indicates that the national food supply should be sustainable with the population growth. However, Indonesia suffers the condition in reverse from the fact above. Indonesia as the agricultural country and abundant natural resources cannot afford to cover its domestic food supply, moreover it has to import them from another countries instead. "Indonesia has imported food products every year and it is irresistible to a chronic level. Almost 65 percents from overall domestic food needs are imported," exclaimed Natsir Mansyur, the Indonesia Vice Chief of Trade Chamber and Industry, Trade, Distribution, and Logistic Sector in Jakarta, Tuesday (September, 4th 2012). He said that import products kept on overflowing in this country since the decrease of food supply as the result of the low productivity performance. Innovation factor becomes one of many factors leads to low productivity.

Food needs and agricultural products projection is referred to population growth. Compared to 6.92 billions of people in 2010, world's growth population tends to rise 7.72 billions of people in 2020. According to the estimation, the food supply shall be well anticipated in case of fulfilling them rather than facing some shortage. It is considered to be beneficial if Indonesia can take an advantage from its demographic bonus in order to solve some problems all at once. The experts define the fine line: if the population keeps growing steadily, the food needs will leap to 35 percents in upcoming years, even in 2030.

Demographic bonus which is also well known as the *window of opportunity* is the one chance or even rare opportunity happens in one or two decades. The demographists estimate that this precious opportunity will occur in Indonesia around 2015-2030. While others argue that the years after this, population in the villages and the farming sectors are still the focus during the development in Indonesia. Arismunandar (2014, p. 59) proposed: Central Bureau of Statistics (BPS) predicts 44-45 percents of population in Indonesia still remain the farming labors in the villages if it is projected in 2020-2030.

Indonesia had persistently carried out the action of implementing demographic bonus through local economic potential improvement with economic corridor theme for the widespread potential and excellence in each area throughout Indonesia. Local economic potential development had 6 (six) economic corridors; Sumtera, Jawa, Kalimantan, Sulawesi, Bali-Nusa Tenggara, and Papua-Maluku. Government had made economic theme/map developed through these 6 economic corridors regarding to each local's excellence and strategic potential.

According to Engkoswara, Demographic bonus that leads to local excellence or 'local *genius'* is expandable potential resources in our lives that recently has not been fully empowered and left behind instead (Ali, 2007, p. 346). The optimum potential enhancement can be an attractive excellent education for the locals. Ancient analogy proved that human being was so much dependent on the nature. Their massive dependency on water had initiated the first civilization around large and fertile rivers.

Local excellence of a region enable its inhabitants more to increase their living or the local revenue income (PAD) (Asmani, 2012, p. 30). The locals who yield advantages and income, manage to protect, preserve, and increase their local excellence quality that eventually strive the national and local competency for their own benefit. As the result, the pushed ahead local excellence will improve human resources quality in particular region.

Generally, Indonesia has not applied the regional based yet in case of its educational process. It means the education system in this country is still common within regions. Due to the establishment of six corridors development, education sector should correspondence to each of corridors. Somehow it is necessary to relate the labor needs and its availability. In the other words, education needs to be implemented on region or corridor based. The mapping of these 6 economic corridors can also be considered to define the type, location, quantity, quality, and time in accordance with education development.

Michael W. Galbraith (Zubaedi, 2005, p. 134) stated that education based on society is educational process which the individuals

or adults become more competent in skill, attitude, and concept toward life and control local aspects from the society through democratic participation. Zakiya Daradjat (Wahjoetomo, 1997, pp. 42-43) claimed that society is a composition of individual and group bound by the unity of the state, culture, and religion. Every society own the goal, regulation, and particular authority system which connect to social life consequently influence each other in education.

Many researches study the relationship between local and education development. One of them is conducted by Seng (2007), studied the relationship between local development and vocational education in Singapore. Since the independence day in 1965, vocational education in Singapore had developed to deal with many stages of economic development. It was reconstructed and shifted from work based economics to capital based economics. Education system especially vocational guaranteed that the labors have knowledgment and skill relevant to the changes.

Sugiharto & Kusmandari (2016) in International Journal of Information and Education Technology, entitled: *Model Development in the Context of Vocational Village Community Empowerment in Central Java*, concluded that vocational village program had succeeded to make villages into role model village. Each of them carried out the program to enhance its potential therefore new entrepreneurs were born and there were less of unemployees.

East Kalimantan Province is one of the region in Indonesia located in the middle of Kalimantan island which has corridor theme, "Production Center of Mining industry and National Energy Storage." Despite of well known mining industry production center, East Kalimantan has local potential in agriculture sector which is plantation sub sector, with 1,292,071 hectares total area producing 7,692,281 ton and employed 482.903 employees according to Department of Agriculture (2014). The largest area was planted with palm oil. The production yielded 7.600.298 ton from 1.115.415 hectares total area. The second biggest production was rubber tree plantation with 59.963 ton from 103.117 hectares total area. Palm oil trees length of area keeps on extending year to year as government program to launch " million hectares of palm oil trees" program followed by the building of manufacturing area. He stated that, "we cannot count on the using of coals, oils, and gasoline no more. We have come now to the act of making new locomotive through agriculture and plantation sector,..." Awang Faroek Ishak, East Kalimantan Governor (Ruslan, 2012).

If the development of plantation in East Kalimantan Province is not initially constructed from the plantation human resources development through qualified establishment of plantation human resources of education planning, East Kalimantan Province will not survive moreover it will be left behind for its dependency on coal and natural gasoline production that slowly decays. Through local potential based education needs analysis in Plantation vocational development strategy in East Kalimantan Province, the preparation and creation of qualified plantation human resources as one of the efforts to achieve future demographic bonus.

Clarke & Winch (2007, p. 9) stated that, "vocational education is specialized to prepare an individual to work that emphasizes on practical and technical aspect." While according to Thompson (1972, p. xvi), vocational education is the education provides experiences, visible stimulus, awareness, information, or psychometric skill, and elevating exploration on vocational development process, establish, and maintaining the individual in the work field." Djojonegoro briefly stated that, "vocational education is the education that prepares learners to be well equipped in the work field."

From the regulation stated in Ministry of Education and Culture no.36/2014, vocational school according to verse 5 should fulfill the criterion: the availibility of local resources with particular vocational skill, vacancies potential, and society support from world business world industry. The establishment of education institution that fits local potential is much possible. Despite of this reason, we can not neglect the government regulation previously mentioned that the longer process is one of the concerns to permit the establishment of education unit. Hence this research uses adding learning group system rather than adding vocational school to insert new spectrum called plantation. Regulation of Ministry of Education and Culture no.36/2014 stated that learning group is "registered learning participants united in a class." The ideal numbers

for a learning group is 32 learners coincides with Regulation of Ministry of National Education no. 69/2009, "Vocational schools program: 6 learning groups consist of 32 learners for each group." This study aims do provide plantation vocational education facilities in accordance with the needs of the plantation labor market for several years to come.

