

The Effect of Problem Based Learning Model in Information Technology Intervention on Critical Thinking of Students in Class XI of SMAN 7 Padang

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Abstract - Critical thinking needs to be developed in the learning process. However, the learning process in schools has not fully implemented a learning model that develops students' critical thinking competencies. From observations at SMAN 7 Padang conducted in the January-June 2019 semester, learning in schools is still predominantly centered on teachers, there is still a lack of use of Information Technology (IT), inactivity, and lack of interest in learning in class. To overcome the problems raised are applying the Problem Based Learning (PBL) learning model that is intervened by IT. This study aims to improve students' critical thinking competencies. This type of research is quasi-experimental research with a 2x4 factorial design research design. The population in this study were all students of class XI MIPA SMAN 7 Padang registered in 2019/2020 Academic Year divided into 6 classes. Determination of the sample is determined by cluster random sampling. The instruments used were essay questions to assess critical thinking, and rubrics to assess creativity, communication, and collaboration. Analysis of the data used is the two-way Anova test. The results of this study indicate that there are significant differences between PBL learning models that are intervened in information technology to students' critical thinking competencies.

Keywords - Problem Based Learning, Information Technology, Critical thinking.

I. INTRODUCTION

The world of education has been in the era of the 21st century. Therefore, learning also follows the demands of 21st century student competencies. According to the Kemendikbud (2016), in the 21st century, the ability of students is closely related to the use of Information Technology (IT) as a supporter in the learning process that results in the ability to understand, process, identify information analytically, and critically.

Integrating IT in the learning process becomes an important role in developing students' thinking skills (Darimi, 2017). According to the Ministry of Education and Culture (2018), in order to be able to survive in the 21st century, students must master IT and develop Higher Order Thinking Skills (HOTS).

HOTS is a skill that trains students to think at a higher level, one of them is critical thinking which includes thinking analytical, synthesis, evaluating and creating in order to solve

problems that will be faced in the future (Sudiyanto, et al., 2018). According to Heong, et al (2011), if HOTS is an important aspect of teaching and learning activities

Critical thinking needs to be developed in the learning process. However, the learning process in schools has not fully implemented the learning model that develops the competencies of students needed in this 21st century. From the results of interviews with biology teacher class XI MIA SMAN 7 Padang conducted in the semester January-June 2019 on April 9, 2019 it was found that learning is still dominant centered on the teacher (teacher centered). In addition, the lack of variety of learning models applied by teachers, so that make students bored, not active in the learning process, and lack of interest in learning in the classroom so they can not hone and develop critical thinking competencies.

In addition, it is known that the teacher has given UH, UTS or UAS questions from C1-C6 level, but students have not been able to answer the questions correctly, because students are accustomed to memorizing, understanding, summarizing subject matter and presenting to the class so that the ability Critical thinking (analyzing, evaluating, and creating) low learners.

To overcome the problems stated above, the solution that can be done by the teacher is to improve critical thinking competencies through the application of learning models. The learning model that can be applied is an active learning model that can develop students' critical thinking skills. Active learning model that can be used is Problem Based Learning (PBL) which is intervened by the use of IT. tudent activities can encourage learners to participate in participation (Yerimadesi, et al., 2018).

With this PBL model, students are trained with various contextual problems. PBL models can develop students' critical thinking in interactive discussions through groups, and peers (Asyari, et al., 2016).

II. METHODOLOGY

This research is a quasi-experimental research in which the researcher uses a group of research subjects from a population, then grouped randomly into two classes, namely the experimental class and the control class. In the experimental class given treatment by applying the Problem Based Learning (PBL) learning model that was intervened by Information Technology (IT), while the control class applied conventional learning, then given a posttest in the

two sample classes. The research design used in this study is Factorial Design 2x4.

III. RESULTS AND DISCUSSION

1. Results

The results of the analysis of critical thinking data use two-way ANOVA test. Anova test is carried out with the help of SPSS software version 20. The test criteria is if the Sig. > 0.05 then the hypothesis is rejected otherwise if the value of Sig. < 0.05, the hypothesis is accepted.

