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Effectiveness Of Problem Based Learning (Pbl) Model With Open Ended Approach Using Student Activity Sheet To Improving Creativity Of Student Senior High School

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Abstract: *The purpose of this research is to see the effectiveness of PBL model with open ended approach to improve the crativity of high school students. This research is a development research adopted from development theory according to Dick, Carey and carey which has 10 stages, that is (1). This research sample used 26 students with pre-test and post-test technique. The test instrument used in this study is a description that has been validated by the previous expert team. To see an increase in student creativity using N-gain test results and an assessment of the creativity indicator. The average value of N-gain obtained by 0, 62, this shows that the PBL model is effective in improving the creativity of high school students.*

Keywords: *Problem Based Learning, Open Ended Approach, and Creativity*

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I. Introduction

The development of science and technology today continues to grow rapidly thus demanding the availability of human resources (HR) quality. Various tasks and jobs in the era of globalization requires adequate knowledge and skills. One of the efforts to form a young generation of quality is to improve the quality and quality of education. The creation of good quality education is with the availability of qualified teachers in terms of planning and implementing the learning process and evaluate the learning outcomes[1].

Teachers as the main actors of education who feel directly the various obstacles in the field should get special attention from various parties considering the many problems facing education. Starting from the problems of planning, learning process, and evaluation of learning outcomes of learners. This should be a special concern of the government because it directly affects the quality of education in Indonesia[2].

The success of educational goals is largely determined by the curriculum that is held as a reference in learning activities. In 2013 a new curriculum emerges as the development of the previous curriculum. Guidelines for curriculum development prepared by the National Education Standards Agency (BSNP) have a purpose that one of them is to provide knowledge and skills of learners. The main objective of this curriculum development is to integrate knowledge with the strengthening of attitudes and skills that learners must have in order to become productive, innovative, creative, and affective human beings [3]. One of the lessons that train that attitude is Physics.

Physics lesson is one of the lessons that is able to train learners to become skilled and creative human. This lesson contains many abstract concepts as well as mathematical equations that require learners to have mature skills and mindset to be able to apply the concept of physics to the given problem. To stimulate the mindset and skills of course this lesson should be packaged in an interesting form of learning, encouraging active participation and involving in learning activities. One way to do that is by choosing an interesting learning model and certainly able to provide space to spell ideas and opinions, such as model Problem Based Learning (PBL). The learning process using PBL is characterized by a problem (both from teachers and learners) that students are then asked to explore information related to the problem-solving techniques presented [4]. [5] PBL is a learning model in which learners are faced with a fairly complex problem and find solutions to problems given either individually or in groups. Problems are in the form of open or incomplete issues so that learners can develop their knowledge to find solutions to problems with various settlement techniques [6]. And the solution technique allows more than one correct answer [7]. The open ended approach is based on a constructivism approach that states that learners can acquire knowledge by way of experimentation, learning style by developing existing knowledge [8]. PBL with open ended approach can improve student creativity.

[9] Creativity is an innovation, quality and conformity to something new to get a job. [10] mentions there are 5 steps internal prerequisite creativity, namely; (1) intelligence; (2) ability; (3) interest; (4) education; and

(5) knowledge. Physical learning by most learners is a very difficult lesson to learn so they have less interest in learning this lesson. The same thing was expressed by students in senior high school Islam Terpadu Mataram who stated that the physics lesson is a very difficult lesson to understand so they tend to be lazy and less participate in the learning process. In addition some facts found in the field, namely: 1) the learning process is still centered on the teacher, 2) teaching methods used tend to use the lecture method without any feedback from learners, 3) learners who are less active in completing and doing the questions given.

From this reason the researchers tried to see the effectiveness of the pbl model with an open ended approach to improve student's senior high school creativity.

II. Methods

This research belongs to Research and Development which is adopted development model from Dick's, Carey and Carey (2001)[11]. After going through the process of validation of experts then the student worksheet will be tested at the school selected as the object of research by taking samples of 26 students. Data analysis technique used is simple quantitative data descriptive analysis technique, that is showing result of problem-based student work sheet development in improving students creativity. And to see the effectiveness of the product used in this study is problem-based student work sheet that is by looking at the difference in value of postes and pretes with the N-gain formula used [12]

$$\text{N-gain} = \frac{\text{Spost} - \text{Spre}}{\text{Smax} - \text{Spre}} \text{ X } 100\ \%$$

Table 2.1. Criteria Skor Gain

Klasifikasi skore Gain	Kategori
$0,7 < \boldsymbol{g} \leq 1$	High
$0,3 < \boldsymbol{g} \leq 0,7$	Medium
$\boldsymbol{g} \leq 0,3$	Low

III. Result And Discussion

1.1 Result

The worksheet used in this study is a worksheet that has been developed using Dick, Carey, and Carey development models.The Work sheet is one of the sources of learning of printed materials used in the learning activities that are developed and developed by the teacher in accordance with the condition of the school, the learners as the subject of learning. LKPD can facilitate learners in studying a KD systematically so that learners are able to understand a material well [13].

The purpose of the development of this student worksheet is as a means of teacher to train the creativity of students using four indicators, namely fluency, flexibility, originaly, and elaboration. In the development of LKPD is of course teachers expect an increase in student creativity of each indicator used in the assessment.

The description of the worksheet used can be seen in Figure 3.1 below.

