Improvement of Student Learning Outcomes through the Implementation of Collaborative-Think Pair Share Project Based Learning Model on Vocational High School

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Abstract. This paper explain about the effects of the collaborative-think pair share project based learning model on learning outcomes of student on the subjects of the auxiliary machine. In this study the twelve grade students of the Commerce Ship Engineering department, SMKN 10 Padang has been considered as research population. The research method is a quasi-experimental. The sample consist of two classes: the first one is an experimental group (EG, n = 21) with collaborative-think pair share group project based learning model. The other one is the control group (CG, n = 20) with conventional learning model. The results of the study show that the use of collaborative-think pair share project-based learning models can improve student's learning outcomes significantly compared to the conventional one. The collaborative-think pair share project-based learning model is more effective than conventional one in improving students' learning outcomes, especially on the vocational high school in Padang.

Keywords: Student Learning Outcomes, Collaborative-Think Pair Share Project-Based Learning Model, Conventional Learning Model, Auxiliary Machine Subjects

1. Introduction

The Industrial Revolution 4.0 demands the consequences of changes in all sectors of life. In this era, artificial intelligence will be formed in the form of digital economy, artificial intelligence, big data, robotic, and others. This is known as the phenomenon of disruptive innovation. In this era, a lot of work is lost and replaced by artificial intelligence. This change will create opportunities and challenges for the world of education [1]

The challenge in education in this era is how to prepare human resources that will not be replaced by machines. Today, many routine and daily jobs have been taken over by the machine. In the future, work that still cannot be taken over by machines and robots is work that requires the ability to analyze, make decisions, collaborate and communicate.

Educational institutions as architects of printing labor, should also have to change. Graduates of educational institutions must be able to adapt to the world of industry or the world of work that is also constantly changing, must be able to lifelong learning characterized by having 4C competencies: 1) critical thinking, 2) creativity, 3) communication, 4) collaboration, including vocational technical education [2]
Vocational technical education is one of the most powerful instruments for enabling all members of the community to face new challenges and to find their roles as productive members of society. Vocational technical education refers to the educational processes that involve the study of technologies and related sciences and the acquisition of practical skills and knowledge aimed at discovering and developing the individual for employment in various sectors of economic and social life [3]. Vocational technical is one of the most powerful instruments for the productive members of society. It is an effective tool for achieving social cohesion, integration and self-esteem [4]. Vocational education covers all types and forms of learning experiences that help students pursue the developmental stages of their problems, from identification, exploration, orientation, preparation, selection and strengthening of careers in the workforce [5]. According to Law No. 20 of 2003 year about the National Education System, vocational technical education is a level of tertiary and secondary education that prepares graduates or students to enter the workforce in certain fields.

In accordance its functions and challenges in the Industrial Revolution 4.0, vocational technical education is required to change as soon as possible. Teachers as the spearhead of learning innovation must be keen to see this change, in order to be able to give birth to graduates who are able to face various challenges of change due to the industrial revolution 4.0. The teacher's job is no longer limited to making students smart but also giving motivation, building character so that they become human beings or individuals with integrity.

Basically, the quality of vocational education is largely determined by the quality of the education process itself. The education process in vocational education is called quality, if the learning process takes place effectively and innovatively. The selection of the learning model is adjusted to the characteristics: the material to be delivered, the condition of the students and available infrastructure and the purpose of the learning itself. One method that can be used is to apply the Think Pair Share Project-Based Learning Collaborative learning model at the auxiliary machine in the Commerce Ship Engineering Department, SMKN 10 Padang.

1.1. Collaborative Learning

Collaborative learning that researchers think is appropriate in conducting this study is think-pair-share collaborative learning model. Think Pair Share teaches students to think with their partner, and then share the results of these thoughts to another couple. Think Pair Share gives students the opportunity to cooperate with other students. There are three main characteristics step in the process of collaborative learning Think Pair share. The first stage is think, the second stage is a pair, and the third is the share[7].

