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PROBLEM BASED LEARNING (PBL) MODEL: ITS EFFECT IN IMPROVING STUDENTS' CRITICAL THINKING SKILL

Dora Aini[1*], Sri Latifah[2], Abdul Hamid[3]
[1]SMKN 1 Gunung Labuhan Way Kanan, Lampung, Indonesia
[2]Department of Physics Education, Universitas Islam Negeri Raden Intan Lampung, Indonesia
[3]Faculty of Education and Teacher Training, Universitas Islam Negeri Raden Intan Lampung, Indonesia

**Corresponding author:* doraaini0396@gmail.com

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ABSTRACT

This study aims to determine the effectiveness of the Problem Based Learning (PBL) model on the critical thinking skills of 7th-grade students of SMP Negeri 34 Bandarlampung (Public Senior High School 34 Bandarlampung). This quasi-experiment involved 2 groups of students, totaling 28 students for the Experimental class and 26 students for the Control class. Data collection was obtained by using an essay test instrument which was presented in the pretest and posttest. Based on the research results, it is known that the posttest results of the experimental class are 78.82, and the results of the control class are 74.07. The data were then analyzed by independent sample t-test and obtained tcount (2.213) greater than ttable (2.007). The effectiveness of the Problem Based Learning (PBL) model was tested with the effect size test, the results showed a number of 0.2 with a low category. So, it can be concluded that the Problem Based Learning (PBL) model has an effect on increasing students' critical thinking skills but with low effectiveness.

MODEL PEMBELAJARAN *PROBLEM BASED LEARNING* (PBL): EFEKNYA DALAM MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS PESERTA DIDIK

Kata Kunci:

Berpikir kritis
Model pembelajaran
Problem based learning

ABSTRAK

Penelitian ini bertujuan untuk mengetahui efektivitas model *Problem Based Learning* (PBL) terhadap kemampuan berpikir kritis peserta didik kelas VII SMP Negeri 34 Bandar Lampung. Jenis penelitian ini adalah *Quasi Eksperimen Design*, penelitian ini melibatkan 2 kelompok belajar peserta didik yang berjumlah 28 peserta didik untuk kelas Eksperimen dan 26 peserta didik untuk kelas Kontrol. Pengumpulan data diperoleh dengan menggunakan instrumen tes berbentuk essay yaitu berupa *pretest* dan *postest*. Berdasarkan hasil penelitian, diketahui bahwa hasil Posttest kelas eksperimen sebesar 78,82, dan hasil kelas kontrol adalah 74,07. Data kemudian dianalisis dengan uji independent sample t-test dan diperoleh t_{hitung} (2,213) lebih besar dari t_{tabel} (2,007). Keefektifan model Problem Based Learning (PBL) diuji dengan uji effect size, hasilnya menunjukkan angka 0,2 denga kategori rendah. Jadi, dapat disimpulkan bahwa model Problem Based Learning (PBL) berpengaruh untuk meningkatkan kemampuan berpikir kritis peserta didik namun dengan efektifitas rendah.

1. INTRODUCTION

Education is a process of changing one's attitudes and behavior in an effort to mature that leads to thinking abilities, such as critical thinking skills. Critical thinking components include logical thinking, reasoning, reflective, and deep thinking [1]. Each individual has different abilities and characteristics. Critical thinking is a cognitive ability in which students process information based on logical reasons and strong empirical evidence. Creative thinking is a thought process associated with behavioral patterns that require active involvement of thought. Complex thinking skills are thinking skills based on basic thinking processes [2-3].

In choosing a learning model, the teacher must pay attention to the learning topic and learning objectives, so that the material can be delivered properly and optimally [4-5]. The learning model has an important role because it can facilitate the learning process, such as creating an interesting learning atmosphere. The Problem-Based Learning model is a model that makes real problems the basis of knowledge. Students are required to identify a problem, both real and through case studies [6-8].