RESEARCH METHOD

This research is quantitative research with secondary data analysis from various organizations and official approved. The researcher obtain the data from East Kalimantan Province Central Bureau of Statistics (BPS), Department of Plantation, and Minstry of Agriculture. The problem of the research using secondary data is the validity and reliability. Analysis unit in secondary data analysis is rather different compared to other quantitative methods. Martono (2010, p. 10) described this point as: to determine validity and reliability matter is how the data is collected and obtained by the data provider. This kind of factor is unavoidable for secondary data users or in the other words this factor is out of control of the researcher. However, the researcher still needs to be aware and check from other related sources (if it is possible).

From this explanation, the researcher still can carry on the process and assume that the official data from the related institutions are valid and reliable.

In case of measuring the plantation labors needs in East Kalimantan Province, the researcher finds the obstacle to analyze since there is no availabilty of supporting data to calculate the labors needs. Inspite of that problem, the researcher still has references in form of supporting data; the plantation labors target from strategic plan of Department of Plantation East Kalimantan Province. Later, vocational school needs will refer to this strategic plan. Plantation vocational school needs analysis in East Kalimantan Province is performed in 3 stages:

Grouping the Population Age

Population data stated in Central Bureau of Statistics reports is range of five years in each group out of the group of school age, starts from 0-4 years old, 5-9 years old, 10-14 years old, 15-19 years old, 20-24 years old and etc. For the research purpose, the range of population age needed for vocational school level is 16-18 years old. Thus, the needed data is mixed up with the inappropriate age that range from 15-19 years old. The method used in analyzing population to know potential age for vocational school is to divide the population age by *Sparague Multiplier Method* which is done by arranging in particular way then multiply it with *sprague multiplier number* (Department of National Education, 2007, p. 5). Sprague multiplier number can be seen in Table 1.

Formula used in grouping population is:

Fa = Sla × F-2 + S2a × F-1 + S3a × F0 + S4a × F1 + S5a × F2

Note :

Fa : Population according to first year range
F0 : Population with age grouping
F1 : First age group of population after F0
F2 : Second age group of population after F0
F-1 : First age group of population before F0
F-2 : Second age group of population before F0
S1a : First Sprague Multiplier Number for a years old
S2a : Second Sprague Multiplier Number for a years old
S3a : Third Sprague Multiplier Number for a years old
S4a : Forth Sprague Multiplier Number for a years old
S5a : Fifth Sprague Multiplier Number for a years old

Population Projection

Population projection is conducted to analyze condition or population number according to the required age for the future thus the counting of population projection shall begin from 2015 till 2019. Next, projection of population number at vocational school age range from 16-18 years old. The counting of population projection is due to population growth following exponential function with this formula:

$$P_n = P_0 (1 + r)^n$$

Explanation:

P_n : Population of year n
P_0 : Population of year 0 or first year
r : population growth number
n : Variance between projection year and firstyear

Learning Group Needs

The calculation of learning group needs is assumed with 32 students in one learning group (ideal number for 1 learning group). Before counting learning group needs, labor needs per year shall be calculated first as the graduation needs reference. The researcher has basis of Data Center and Agriculture Information System based on the counting of age grouping. The labors age which has to be fulfilled or replaced by the age range from 15-19 years old is what the researcher has to take as a reference in line with the fact that the age is at the school level then other grouping age will face the regeneration as ssen in table 2. Therefore, the total presentation of plantation labors is 4 percents based on this grouping age. The availability of plantation labors toward the graduate ones is 4 percents from total plantation labors per district/city. The counting of learning group needs is described below:

$$(LGN) = \frac{Plantation\ labor \times \mathbf{4}\%}{\mathbf{32}\ \boldsymbol{students}\ (\mathbf{1}\ \text{learning group})}$$

$$\boldsymbol{LGN = Learning\ Group\ Needs}$$

RESEARCH RESULTS AND DISCUSSION

Table 3 reveals the amount of population in East Kalimantan Province in 2013 and 2014 based on group of age and gender. The overall population elevates 75 thousands inhabitants from 3,275,844 (2013) to 3,351,432 (2014) inhabitants

The grouping at population of 16-18 years old, in 2013 the population grows 55,649 inhabitants while in 2014 the population changes to 55,216 inhabitants,

After conducting the grouping population age, 5 next years projection is carried out from 2015 until 2019 with the following explanations, vocational school students population in East Kalimantan Province in 2015 is 224,971; in 2016 the population is 222,635; in 2017 the population is 220,325; in 2018 the population is 218,037; and in 2019 the population is 215,774. Population with age level 16-18 years old can be classified as raw participation number at high school level (Table 5).

Table 6 shows that high school and vocational school data in East Kalimantan Province in 2014, high school has absorbed 57,165 students or 33% from APK at age level 16-18 and vocational school has absorbed 60,709 students or 35% from APK. Approximately there is about 32% from APK of age level 16-18 have not been served yet.

Department of Plantation East Kalimantan Province has marked the plantation labors of 5 commodities (palm oil, rubber, cocoa, coconut, and pepper) for 5 years in accordance with Renstra (described in table 7) so that the required labors each year revealed in research method is 4% from the targeted labors, shown in table 7.

If there is a combination between table 6 and 8, there will be an adding toward plantation vocatinal school that solve the APK problem which approximately there are 9% in 2015; 10% in 2016; 10% in 2017 ; 11% in 2018; and 12% in 2019 have not been served yet (table 8).

Overall, East Kalimantan Province needs on plantation labors and vocational education will rise in the next 5 years; 20,452 labors and 639 learning groups in 2015; 21,474 labors and 671 learning groups in 2016; 22,548 labors and 705 learning groups in 2017; 23,675 labors and 740 learning groups in 2018; 24,858 labors and 777 learning groups in 2019. According to Regulation Policy No. 23/2014, education is managed in this following; Central Government runs the higher education (dikti), Provincial Government runs secondary education (dikmen), and District Government runs elementary education (dikdas). Instead of the efficiency and focus that this type of management has, the success and failure happen to each level education are much easily detected and repaired immediately. As well as the plantation vocational school needs applied thoroughly in district/city will enable the efficient search toward the opening of plantation vocational education.