Think Pair Share learning provides an opportunity for students to work independently and together with others. The procedure used in think-pair-share give students time to think, to respond and to help each other, the teacher function is simply to complete the presentation[8]. On this learning technique, the student is given the opportunity to find answers on their own, then students are asked to pair up with a friend next to him and expressed the results of his thinking. After that, the student shares his thought with his partner. By this type of learning, student can build lesson concepts by his own gradually and make students more active and play an important role in the lesson.

There are many techniques available for collaboration that are: Fishbowl, Jigsaw, Paired Annotations, Think-Pair-Share, Teaching Game Tournamen (TGT), Student Teams Achievement Division (STAD), Group Investigation (GI), and Team Accelerated Instruction (TAI), etc.

1.2. Think Pair Share Technique
Think Pair Share is a collaborative learning that has 3 parts to the process: 1) student think about a question or project task, 2) they talk with a partner about their thoughts, then 3) some student’s share their discussion and thinking with the class [7]. Think pair share technique is a low-risk strategy to get many students actively involved in classes of any size. It’s procedure is simple: after asking question, the teacher tells students to think silently about their answer. As a variation, you might have them write their individual answer. Then the teacher asks them to work in pair to compare or discuss their responses. Finally, the teacher call randomly on a few students to summarize their discussion or give their answer [9].

1.3. Project-Based Learning Model

Project-Based Learning Model (PjBL) as a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks[10].

[11] State that the PjBL model is a student-centered learning model to conduct an in-depth investigation of a topic. A well-designed PjBL will encourage a high-level analysis and thinking process. From this activity will provide new understanding to students through activities that will raise questions why, when, and how the facts that arise and relevant skills [12].

1.4. Collaborative Think Pair Share Project-Based for Learning Model

This learning model is a combination of two learning models namely collaborative think pair share with a project-based learning model. This model consists of six steps: giving project tasks, thinking individually (think), collaborating learning by pairing (pair), making project tasks, reporting project tasks, and sharing with all (share).

Table 1. Summary of the Collaborative Think Pair Share Project-Based Learning

| Description |
|----------------|
| **What?** | Collaborative Think Pair Share Project-Based Learning is a combination collaborative learning and project-based learning |
| **Why?** | To increase participation by allowing a group of students to interact and share ideas, which can lead to the knowledge building among them. This learning model can to improve of the student competencies about is collaboration, creativity, critical thinking, and communication. They will face challenges globalization. |
| **How?** | There is six stages: 1) Teacher giving project task to students, 2) Think-each participant thinks about the project tasks, 3) Pair-collaboration with partner to solve a problem given teacher (project task). The learners need to form pairs. The teacher need to cue students to share their response with their partner. Each pair of students will then discuss their ideas about the project task, and their previous ideas. 4) Making project tasks – each pair will conclude and produce the final answer about the project tasks. Then they need to move to the next stages. 5) Reporting project tasks – all pairs make a report on the project task, to be presented in front of the class. 6) Share the large discussion will happen, where each pair will facilitate class discussion in order to find similarities or differences towards the response or opinions from various pairs. |

2. Methods

This research doing at the twelve grade students of the auxiliary machine Commerce Ship Engineering Department, SMKN 10 Padang. The research method is a quasi-experimental. The sample consist of two classes: the first one is an experimental group (EG, n = 21) with collaborative
think pair share group project-based learning model. The other one is the control group (CG, n = 20) with conventional learning model.

Design learning is as shown in the following table 2, like this:

Table 2. Design learning

| Class     | Pre Test | Treatment | Post Test |
|-----------|----------|-----------|-----------|
| XII TKN   | O1       | X1        | O2        |
| XII TKN   | O1       | X2        | O2        |

Where, X1 is the class be treatment with collaborative -think pair share project based (C-TPSPjBL) learning model; X2, the class is be treatment with conventional learning model; O1: pre test and O2 post test to experimental and conventional class. This study design was conducted with the following steps: 1) providing pre-test to the same group of students who have not received treatment, 2) providing treatment with collaborative-think pair share project based learning model to the experimental class; 3) providing treatment of conventional learning to the control class; 4) providing post test to both class group after being given different learning models applications.