Based on the pre-survey, there were several problems found in the learning process. Such as learning that still uses the Direct Instruction model and lacks enthusiasm during the learning process, so that learning conditions are still dominated by teachers, students only listening and working on problems, not actively participating in the learning process. Factors of facilities and infrastructure in learning also affect learning conditions that are not ideal, so that students tend to be bored and bored. This situation results in the critical thinking skills of students being less trained [9-10]. This can be seen from the results of the mid-semester test, students who scored below the standard (70) amounted to 47 students or about 78.83% of all students, while the total number of students was 54.

A good learning model is a model that can broaden horizons and refers to a student-centered approach in the process. Some of the benefits of using the right learning model include increasing activity, understanding, communication, and involving all students actively in the critical thinking process.

Problem-Based Learning is a learning model that is based on real problems. In PBL, student activity is collaboration to uncover or solve problems in groups. Through problem-based learning, students can evaluate the investigation process from real problems. This model can attract students to be more enthusiastic and active in the learning process and can train students to think critically [11-13].

Isjoni and Howard say that the learning model can be interpreted as a plan or pattern used in preparing the curriculum, to help, reward, and provide knowledge. Teachers must arrange learning topics in class to create interaction, so they can see the difference in students' critical thinking [14-16]. Critical Thinking Ability is a very essential and important ability at work. Critical thinking skills are also effective in all other aspects of life. Critical thinking is the ability to think accurately, logically, relevantly, and logically that focuses on the right argument. The critical thinking process is a cognitive process in learning starting with identifying problems, analyzing and evaluating learning [17-18]. Enniss and Johan said that critical thinking is the ability to think relevant, reasonable, reflective, and able to draw conclusions in solving problems that underlie a theory that focuses on deciding what to believe or do [19].

Previous research has proven that the Problem-Based Learning (PBL) model can improve students' critical thinking skills in temperature learning [21]. Based on another research, it is proven that Problem Based Learning (PBL) is more influential in improving students' critical thinking skills compared to direct learning models. Other studies also prove that the PBL model can improve students' solving abilities to reach the Minimum

Completeness Criteria [20][9]. If students are able to answer problems at the cognitive aspect level (analyze-C4, evaluate-C5, or create-C6), it can be said that students show signs of mastering critical thinking skills.

The characteristics of the PBL model are learning with a problem-solving process and students working together in groups to achieve common goals. Each group member must contribute information, experiences, ideas, attitudes, opinions, abilities and skills to jointly increase the understanding of all members. The teacher as a facilitator who helps and encourages students to find the right solution with a systematic approach. PBL's evaluation approach is more than a metacognitive process. Students are encouraged to monitor the knowledge they have acquired in the process of finding problem solving by making effective learning plans in relation to the problems posed based on the advantages and disadvantages of existing knowledge. Learning in this way is believed to be able to provide a more active atmosphere, because student-centered learning makes students feel happy because they are free to be creative, exchange ideas, and feel valued. So that it has a good effect on students' critical thinking skills.

2. METHOD

The research method used is Quasi Experimental design. The design of this study used a nonequivalent control group design [22] This research was conducted at SMPN 34 Bandar Lampung in two classes, class VII A and class VII B. The stages of this research are 1) conducting a pre-survey, 2) making research instruments, 3) testing instruments, 4) giving pre-tests to students in the experimental class and control class, 5) giving treatment using the Problem Based Learning (PBL) model for the experimental class students, while for the control class using the Direct Instruction (DI) model, 6) giving post-tests to the experimental class and control class students, 7) analyzing the data.

The instruments used in this study were tests, observations, and documentation. The test given for the pretest and posttest is an essay test that is adjusted to the indicators of critical thinking skills, totaling 15 questions that are valid and reliable. Observation was made to see the activities of students during the learning process with the Problem Based Learning model. Meanwhile, documentation was used to retrieve respondent data such as student names, school profiles, list of student learning outcomes, and other things needed in research. Before being tested, the instrument was tested by testing the validity, level of difficulty, different power, and reliability. The results of the instrument test are attached in Table 1.