Table 1. Sprague Multiplier Number Level 16-18 Years Old

Age	0-4 year F-3	5-9 year F-2	10-14 year F-1	15-19 year F0	20-24 year F1	25-29 year F2	30-34 year F3
15 years old		-0,0128	0,0848	0,1504	-0,0240	0,0016	
16 years old		-0,0016	0,0144	0,2224	-0,0416	0,0064	
17 years old		0,0064	-0,0336	0,2544	-0,0336	0,0064	
18 years old		0,0004	-0,0416	0,2224	0,0144	-0,0016	
19 years old		0,0016	-0,0240	0,1504	0,0848	-0,0128	

(Source: Department of National Education 2007, p. 10)

Table 2. Population of Men and Women of 15 years old above Working in Plantation Sub Sector According to The Grouping Age and Projection Year 2015-2019

Group Age	August 2012	August 2015*)	August 2016*)	August 2017*)	August 2018*)	August 2019*)
15-19	5.007	4.892	5.101	5.130	5.103	5.281
20-24	14.591	14.256	14.864	14.949	14.869	15.390
25-29	15.078	14.731	15.360	15.448	15.366	15.904
30-34	23.464	22.925	23.903	24.039	23.912	24.749
35-39	13.168	12.865	13.414	13.491	13.419	13.889
40-44	17.163	16.769	17.484	17.584	17.491	18.103
45-49	11.274	11.015	11.485	11.550	11.489	11.891
50-54	10.137	9.904	10.327	10.386	10.330	10.692
55-59	3.357	3.280	3.420	3.439	3.421	3.541
60+	6.901	6.742	7.030	7.070	7.033	7.279
Jumlah	120.140	117.379	122.388	123.086	122.433	126.719

(Source: Ministry of Agriculture, 2013, pp. 201-205)

Table 3. Population of East Kalimantan Province Based on Group Age and Gender

Group Age	2013			2014		
	L	P	L+P	L	P	L+P
0 – 4	174.714	165.910	340.624	176.700	168.531	345.231
5 – 9	161.085	151.022	312.107	162.487	152.254	314.741
10 - 14	152.806	144.153	296.959	154.658	145.789	300.447
15 - 19	147.141	138.964	286.105	148.542	140.155	288.697
20 - 24	155.321	144.045	299.366	155.295	144.373	299.668
25 - 29	162.183	147.706	309.889	163.791	148.725	312.516
30 - 34	159.165	144.348	303.513	162.022	147.101	309.123
35 - 39	148.043	130.326	278.369	151.823	134.137	285.960
40 - 44	130.286	113.686	243.972	134.617	117.484	252.101
45 - 49	106.914	92.147	199.061	112.129	96.793	208.922
50 - 54	81.416	68.142	149.558	85.770	72.433	158.203
55 - 59	58.926	46.069	104.995	62.579	49.921	112.500
60 - 64	37.584	28.261	65.845	40.903	30.712	71.615
65 - 69	20.770	18.090	38.860	22.773	19.530	42.303
70 - 74	11.947	11.749	23.696	12.690	12.354	25.044
75+	10.617	12.308	22.925	11.294	13.067	24.361
Total	1.718.918	1.556.926	3.275.844	1.758.073	1.593.359	3.351.432

(Source: BPS East Kalimantan Province, 2014 & 2015)

Table 4. Grouping Age Result level 16-18 years old in 2013-2014

Year	Population Based on Age of SMK Prov. Kal-Tim						Total of Age 16-18		
	Age 16		Age 17		Age 18				
	L	P	L	P	L	P	L	P	L+P
2013	29.591	27.972	57.563	29.463	27.832	57.295	28.641	27.008	55.649
2014	29.243	27.693	56.936	29.149	27.581	56.729	28.409	26.807	55.216

Table 5. Projection Result of Population Age 16-18 years old Based on Gender in East Kalimantan Province

Age	Projection Year Population at Age 16-18 East Kalimantan Province									
	2015		2016		2017		2018		2019	
	L	P	L	P	L	P	L	P	L	P
16	28.899	27.417	28.559	27.143	28.223	26.873	27.891	26.605	27.563	26.339
17	56.316	28.838	55.702	28.531	55.096	28.227	54.496	27.926	53.902	27.628
18	27.332	56.169	27.086	55.614	26.842	55.064	26.599	54.520	26.360	53.982
Total	112.547	112.424	111.347	111.288	110.161	110.164	108.986	109.051	107.825	107.949
L+P	224.971		222.635		220.325		218.037		215.774	

Table 6. The Sum of School, Teacher, Student, Population at Age 16-18 SMA/MA and SMK Based on District/ City in East Kalimantan Province year 2014

No.	District/ City	Population Age 16-18	SMA/MA			SMK		
			School	Student	Teacher	School	Student	Teacher
1	Paser	13.694	18	4.068	357	12	3.913	368
2	Kutai Barat	9.311	21	3.181	333	13	3.013	279
3	Kutai Kartanegara	36.520	51	12.445	1.044	39	11.056	941
4	Kutai Timur	14.688	21	4.666	369	22	5.133	426
5	Berau	9.410	18	4.545	399	15	2.701	317
6	Penajam Paser Utara	8.252	8	2.542	194	9	2.920	264
7	Balikpapan	29.904	20	9.657	666	29	8.643	779
8	Samarinda	44.984	36	11.888	937	54	20.084	1.641
9	Bontang	7.636	11	3.511	291	13	3.069	364
10	Mahakam Ulu	1.318	5	662	62	2	177	35
	Total	175.717	209	57.165	4.652	208	60.709	5.414

Source: BPS East Kalimantan 2015 (data is processed)

Table 7. Target, Indicator dan Target of Renstra Department of Plantation East Kalimantan Province (2014-2018)

Target	Indicator	First Condition (2013*)	Working Target of Year				
			2015	2016	2017	2018	2019**
The Increase of Plantation Labors (TKP)	The Sum of Plantation Labor (person)	463.753	511.288	536.852	563.695	591.879	621.466
The Making of Palm Oil Plantation	The Expansion of Plantation Width (Hectares)	1.000.000	1.240.000	1.360.000	1.480.000	1.600.000	1.720.000
The Making of Rubber Plantation	The Expansion of Plantation Width (Hectares)	93.463	97.463	99.463	101.463	103.463	105.463
The Making of Cocoa Plantation	The Expansion of Plantation Width (Hectares)	17.453	18.500	19.000	19.500	20.000	20.500
The Making of Coconut Plantation	The Expansion of Plantation Width (Hectares)	18.727	19.727	20.227	20.727	21.227	21.727
The Making of Pepper Plantation	The Expansion of Plantation Width (Hectares)	6.466	7.466	7.966	8.466	8.966	9.466

