

Influence of Learning Model through Problem-Based Learning Method to Improve Student Learning Outcomes

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Abstract—This research is about the influence of the use of learning model through Problem-Based Learning (PBL) method to improve student learning outcomes. Problem in this study is the low learning outcomes of students on correspondence lesson's material and information class eleven Office Management programs in one of Vocational High Schools (SMK) in Sumedang City. The research method used is quasi experiment with research design The Non-Equivalent Pre-test - Post-Test Control Group Design. Based on the normality test, homogenies, and t-test from the pretest posttest data understanding of the learners' concept of the experimental class and the control class. The use of Problem-Based Learning method on vocational students is expected to improve student learning outcomes on the subject's Correspondence and information.

Keywords—*learning model; problem-based learning; learning outcome*

I. INTRODUCTION

The core problem this study is the low learning outcomes of correspondent and information subjects in Vocational High Schools. Learning outcomes are interpreted as a measurement of what has actually been learned during Learn at school and as a report of what students except during their study period to be the same as what they obtained. Learning outcomes is the result from an interaction between learning and teaching. In this case, the teacher does not teach by ending with the evaluation process. However, students, learning outcomes is the end of teaching from the top of the learning process. Student learning outcomes represent student achievement in various assessment components [1] and giving students a quality change as a result of the learning experience [2].

Learning outcomes continue to be highlighted in the education world due to the benefits of learning outcomes themselves, namely for the accreditation of students in learning outside the classroom and in real life [3], reveal whether people with certain qualifications are able to know, understand and act according to their qualifications. The qualification here is the relationship between knowledge developed during the education and the demands from the world.

Related parties to this case the government and educators continue to seek ideas, creative and innovative ideas to improve the quality of student learning outcomes in order to be able to compete in society. However, there are still many students who are unable to achieve the criteria that have been set as the standard of learning outcomes that must be achieved by students. This phenomenon certainly leads to disparities in the achievement of learning outcomes and shows that there are obstacles and problems through the student learning process, both in the process at school and at home. Therefore, educators are expected to always be able to provide encouragement / motivation to their students who are less enthusiastic in learning and provide solutions to learning problems faced by their students [4].

This condition is certainly not allowed to go unpunished, because if left unchecked continuously, it is feared that it will cause adverse effects on vocational high school graduates which in turn will continue their education within higher education or enter the workforce. These graduates will be considered not to have the expected qualifications or competencies. As learning outcomes is useful for students and teachers to achieve educational goals, national development goals reduce unemployment and also reduce poverty [5].

Learning outcomes are influenced by two factors: inside and external factors of students. Internal factors that influence student learning outcomes are student learning styles, self-efficacy, student learning motivation [6], students' cognitive abilities and student skills [7]. External factors that influence student learning outcomes are learning systems, teaching strategies, curriculum, learning models [8], teacher teaching experience, curriculum, teacher and material, teacher motivation in educating and the use of learning models [9], interaction during the learning process, teaching technology and teaching methods [10], curriculum development and pedagogic abilities of teachers [3], teaching and gender approaches [1].

Lots of research related to learning outcomes. Such studies of learning outcomes are caused by low motivation and learning style in students who results in despicable quality of learning [11,12]. These studies do contribute to the importance

of internal factors that must be improved in students in the form of student motivation, but these studies are only limited to providing information that the motivation of students themselves must be increased through the learning process. The teacher competency and teacher quality are part of external factors that influence learning outcomes. These studies have clearly only focused on one of the factors that influenced learning outcomes, and no one has collaborated with these two factors as a cause of low learning outcomes.

This research focuses on external factors presented by experts suspected of using learning models [13–15] is a factor influenced learning outcomes, and researchers believe that the role the teacher that will strengthen or weaken the relationship between independent variables and the dependent variable [16–20].

In this study, the use of learning model is an external factor that influences learning outcomes. The learning model used is Problem-Based Learning. So many learning models in the academic world, there are many theories, techniques, approaches created by scholars of learning models to improve the efficiency and effectiveness of teaching and learning activities. However, not all are suitable for educators and students. For that, given the opportunity for educators to explore, try and then choose each method of learning that fits the philosophy and style of teaching educators.

There are four learning models suggested in the 2013 curriculum to use correspondent subjects and information, including Inquiry-Based Learning, Discovery Based Learning, Project-Based Learning, Problem-Based Learning [21].