Table 1. Test Results of Two Way Anova Critical Thinking for Students

Parameter	Mean Square	F	Sig	Keterangan
Perlakuan	6878,65	327,22	0,00	Signifikan

Based on Table 1. note that the data on the treatment parameters (class), namely Sig. 0,00 <0,05 so that it can be concluded that there are significant differences in students' critical thinking between the experimental class and the control class.

2. Discussion

Problem Based Learning (PBL) is a learning model that uses real condition problems as a context for students to learn about critical thinking and problem solving skills, as well as to obtain essential knowledge and concepts from subjects. The teacher participates in building students' understanding. Teacher participation for example stimulates and presents the situation of thinking for students on the authentic problems of a material through the application of concepts and facts. Developing critical thinking skills will be able to direct students into people who are able to make decisions to make decisions and solve problems (Yulianti and Dwijananti, 2010). The ability to think is one of the capital that students must possess as a provision in facing the development of science and technology at the present time.

According to Uno and Muhammad (2012) the PBL model is a learning model that guides students to pursue authentic problems with a view to compiling their own knowledge, developing inquiry and critical thinking skills, developing independence and self-confidence of students. This is in line with Amin's opinion (2017), that the problems given to students in the learning process by using problem-based learning models can trigger students to find solutions to a problem. So the learning outcomes of students who use the problem-based learning model are higher.

The learning process in the experiment class applied PBL learning models that were intervened in information technology assisted by using the Student Worksheet (LKPD) which is one form of group exercise given, which can be used to attract students' attention to better think and understand concepts. LKPD is given to each group, adjusted to the steps of the PBL learning model. Through discussion students can strengthen and expand knowledge (Alberida, et al., 2018).

The first step of PBL learning model is the orientation phase of students towards the problem, the students read and understand the problems that exist in the LKPD. The problem used is contextual problems as a beginning of learning. The problem given to students aims to arouse curiosity by connecting it with daily life. Observations when learning takes place show that students find ideas and ways to overcome the problems that exist in LKPD. Students solve the problem together and successfully express opinions in accordance with their experiences through explanations given by the teacher.

In the second and third stages the teacher organizes students to learn and guide individual and group investigations. The teacher gives time for each group to analyze and evaluate the results of answers to existing questions. If the group does not find the answer, the teacher will direct students in answering questions, while students think in groups to connect the problem with the solution to be solved, so that the problem can be solved optimally.

In the fourth stage, students develop and present their work. At this stage students learn to socialize with group members in finding solutions to the problems raised. This was explained by Apriono (2011) who stated that problem-based learning is a learning model that can encourage students to learn through problem exploration, because in this model students work in small teams to describe, solve, and reflect above research tasks, which based on "real life". Problem solving and independent thinking are invaluable skills for everyday life. In addition students are trained to take responsibility for the opinions expressed during the discussion. The courage that students have to express their opinions requires students to display the results of their discussions in front of the class. The fifth stage is to analyze and evaluate the problem solving process. After the presenter group presents the results of their discussion, then the presenter group requests a response from the other groups. The presenter group seeks answers from the responses given by other groups. Then the teacher evaluates the results of the

discussion, the responses of other groups, and together concludes the learning material that has been learned.

The syntax in the PBL model can train students' thinking skills on each indicator. As explained by Izmaimuza (2010), indicators of analysis can be trained with the activities of students at the stage of identifying existing concepts in the problem and formulating the problem. Evaluation skills can be trained by students' activities in making conclusions. PBL can improve students' understanding of critical thinking skills and learning competencies (Aswan, et al., 2018).

In addition to filling in the questions in LKPD students can use cell phones (internet use) as a source to answer these questions. This can facilitate students in conducting group discussions and cooperation with each group, as well as making them more active, able to link one concept to another that occurs in daily life, formulate problems, analyze and find solutions to the problem. Farisi (2017), also added that PBL learning models that use problems in daily life as an initial concept of learning can facilitate students in applying what has been obtained in class into everyday life and the learning is not abstract. Therefore PBL learning models have the opportunity to improve students' critical thinking skills.

IV. CONCLUSION

Based on the results of data analysis Problem Based Learning learning model which intervened in information technology can significantly improve the critical thinking of class XI students at SMAN 7 Padang significantly.

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