) Temporary Number year 2013* *) researcher calculation on pattern based*

(Source: Department of Plantation East Kalimantan Province 2013, p.54)

Table 8. Target of Graduation per Year to Fulfill The Plantation Labor Availibility in East Kalimantan Province

Indicator	Target of Graduation Per Year & Grouping Learning Needs				
	2015	2016	2017	2018	2019
Target of Graduation (4% of TKP*)	20.452	21.474	22.548	23.675	24.858
Grouping Learning Needs	639	671	705	740	777

**) TKP = Plantation Labors*

CONCLUSION AND SUGGESTION

Conclusion

The research result as an examined main problem which has been revealed leads researcher comes to a conclusion that plantation vocational school needs in line with plantation labors needs concludes 4% plantation labors per projection year in East Kalimantan Province so the researcher gain this following data; 4% plantation labors per projection year in East Kalimantan Province, 639 learning groups will be needed in 2015; 671 learning groups in 2016; 705 learning groups in 2017; 740 learning groups in 2018; and 777 learning groups in 2019.

Suggestions

First, to Central and Local Government, this type of education model can be Piloting Project to develop education model in preparing labors and minimizes the unemployees additionally to society prosperity improvement in case of reducing the poverty; Second, to related institutions such as the existing companies may apply this research in form of building private schools which its graduates automatically hired by the company itself; Third, to the future researchers and education experts, this research can be developed to other sectors according to each local potential. And fourth, Further research is required although it is in a macro province regional level of research. The research should be carried out in detail through subdistrict level in order to put plantation vocational education facilites correctly and precisely.

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STANDARDS OF TIERED TEACHER COMPETENCE AS A GUIDE FOR CONTINOUS PROFESSIONAL DEVELOPMENT OF VOCATIONAL HIGH SCOOL TEACHERS

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Abstract

The objective of this research is to produce tiered teacher competency standards and increment assessments, as a guide for the continuing professional development of vocational high school teachers. Type mix of research methods, approaches Research and Development of Richey and Klein are limited to 2 stages of development and product validation. Internal validation with expert review and FGD. External validation through product testing on Vocational Audio Technique teachers. Instrument validity test using factor analysis obtained 90,254% validity level in highly valid category. Reliability measured by Alpha Cronbach, reliability coefficient 0.9 in the category is very reliable. Data were analyzed using Rank-Order of Different Scores. Stakeholders assess the differences in the professional work area and the demands of depth of competence between levels clearly. The effectiveness of standard assessment can be enhanced through teacher explanation, among others: (1) the importance of impolementation of the results of scientific activities in learning, (2) the role of resource persons more effectively improve performance.

Keywords: *teacher competency standards, guidelines continuing professional development, continuing professional development (CPD),vocational high school (VHS) teachers*

INTRODUCTION

The teacher is an important component in education. Kempton (2013) expressed the most effective improvement of the quality of education is to improve the teaching quality of teachers, because the quality of the education system will not exceed the quality of teachers and their work. Teacher quality is the most influential variables on student achievement (An Roinn Oideachais agus Scileanna, 2012, p. 25), determining 40 to 90% (Public Education Network, 2004). Clearly, the teacher is the first component and the main determinant of the quality of education.

Educator certification in recognition of teachers as professionals do not necessarily make a professional teacher. That means being professional takes time to process as Harwell stated "Professional development is a process, it's not a event" (Harwel, 2003, p. 1). The fact that a good teacher is a teacher who is able to internalize the four competencies of teachers, pedagogy, professional, personality and social (Wahid, 2005, p. 6) into teaching practice and solve the complexity of classroom teaching problems. In addition, teachers can be role models in behaving, upholding ethics and norms inside and outside the classroom. It all takes time to process. The results of preliminary studies have shown no difference in terms of seniority teacher competence functional position. Teachers group IVa-IVc certified educators, tend to stagnate. This means that teachers lack the professional learning effect of experience daily work of teaching. Therefore, it is necessary to study teacher performance appraisal system, because without the ability to reflect, the experience is not the best teacher (Conti, 2007, p. 19).

The portfolio assessment for teacher certification, which consists of 10 (ten) assessment aspects, has only 1 (one) direct link to the teaching of students in the classroom (Ministry of Education and Culture, 2012a, p. 64). The grain is the planning and implementation of learning. Implementation of teacher activity assessed in the opening, the core activities of teaching and learning close. If the analogy with the newly compiled this step cooking recipe, prepare the ingredients and cooking sequence. How can generate a chef reliable if the chef is not accustomed to taste the flavor, analyzing taste, take corrective action and improve the taste of cooking plan that will come. So the teacher performance appraisal system has not reflect the thoroughness of the work of a teacher.

Professionalism test system in Indonesia is still composed of paper and pencil, less represent the complexity of teachers' knowledge and skills. This opinion is strengthened results of preliminary studies the majority of teachers (80.88%), recognizes the competence of the teacher appraisal system not represent the complexity of the knowledge and skills of professional teachers. Comparison of the performance of teachers before and after passing the certification, showing the average performance of post-certification of teachers is decreasing (Hariri, 2010, p. iii.). Therefore the system qualification test professional competence of teachers need to be developed, to be able to measure the complexity of the knowledge and skills of professional teachers.

The government in the last three decades facilitate ongoing professional development needs of teachers in the form of a number of large projects and the training of teachers. Sweeting (Steer, 2004, p. 233) stated the project includes the revision of curricula and training, capacity building of teachers and teacher education institutions, in-service training, professional support and mentoring teachers in school-based concept. Sweeting (Steer, 2004, p. 234) found that most of the in-service training does not improve the quality of teachers, even cynically Jesness (Villegas, 2003, p.93) states that anyone think education can be improved substantially with workshops, maybe she had never attended the workshop. The government runs a program of sustainable professional development of teachers are not in earnest. Facts on the ground most of the teachers (82.5%) did not know Continuous Professional Development (CPD-Kemendikbud term), but the teachers are very familiar with the Teacher Performance Assessment (TPA) whereas TPA is part of the CPD. There are inconsistencies in the CPD guide between objectives, implementation and assessment. Fostering continuous professional development of teachers as needed, implemented gradually, continuously improve the professionalism of teachers. However, activity was not supported needs assessment or map skills can serve as a guide to facilitate the teacher relat-

ed to who needs what, experts in what, where and when. Increased done gra-dually, without a clear explanation of staging criteria. CPD is not practical assessment consists of 14 competencies 78 indicators of the three criteria and less support independent professional learning of teachers (Ministry Education and Culture, 2012b, Pp.42-57).