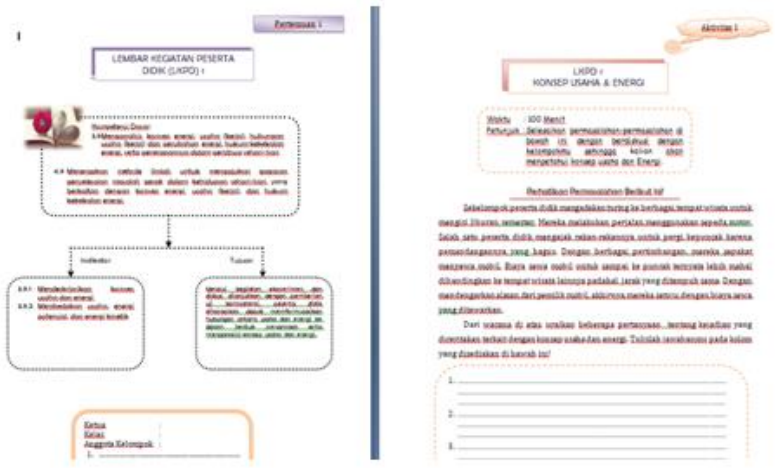

Figure 3.1 Students Worksheet

And the effectiveness test result of PBL model with the open-ended approach of working sheet can be seen in the following Table 3.1

Table 3.1 Results of PBL model effectiveness test with open ended approach

Students	Pre-Test	Post Test	N-Gain	Criteria
26	43.99	78.49	0.62	effectives

The graph of this creativity improvement can be seen in Figure 3.2 below.

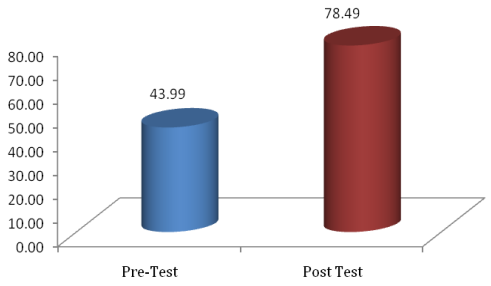

Figure 3.2 Improved pre-test and post test creativity

for improvement of each indicator of creativity can be seen in Table 3.2 below.

Table 3.2 average of N-Gain value for Creativity improvement

students	N-Gain fluency	flexibility	elaboration	originality
26	0.81	0.81	0.32	0.55

Graph of the increase from Table 3.2 can be seen in Figure 3.3 below.

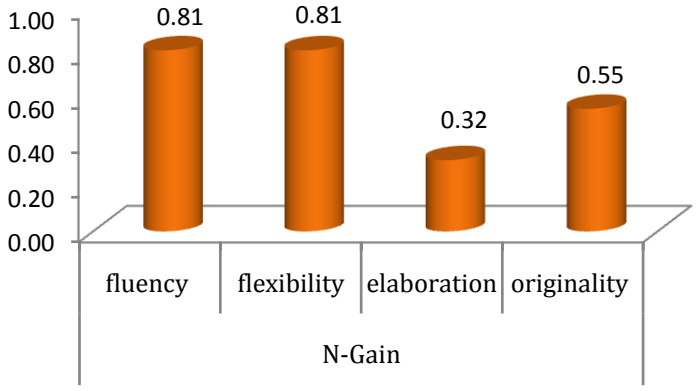

Figure 3.3 Graph of creativity improvement of each indicator

1.2 Discussion

Problem Based Learning (PBL) is a learning model that poses real problems to learners so they feel challenged to solve problems. The learning process using PBL is characterized by a problem (both from teachers and learners) that students are then asked to explore information related to the problem-solving techniques presented [14] And then The open ended approach is a learning approach that is the same principle with problem based learning, that is an approach that begins with giving the problem to the learner which then the problem has correct answer more than one [15].

Based on the results of research effectiveness shown in Table 3.1 shows that physics learning using PBL model with open ended approach and assisted student worksheet can effectively improve the creativity of 26 students on average by obtaining N-gain value 0.6. This figure shows that the PBL model effectively improves the creativity of the students. Table 3.2 shows the improvement of the creativity of each indicator. based on the table students had a very good improvement on the fluency and flexibility indicators. While for the category of originality is in the category of moderate and elaboration indicators are in the low category. This shows that at two very low indicators the student is really able to express the idea and give the reason for the answer with some possibility with the correct answer and according to the accepted concept. As for indicator originality obtained results on the criteria are. This means that most students are able to solve the problems

given numerically. While for the elaboration category is still relatively low. This is because unfamiliar students have revealed the possibility of solving problems that may occur when faced with several options. Overall, however, that the increased creativity of students taught by the PBL model can be effectively improved.

The results of this study are consistent with that done [4] examines the development of open ended problems to measure high schoolers' high thinking skills about the phenomenon of global warming. The results of his research indicate that the product developed is effective enough to improve the thinking ability of high-level learners. [16] examines the use of Open-Ended Question (OEQ) Physical Testing Instruments as a Critical and Creative Thinking Facility for High School Students. The results of his research indicate that OEQ-based instruments are effective for improving critical and creative thinking of high school students.

[17] Stated that PBL is an innovation in learning activities because learners are optimized to explore the ability to think, communicate, through group work. [18] states that the open-ended approach allows learners to gain knowledge by finding, recognizing, and solving problems with several techniques.

IV. Conclusion

Based on the results of research that has been found in the results and discussion then it can be concluded that PBL learning model with open ended approach can effectively improve students' creativity with the average value of N-Gain 0, 62.

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