Of the four suggested models, the problem-based learning model is considered the most suitable for most correspondent and information subjects, because correspondent subject matter and more information are faced with various problems that must be solved. Initially, Problem-Based Learning was widely used in learning models in the medical world. Then it develops to be used in Natural Sciences such as Physics, Mathematics, Physics and Biology. However Problem-Based Learning can also be used as a learning model at the Vocational High School level such as correspondent and information subjects. More value this learning model compared the others. This learning model trains students' abilities, knowledge and skills in solving problems, and strengthens students' memory of the problem solving they do because the problems taken for students to solve are frequent correspondence problems and experienced by students.

Problem-Based Learning (PBL) is a constructivism learning theory introduced by John Dewey. According to him, the school must be a place to solve real-life problems by providing a philosophical support for PBL [22]. Problem-Based Learning helps students develop their thoughts and problem-solving skills, and make independent students so that they have a positive effect on student learning outcomes [23]. This view is also supported by previous research conducted by Bilgin, Erdal and Mustafa where Problem Based-Learning significantly affects student learning outcomes [24].

II. METHOD

Research methods can be interpreted as ways that can be used by researchers in conducting research so that research objectives can be achieved. This study uses descriptive and verification research types. The method in research is basically a scientific way to get data with goals and uses to solve a problem. Based on the variables studied, this type of research is derivative research. The verification method is testing the truth of something / knowledge in an existing field and to a tester the hypothesis using statistical calculations." Verification research basically tests the truth of a hypothesis that is done through data collection in the field.

Based on the objectives to be achieved, namely seeing the effect of Problem-Based Learning model on student learning outcomes, then this study uses experience design. This research activity is aimed at students who are divided into two classes, divided into two classes: empirical learning class using PBL Model and learning control classes using a conventional learning model.

This learning model can be applied to correspondent subjects and information in the following ways:

A. Defining the Problem

In this step, the facilitator conveys scenarios or problems, and learners perform different brainstorming activities and all group member's express opinions, ideas, and responses to the scenario freely, so that various alternative opinions may emerge.

B. Self Learning

Students look for various sources that can clarify the issues under investigation. The source in question can be in the form of written articles stored in libraries, web pages, or even experts in relevant fields.

C. Investigation

The investigation phase has two main objectives, namely: (1) so that students seek information and develop understanding is pertinent to the problems that have been discussed in class, and (2) information is collected with one goal that is presented in class, and the information must be relevant and can be understood.

D. Exchange Knowledge

After obtaining resources the purpose of deepening the material in the step of independent learning, then at the next meeting students discuss in their groups to clarify their achievements and formulate solutions to team problems. This exchange of knowledge can be carried out by students' learning to gather according to their groups and facilitators.

E. Assessment

Assessment is done by combining three aspects of knowledge, skills, and attitude. Assessment of mastery of knowledge that covers all learning activities carried out with the final semester exams, midterm exams, quizzes, homework, documents, and reports. Assessment of skills can be measured

from the mastery of learning aids, both software, hardware, and design and testing capabilities.

III. RESULT AND DISCUSSION

The data obtained through this study the form of learning outcome's data consisting of pretest data, posttest data and learning achievement. Pretest data is data obtained before the class is given treatment, while the posttest is data obtained after the class is given treatment. Learning outcome data will be used to process data quantitatively in testing hypotheses. To simplify the analysis of research results, a statistical analysis tool is used the form of SPSS version 23 application program, which can provide information automatically after going through several operations.

After the experimental class and the control class are determined, the two classes are given the same pretest problem with the Multiple-Choice Problem. For the 1st pretest, there were 15 questions, the 2nd pretest was 20 questions, and the third pretest was 25 questions.

In the first pretest of the experimental class with a total of 31 students, the smallest value was 30, and the largest value was 80. The average score was 58.28 with a standard deviation of 14.1. In the first pretest of the control class with a total of 30 students, the smallest value was 20. The largest value of 75 was 50.36 with a standard deviation of 15.5. The highest value of Learning Outcomes for Class Experiments on this 1st test is 80 or around 80% of the ideal value while the control class is 75, or 75% of the perfect value.