Based on the above explanation, the researchers felt the need to develop a tiered teacher competence and qualifications standards that can be used as a reference for schools and teachers in professional development. This is in accordance with the results of research Sugiyanto, Slamet, & Sugiyono (2016, p. 302) that vocational lecturers have different levels of competence different, bringing the consequences of counseling difficulties. Standard tiered of teacher competence and qualifications adapted to the functional hierarchy of teachers. Stages of development of dynamically compiled able to accommodate the dynamics of the growth of professionalism of teachers. Demands depth and breadth of competencies of teacher professional work area increased gradually according to stages of the increase teachers functional hierarchy. Tiered teacher competence qualification standards equipped with a standard assessment of competence qualification level rise. Assessment standards based on the completeness of daily work of teachers teach, students learn and teachers' efforts in developing professionalism.

Each state has a professional teacher standards vary influenced by culture and context of the country concerned. Standard professional teachers in Australia comprises three elements, namely professional attributes, knowledge and practice. Professional attributes describe the attitudes and behaviors that demonstrate the ability of teachers to facilitate student learning. Underlying professional know-ledge of teachers in understanding and implementing high-quality learning. Professional practice, the ability of teachers to make learning interesting and meaningful. Professional attributes include: collaborative, committed, effective communicators, ethical, innovative, inclusive, positive and reflective. Competence and qualifications of teachers are classified into four levels, namely prospective teachers, teacher expert, proficient teachers and lead teachers (Barr et al., 2011, pp. 12–18).

Teaching license in New Mexico in the classification into 3 levels: level I, level II and level III. License level 1, a temporary permit allowing the initial level teachers to implement additional preparation become qualified teachers. License Level II, was given to a qualified professional teachers, responsible, fulfilling perhaps even beyond the academic content and performance standards set by the department. License level III, the highest level license given to the teacher as a coach in the teaching profession and is responsible for curriculum development, collaboration and mentoring colleagues (Public Education Department, 2012, p. 14). The validity period of the license to teach each different level, must be renewed periodically (Rendón, 2012, p. 6). The assessment system is based on the ability of teachers in teaching, analyzing student learning and teacher participation in professional development.

Standard of competence and qualifications of teachers in England divided into five levels, namely: (1) *Qualified Teacher Status* (*QTS*); (2) *Core* (*C*); (3) *Post Treshold Teachers* (*P*); (4) *Excelent* (*E*); dan (5) *Advanced Skill Teachers* (*A*) (Training and Development Agency, 2007, p. 2). Professional standards of teachers includes three professional attributes such as knowledge, understanding, and professional skills are interrelated. The increase in the level of qualification through the stages of development, a teacher can ask for an increased level Excelent as Advanced teacher must go through stages as QTS teachers, C, P and E (Training and Development Agency, 2007, p. 4). The higher levels of levels of competence and qualifications of teachers demands higher professional work area (Training and Development Agency, 2007, p. 4).

Standards of professional teachers in Indonesia consists of pedagogical, personality, social and professional competencies. Functional hierarchy of teachers in Indonesia are classified into four functional hierarchy based on the ranks of teachers. Although functional tiered teacher made but not followed the demands of different depth of competence and professional work area between the hierarchy. In connection with the duties and functions of teachers, there is no difference in the rights and responsibilities of teachers in terms of seniority functional.

Teachers as professionals supposedly able to maintain, protect and develop their professional abilities throughout his career. *Institute of Profesional Development* The Institute of Professional Development characterizes the United Nations as follows:

> *Continuing Professional Development can be defined as the conscious updating of professional knowledge and the improvement of professional competence throughout a person's working-life. It is a commitment to being professional, keeping up-to-date and consciously seeking to improve. CPD is the key to optimizing a person's career opportunities for today and for the future. It focuses on what you learn and how you develop throughout your career* (Chartered Institute of Professional Development by Kennedy, 2009, p. 41).

Professionalism of teachers was developed in order to improve the level of knowledge/understanding of teachers as an integral part of professional growth and improvement of learning (Drage, 2010, p. 35). In order to increase the quality of teachers positively correlated with student achievement, Puriefoy (2004) suggest PPB should be carried out by: (1) continuous learning, not one-time seminar; (2) activities focus on improving classroom practice and student learning; (3) integrated in the daily work of teachers teaching and learning; (4) cultivated collegiality that involve a variety of knowledge and experience for the purpose of improvement of student achievement.

METHODS

Mixed methods research approach with development procedure refers to Richey and Klein (2009) models. Internal validation by expert review and FGD. instrument of taking data with questionnaire. As a data source are vocational teachers Audio-video engineering, principals, school inspectors, lecturers, resource persons from the LPMP (Institute for Quality Assurance of Education). Data were analyzed using Rank-Order of Different Scores.

As a first step of development is a needs analysis based on preliminary research results. Results of a preliminary study are: (1) the majority of teachers (70.59%) agreed that teacher competence standards are made tiered; (2) most of the teachers (80.88%) admitted that the assessment of teacher competence not represent the complexity of knowledge and skills teachers' professional; (3) almost all (94.12%) teachers agree that teacher performance appraisals are based on the quality of classroom teaching, along with process evidence and learning outcomes; (4) most teachers (85.29%) acknowledge nonpermanent performance, it is necessary to consider periodic re-competency tests; and (5) the average of teacher takes 9.1 hours/month for professional and collaborative development.

Development of teacher competence standards refer to standards of professional teachers of some developed countries. Standard professional teachers in Australia coloring preparation professional elements, professional attributes and professional division of labor dimensions of teachers (Society fo the Provision of Education in Rural Australia, 2013). Teaching and assessment standards licensing in New Mexico coloring element of assessment of teacher competence qualification levels rise (Rendón, 2012). Standard professional teachers in England coloring in determining the level of qualification, competence and depth of teachers' professional level work area (Institute for Learning, 2009). Standards of profes-sional teachers in Indonesia, which consists of pedagogical, personality, social and professional competence all covered in the professional attributes and other elements of professional teachers.