3. Data Analysis

Research data analyzed was using parametric statistics. Analysis of research data was conducted to see whether there were significant differences to the student learning outcomes using collaborative-think pairs share project-based learning models with conventional learning models. The statistical analysis that doing is:

3.1. Validity Test

Validity basically aims to show the levels of validity or validity of an instrument [17]. If an instrument can measure what it intends to measure the instrument is said to be valid. Test questions are organized according to the curriculum and Auxiliary Machinery subject. Calculation of the validity on test items is using the coefficient correlation formula variables x and y [18]:

\[
\rho_{xy} = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{(N\Sigma x^2 - (\Sigma x)^2)(N\Sigma y^2 - (\Sigma y)^2)}}
\]

(1)

Where, \( \rho_{xy} \) is coefficient of correlation variables x and y; N is number of respondents; x is a score for each item; and y is score for all items.

3.2. t-Test

The t-test was conducted on the results of the students' pretest at the beginning before learning and the t-test for the final test results (posttest) after the learning was done using either collaborative learning models think pair share based on projects and learning using conventional models. Because the sample is treated differently, the equation used for the t-test is:

\[
t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}
\]

(2)
Where, $X_1$ is average value of sample 1; $X_2$ is average value of sample 2 is standard deviation; $n_1$ is students number of experimental class; $n_2$ is students number of control class.

4. Results

The research was conducted at Vocational Hight School of the Commerce Ship Engineering Department, SMKN 10 Padang began on October 25th until November 22nd, 2018 with result are:

4.1. Gain Score Students Learning Outcomes

At the beginning of the study all students were given a pre test and the average score of 54.33 and at the end of the study was given a post test, so for the class using the collaborative think pair share project-based learning learning model, 78.33, the gain score was 24. the end of the study the average value of the pre test and post test for the class using conventional learning models was 46.66 and 65.33, with a gain score of 18.67.

4.2. Improve Activity, Creativity, Motivation and Collaboration Student’s Competencies

The observations during the study using rubric assessment were derived from 4 aspects, namely increased activity, creativity, motivators and collaborative students during the thermodynamic learning process in the experimental class using the collaborative learning model, think pair share project based learning, there was a significant increase. At the beginning of the study the average of the four aspects in the category was moderate to moderate, while after using the collaborative learning model think pair shared project based learning, then the four aspects in the research rubric were in the good category. This means that collaborative learning models think pair share project based learning can improve Activity, Creativity, Motivation and Collaboration Student's Competencies

5. Discussion and Conclusion
The research data were analyzed using parametric statistics including the instrument validity test, and the t-test to determine differences in the results of the two treatments for the two samples. The test results showed that there was a significant increase in student learning outcomes using collaboration-think pair share compared to conventional learning models in the auxiliary machine Commerce Ship Engineering Department, SMKN 10 Padang.

The t-test was conducted to determine the difference in the results of the two treatments for the two samples. The test results show that there is a significant increase in student learning outcomes using collaborative-think pairs to share project-based learning models with a 24-point gain score compared to using conventional models with a gain score of only 18 points. The same thing as stated in the research [12], [13]. In addition to student learning outcomes in terms of mastery of teaching material increases, other aspects of learning outcomes using collaborative learning models think pair project based learning share is learning motivation, creativity, ability to think, collaboration, and communication of students also increases [14].

The test results showed that there was a significant increase in student learning outcomes using collaboration-think pair share compared to conventional learning models in subject auxiliary machine Commerce Ship Engineering Department, SMKN 10 Padang. The student gain score average for learning outcomes is 24 points for the Collaborative learning model -think pair share, while the conventional model is only 18 points. The same condition was also stated in the study [12], [13].

Therefore, from the results of this study, it can be concluded that the collaborative learning model think pair share project based learning more effectively used in subject auxiliary machine Commerce Ship Engineering Department, SMKN 10 Padang compared to conventional models. In addition, this model can enhance creativity, collaboration, critical thinking and student communication. So it is hoped that this model can make students have competencies that can face the ever-changing Industrial Revolution 4.0. Only 4C competencies (Creativity, Collaboration, Critical Thinking and Communication) are able to face a situation like this.

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