In the second pretest of the experimental class with a total of 31 students, the smallest value was 22, and the largest value was 78. The average score was 50.21 with a standard deviation of 10.8. In the second pretest of the control class with a total of 30 students, the smallest value was 27. The largest value was 76. The average was 52.14 with a standard deviation of 11.4. The highest value of Learning Outcomes for Class Experiments on this 2nd test is 78 or around 78% of the perfect value while the control class is 76, or 76% of the ideal value.

In the third pretest of the experimental class by the number of students as many as 31 people, the smallest value was 31, and the largest value was 79. The average score was 54.44 with a standard deviation of 12.3. In the third pretest of the control class with a total of 30 students, the smallest value was 25. The biggest value was 74, an average of 45.67 with a standard deviation of 10.4. The highest value of Learning Outcomes for Classes Experiments on this 3rd test is 79 or about 79% of the perfect value while the control class is 74, or 74% of the ideal value.

To test the differences of the two averages between the experimental class and the control class by looking after the distribution of learning outcomes by the normality test and the homogeneity test needed to meet the two average test requirements using parametric statistical tests. If the test results are abnormal and not homogeneous, non-parametric tests are carried out.

To test the normality of the posttest data, the one-sample statistical test of Kolmogorov-Smirnov test was used on SSS

version 23.00. The result by comparing the probability of Assymp sig. (2-tailed) An alpha (α) value. The test criteria are if the probability of Assymp. Sig (sig. 2-tailed) > alpha (α), then the test is said to be normally distributed. The hypothesis of normality testing is:

- Ho: the significance number (Sig) < 0.05, the data is not normally distributed
- H1: the number of significance (Sig) > 0.05 then the data is normally distributed.

From the results than the study, it can be seen and concluded that in the experimental class, using cooperative learning models with PBL method shows the number of sig. Kollmorgen-Sinovan for the 1st posttest both in the experimental class and in the control class, the sample from the population is not normally distributed because of sig. < 0.05. For the second posttest sig experimental class: 0.042 which are < 0.05 and sig. control class. = 0.04 which are < 0.05. The third posttest is both the experimental class and the control class. The sample comes from the population with abnormal distribution because of sig. For the experimental class is 0.01, which are < 0.05 and the control class is 0.00 < 0.05.

After the normality test, the next step is a homogeneity test. The homogeneity test criterion is done by comparing the significant numbers. From the results the homogeneity test, the significance is obtained. 2-tailed, at the 1st, 2nd and 3rd posttest of 0,000. Therefore, the significance is less than 0.05 so it can be concluded that the experimental class posttest, and the control class are not homogeneous or have unequal variances.

After testing the normality and homogeneity of the experimental class and control class posttest data, it turns out that the data of both classes is normal but not homogeneous in learning outcomes, so testing the average difference in posttest data using non-parametric statistics is t-test using Mann-Whitney test at the significance level? = 0.05 (two-party test) is accepted, and H1 is rejected.

For the second posttest, the little Z test statistic value is 3.675 and the sig.2-tailed value for the alternate posttest is 0.000 < 0.05, thus Ho can be concluded and H1 is accepted because there are significant differences and posttest 3 the small Z test statistic value is 4,498 and the sig.2-tailed value for the 3rd posttest is 0,000 < 0,05, accordingly it can be concluded that Ho is rejected and H1 is accepted because there is a significant difference.

IV. CONCLUSION

Based on the results the research that has been done, it can be concluded that there is a positive influence the application of the Problem-Based Learning model on learning outcomes in the eyes of correspondence and information at the vocational high school education level. The effect can be seen from the increase in learning outcomes between the experimental class and the control class. The results of the mean increase in the pretest in the experimental class, the results of the average value of N-Gain of experimental class and control class students. The difference in average shows that the increase in

learning outcome of the experimental class is higher than the control class. The results the hypothesis test analysis using SPSS Version 23 can be concluded that H₀ is rejected and H₁ is accepted.

For more distant researchers, the results this study cannot be generalized to all levels of education and all subjects. However, this provides an opportunity for further research carried out in the field of elementary school education, junior high school, as well as senior high school and even in tertiary education using additional variables, both moderator and intervening variables.

ACKNOWLEDGMENT

In this paper I would like to say thank you to Ari Riswanto, who helped and became a team in preparing this paper so that it can be published to the fullest. I do not forget to say thank you to all lecturers of the Graduate School of Education in Indonesia, the Department of Economic Education who have provided their input and direction.

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