In this study, based on ownership hierarchy educator certificate for alleged effect on the performance of teachers, namely: (1) the novice teachers for teacher training and induction programs; (2) the proficient teacher, teacher groups IIIa-IIIb or remain uncertified teacher educators; (3) the highly accomplished teacher teacher, teacher group IIIc-IIId been certified educators; and (4) the lead teacher, teacher group IVa-IVc certified educators. Demands competence of beginning teachers, teachers can carry out basic tasks of teaching under the guidance and responsibility of the mentor. The proficient teachers have autonomy in performing basic tasks of teaching. The highly accomplished teacher is able to develop and give effect to the implementation of effective teaching at school level.

The lead teacher is able to evaluate and improve the effectiveness of teaching in and outside of school.

Teacher competence qualification standards set comprises four elements, namely professional knowledge, attributes, practice and involvement of teachers in professional development. Professional attributes describe the attitudes, behaviors, and values that demonstrate the ability of teachers to facilitate student learning. This is in line with opinion (Priyatama & Sukardi, 2013, p. 156) that teacher performance achievement can be measured from the achievement of the student receiving the instruction from the teacher. Professional knowledge, the underlying teachers in understanding and implementing high-quality learning. Professional practice, the ability of teachers to make learning interesting and meaningful. Professional involvement is the participation of teachers in forums and scientific activity. Professional attributes include normative, collaborative, effective communicator, dedicated, inclusive, innovative and reflective.

All professional elements other than the professional attributes are translated into six interrelated dimensions of work and contribute to effective teaching. These six dimensions of the work are: (1) facilitate student learning; (2) assess, evaluate, analyze and report on learning outcomes; (3) create a learning environment that is challenging and conducive; (4) implement and participate in curriculum development; (5) participation in professional learning and reflection; (6) the role of the teacher in partnership with the school community, society and the world of work. Sample descriptions qualification standards of professional competence of teachers working dimension 1 are shown in Table 1.

Draft standard tiered teacher competency qualification validated by expert judgment Delphi round 1, obtained some improvement inputs. Improvement suggestions received, the draft standard with enhanced competence and qualifications: (1) add indicators on the assessment of professional attributes; (2) operational dimension elaborated work; (3) level rise structured assessment standards incorporating elements of reflection, so that work experience is correlated with the capacity of teachers; (4) integrating dimensions 6 and 5 because both are interrelated. Teacher competence and qualifications framework after being validated as a whole is visualized in Figure 1.

Tabel 1. Dimensions of Job Qualifications Teacher Competency 1 Facilitate Student Learning

Beginner	Yunior	Highly Accomplished	Lead
1. Understand the diverse characteristics of students. 2. Designing and implementing learning with guidance and responsibilities of a mentor. 3. Selecting and utilizing a variety of sources. 4. Understand career and entrepreneurial opportunities appropriate field of study.	1. Apply the appropriate range of vocational learning characteristics of students. 2. Design and implement effective learning. 3. Determine and utilize a variety of learning resources. 4. Understand the range of appropriate career and entrepreneurial subjects. 5. Choosing a learning approach that trigger students' critical thinking, creative, innovative and productive.	1. Analyze the needs of vocational learning approach based on the characteristics of the students. 2. Evaluating the effectiveness of vocational learning. 3. Giving students the freedom of choosing a variety of learning resources on the internet that are relevant. 4. The details of the skills, knowledge and entrepreneurial career. 5. Planning a challenging learning activities. 6. Designing authentic assessment instruments.	1. Evaluate the effectiveness of vocational learning in a variety of student characteristics. 2. Utilizing the results of the evaluation to improve 3. learning effectiveness. Sharing learning information through the internet. 4. Analyzing the results of assessment to improve the quality of learning that will come. 5. Integrating productive skills of students to create business opportunities that are creative, innovative and productive. 6. Analyze the quality of assessment instruments.

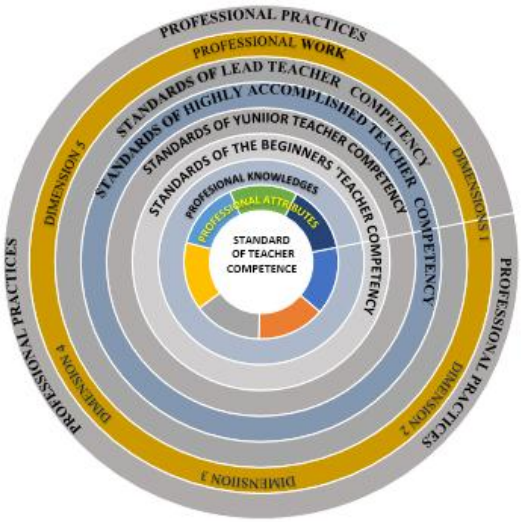

Figure 1. Professional Teacher Work Dimensions

Tiered teacher competence qualification standards equipped with the increase in the level of qualification assessment standards. Standard assessment of competence qualification level rise composed consists of 5 elements of evaluation are: (1) teaching teachers; (2) student learning; (3) professional development; (4) professional support; and (5) administrative requirements. Teaching is based on the thoroughness of the work of teachers teaching teachers of preparation, implementation, learning facilities, assessment instruments, analysis of student achievement of learning and reflection improvement forthcoming.

Assess student learning elements teacher's ability to explain how students learn concepts, analyzing the students' ability to build competencies, explains how teachers help students learn different abilities. Professional development of teachers in the test assesses the ability of the implementation of the results of scientific activities into classroom teaching practice, the way teachers interact with colleagues in achieving the goal of collaboration with evidence. Elements of professional support is a testament to the teachers involved in professional activities but can not be implemented in the classroom. Terms administration not rated yet must meet the criteria consist of academic qualifications, work experience and professional attributes assessment by superiors.

Validation of assessment standards of competence qualification level rise using expert judgment, involving 10 experts vocational education, continuing professional development coordinator at the school, chairman deliberation subject teachers, vocational supervisor, resource persons from Institute for Quality Assurance of Education *Lembaga Penjaminan Mutu Pendidikan*/LPMP). The consensus reached at least 80%. Item that does not reach 100% consensus entries were received and repaired in accordance input. Put in general is a refinement of a sentence to clarify the intent statement, and compliance of the terms used in the school.

After Delphi round 2, all the panelists were invited to the discussion, clarification of the answers that have been given and responses possibility of applying the product. FGD give suggestions: (1) continuing professional development of teachers' guide should be practical, easy to understand teacher; (2) assessment must be objective qualification level rise, focus on the duties and functions of teachers in educating students, integrated with assessment of credit rate teachers; (3) growing effects of teacher professional learning, improve critical thinking, creative, expanding horizons, as a vehicle assessor training.

Subject test products are teachers vocational competency skills Techniques Audio Video in Yogyakarta and related parties include lecturers Faculty of Engineering YSU, speakers from institution of quality assurance of education, centers for the development and empowerment of educators and education personnel engineering Malang; head teachers, superintendent SMK Engineering. Instrument for collecting data using structured questionnaire based models Summated Rensis Likert rating scale of 1-4. Test the validity of the questionnaire using factor analysis with the aid of a computer program SPSS version 20, result of validity 77 781% obtained a valid category. Cronbach alpha coefficient of 0.896 realiabilitas, highly reliable instrument category. Data were analyzed using the Rank-Order of Difference Score (Witkin, 1984, p. 213).

RESULT AND DISCUSSION

Assessment of Competence Qualification Standards Tiered Assessment tiered teacher qualification standards of competence consists of 10-point declaration, the minimum

value 10 of the maximum 40. The results of the overall assessment of the respondents obtained in the range of 28 to 40. Further data classified into 4 categories, shown in Table 2.

Tabel 2. Category Assessment Qualification Standards Kompetensi Berjenjang

No	Range scores	Frequensi	Category
1	32,6 - 40	45	strongly agree
2	25,1 - 32,5	78	agree
3	17,6 - 25	0	disagree
4	10,0 - 17,5	0	strongly disagree

The proportion of product assessment results are presented in the form of a pie chart, Figure 2.

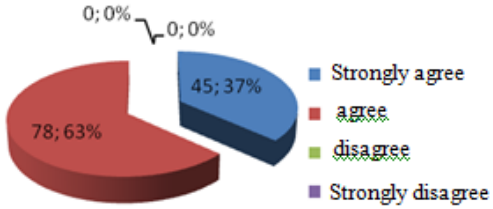

Figure 2. Proportion of Teacher Competency Assessment Qualification Standards

Increase Qualification Qualification Standards Assessment of Competence

Standard assessment of teacher competence qualification level rise consists of 22 items with a value range of values from 22 to 88.The results of the overall assessment of the respondents was obtained in the range of 58 to 88. Data were then classified into four categories shown in Table 3. The proportion of product assessment results are presented in the form of a pie chart Figure 3.

Tabel 3. Category Rate Increase Qualification Qualification Standards Assessment

No	Range scores	Frequensi	Category
1	71,6 - 88	80	strongly agree
2	55,1 - 71,5	43	agree
3	38,6 - 55	0	disagree
4	22,0 - 38,5	0	strongly disagree

Respondents 100% agree and strongly agree on a standard formula competence and qualifications. The effectiveness of the product can be enhanced through the implementation of a grain explanation that met with low scores. Identify weaknesses done by calculating the value of the gap between the ideal situation and assessment of the respondents. Ideal state is the highest score in all assessment point statement. Furthermore, the value of the gap are sorted from high to low values. To be easily understood weakness displayed in the form of a Pareto chart 4, the effective repair is done from the smallest to the largest gap. Effectiveness enhanced by understanding the importance of teacher qualification standards tiered, professional attributes indicator, periodic re-testing competence, more are presented in Figure 4.

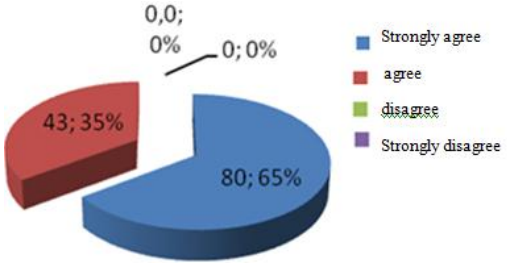

Figure 3. Proportion of Assessment Standards The Increase Qualification

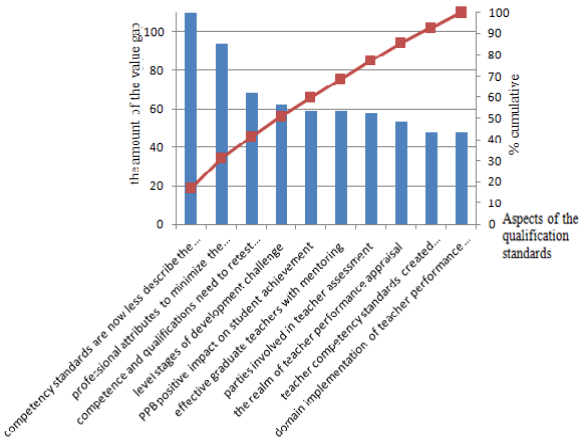

Figure 4. Diagram Pareto Teacher Competency Qualification Standards

Respondents argue 100% agree and strongly agree to the formulation of the increase in the level of qualification assessment standards. The effectiveness of the product can be enhanced through the implementation of a grain explanation that met with low scores. Standard assessment of teacher com-

petence qualification level rise is basically an evidence-based assessment of teacher performance. Ratings are based on real actions of teachers in carrying out their duties and functions of teaching. Large gap between the ideal and the assessment survey, placing priority repair. Based on the five largest gap sequence created Pareto diagram is shown in Figure 5.

Problems in the constrained Pareto diagram 6 in the world for easy reading. Based on Figure 5, the weakness of the implementation of assessment standards 42% increase in the level of qualification could be solved through the completion of the six biggest problems row from left to right.

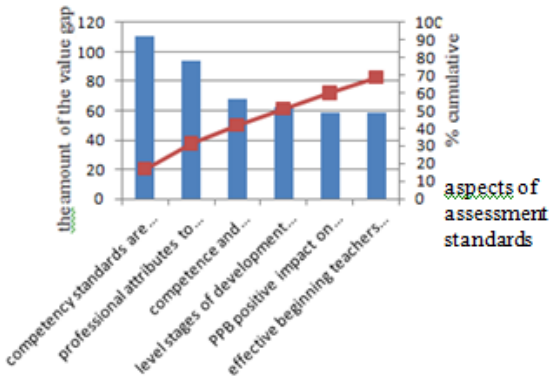

Figure 5. Pareto Diagram Increase Qualification Qualification Standards Assessment

This study developed a 2 standard as well as a single entity, namely the development of competence and qualifications standards tiered and the increase in the level of qualification assessment standards. Standard qualification level rise is a measure of the success of teachers in applying the five dimensions of professional work. Professional teacher competency standards that now apply the formula to all levels of teachers, linkages with the daily work of teachers teaching less clear. Tiered teacher qualification standards of competence has several advantages when compared with the current standard of teacher competence applies. The advantages include: (1) differences in depth demands competence and professional work area clear hierarchy between the teacher; (2) dimensions of professional work is closely related to the daily work of teachers teaching in the classroom; (3) differences in professional work area teachers assist teachers in setting the initial growth of professional development; (4) increase in the level of qualification assessment standards help teachers reflect on learning in the classroom.

The test result shows that the products in the field of teacher understanding of teacher competency standards have been patterned with existing competency standards. Based on figure 4 if the qualifying standard is applied in the field of competence tiered, effectiveness can be enhanced through the explanation of the teacher: (1) the need for a dynamic competency standards; (2) Indicator assessment professional attributes inherent in real life teacher; (3) the need for periodic re-testing competence and so on.

Increased depth of competence and professional teacher work area can be seen in the example of the dimensions of professional work 1 Table 1. Demands related to understanding the characteristics of teacher competence of students, teachers beginners quite understand the wide differences of students, in setting learning approach used must be consulted on the mentor. Proficient teacher is able to provide the services required according to the characteristics of students learning. Highly accomplished teachers demanded to be able to analyze differences in the needs of student learning services based on different characteristics of students at the school, the results for the enrichment of learning. Lead teachers supposedly able to evaluate the effectiveness difference learning approaches used by teachers at the school level in serving the diverse needs of student learning.

Standard assessment of competence qualification level rise is a measure of the success of teachers in implementing tiered standard of competence and qualifications. There are five elements that assessment is closely related to five dimensions of professional work of teachers. These linkages are elements of assessment A teacher teaching a one-dimensional assessment of implementation of professional work is to facilitate student learning. Elements of B are students learning assessment is an assessment of the ability of teachers to implement the dimensions 2, 3 and 4 of the standard tiered teacher competence and qualifications. Elements of C and D is a 5-dimensional implementation of professional work is a reflection of continuing professional development and partnerships.

Moderate elements E administrative requirements except professional attribute ratings by superiors, not rated yet to be fulfilled. Professional assessment by the superior attributes must meet the minimum requirements.

Assessment elements of a teacher teaching a teacher mastery teaching job, including planning, execution, facilitate student learning, preparation of evaluation instruments, analysis of student achievement and reflection for the improvement of teaching planning to come. No matter how good planning will not guarantee a good student achievement for different classes. Because students are learning the subject, no attitude planned to be appropriate for all circumstances (Liakopoulou, 2011, p. 70), differences in experience and atmosphere interactions in the classroom can affect the consistency of the quality of service (Salis, 2010, p. 128). Throughness of the work of teachers teaching is experiential learning that teachers can do as an independent professional development. According to Opfer (2010), Professional development in the workplace can be developed through 4 cyclical steps including: (1) understanding knowledge and skills needs; (2) improving learning services; (3) renewing learning practices and (4) sharing innovative learning.

Assessment of student learning element B, is an assessment of the ability of the teacher to explain the various ways that students learn concepts or skills, student competency development, how to help the students learn different abilities. The teacher can explain how students learn the material master of glasses of students, understand the sub-competencies which are not controlled or take a long time to learn, which are difficult to follow the instruction of students. Element B assessment helps teachers learn about learning from their daily work together to teach students. Assessment element B also help teachers to understand how to help students learn to master certain skills, or even possible to develop skills up outside the instruction given. The way this assessment puts students as subjects of study are greatly appreciated.

Assessment elements C professional development, assessment is based on the ability and efforts of teachers to apply their professional activity into student learning in the classroom. Assessment standards are developed, certified evidence of activity in scientific forums are recognized as an element of D, supporting the profession. Assessment elements C of testing and learning changes based on the implementation of the results of activities of teachers in scientific forums. If the form of collaborative activity, the teacher should be able to explain how to interact with others in achieving collaboration with evidence. Assessment elements C and D is a 5-dimensional implementation of professional work of teachers.

Based on the test results of products in the field, the effectiveness of the implementation of the increase in the level of teacher assessment standards can be enhanced through improvements in aspects that assessed the teachers less. Based on Figure 5 standard implementation effectiveness assessment qualification level rise can be enhanced through: (1) increase teachers' understanding of the complexity of the problem of teaching; (2) awareness of teachers without the implementation of the results of professional activity in the classroom, the number of their certificates will have no effect on student learning outcomes; (3) the teacher's role as a keynote address in the scientific meeting more effective in improving the competence of the participant; (4) increase academic qualifications such as diplomas will not affect the performance of teachers without renewal as increase his knowledge; (5) the preparation of lesson plans and open, core activities and close the lesson is teaching the normative acts; (6) ability to analyze student achievement is an important element in the assessment of teacher performance.

CONCLUSION

Based on preliminary studies obtained a reality: (1) most of the teachers (70.59%) agreed competence and qualifications of teachers made a tiered appropriate functional hierarchy of teachers; (2) most of the teachers (80.88%) recognizes the competence of the current valuation has not reflect the complexity of effective teaching; (3) most of the teachers (85.29%) admit performance is not permanent need periodic re-testing competence; and (4) teacher takes ra average 9.1 hours/month to carry out continuous professional development independently and collaboratively.

Tiered teacher qualification standards of competence can be used as a guide teachers in professional development stages. The effectiveness of the qualification standards of competence can be improved mainly through the explanation of the need for a dynamic competence qualification standards, assessment of real professional attributes inherent in the everyday lives of teachers, the need to periodically test the performance of teachers.

Standard assessment of teacher competence qualification level rise of evidence-based portfolio, attached to the daily work of teachers teaching. Effectiveness assessment standards can be improved through teacher explanation, among others: (1) the importance of the implementation of the results of scientific activities, (2) role keynote address more effectively to improve performance, (3) diploma S1 / DIV can improve performance if the teacher brought a change in teaching, (4) 3-step lesson plans and teaching is a follow nomatif teachers in teaching.

Stakeholders assess differences demands depth and breadth of competencies between the professional work of teachers clear functional hierarchy.

Recommendation

For education and cultural services, qualifications and assessment standards can be used as an alternative training and continuous professional development teacher assessment in schools.

For LPMP (Institute for Quality Assurance of Education), qualification and assessment standards can be used as a guide in the service of consultation, guidance, teacher training programs related to the ongoing professional development of teachers.

For LPTK (Institute of Education and Education Personnel), two standards can be used as a reference in preparing teacher candidates who are ready to develop its capacity on an ongoing basis since the students.

For SMK (Vocational High School), two standards can be a sustainable alternative (an alternative to the professional development of teacher training and as a basis for teacher empowerment in schools.

For the teacher of this standard can be used as guidelines and challenges in developing professionalism throughout his profession as a teacher.

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