Tabel 1. Instrument Test Results

Testing type	Total Item
Validity	15 valid, 5 invalid
Level of difficulty	8 Easy, 8 Moderate, 4 Difficult
Different power	6 Very good, 6 good, 6 moderate, 2 poor
Reliability	Reliable

After being tested, it was determined that 15 valid and reliable questions were used as test instruments to measure students' critical thinking skills

3. RESULTS AND DISCUSSION

Based on the results of the study, it was shown that the implementation of the Problem Based Learning model was more effective in improving students' critical thinking skills compared to using the Direct Instruction (DI) model. The results of the research at each meeting can be seen in Table 2.

Table 2. Percentage of Learning Implementation

Meeting	Percentage
1st meeting	85%
2nd meeting	90%
3rd meeting	95%
4th meeting	97,5%
5th meeting	100%

The results of the interpretation for the implementation of learning in the PBL model were obtained from the observation sheet filled out by the science teacher when the researcher was carrying out learning in the classroom. Based on the calculation, it can be seen that for learning management using the Problem Based Learning model at the first meeting it is 85%, the second meeting is 90%, the third meeting increases to 95%, the fourth meeting increases to 97.5%, and the fifth meeting increases to 100% .

Based on the results of the study, the average pretest and posttest values in the experimental class were higher than the pretest and posttest values in the control class. And after treatment, both classes experienced an increase in critical thinking ability test results. The increase can be seen in Table 3.

Tabele 3. The Results of Pretest, Posttest, and N-Gain

Class	Score		
	Pretest	Posttest	N-gain
Experiment	40,71	78,82	0,60
Control	37,46	74,07	0,56

The results of the N-Gain calculation calculated from the pretest and posttest stated that there was a significant difference between the N-Gain values in the experimental and control classes. The average N-Gain value for the experimental class is 0.60 with moderate criteria and the average N-Gain value for the control class is 0.56 with moderate criteria. So that the average value of N-Gain in the experimental class is higher than the control class. Accordingly, it can be concluded that the Problem Based Leaning (PBL) model is better in improving students' critical thinking skills compared to the Direct Instruction (DI) learning model.

The effectiveness of the PBL model was tested with effect size [23]. Effect size is a measure of the magnitude of the effect of a variable on other variables [24]. The effectiveness test (effect size) in this study is used to see how much PBL is effective on critical thinking skills, how is the quality of the relationship between PBL and students' critical thinking skills in science learning.

The results of the effect size test in this study are shown in Table 4.

Table 4. The results of effect size test

Class	Gain Average	Standard Deviation	Effect Size	Category
Experiment	38,1071	17,3276	0,2	Low
Control	35,0385	14,6546		

Before testing the effect of the model on increasing students' critical thinking skills, a prerequisite test for data analysis was conducted. The prerequisite test used is the normality test with the Liliefors test and the homogeneity test with the Fisher test.

The results of the pretest-posttest normality test for the experimental and control classes can be seen in Table 5 below.

Table 5. The results of normality test

Statistic	Experimental		Control	
	Pretest	**Posttest**	**Pretest**	**Posttest**
N	28	28	26	26
$\bar{x}$	41	79	39	74
SD	18,05	8,499	14,91	7,446
L_{count}	0,151	0,153	0,124	0,131
L_{table}	0,167	0,167	0,174	0,174
Conclusion	Normal	Normal	Normal	Normal

Based on Table 5 above, it can be concluded that the value of L_{count} of the experimental class in the pretest is 0.151 and the posttest is 0.153, the L_{count} indicates that the experimental class data is normally distributed. In the control class, the L_{count} in the pretest is 0.124 and the posttest is 0.131, the L_{count} indicates that the control class data is also normally distributed. Based on the results of the homogeneity test, the data from the pretest results of the experimental class and the control class revealed an F_{count} of 1.1941 and the posttest data obtained F_{count} of 1.4197, while F_{table} of 1.9142. From the data obtained $F_{count} < F_{table}$, it can be concluded that the two samples have the same or homogeneous variance.

After knowing that the data is normally distributed and homogeneous, to determine the effect, the t test (differential test) is used to calculate the hypothesis test. The results of hypothesis testing are in Table 6.

Table 6. Hypothesis Results

Class	N	$\bar{x}$	Sp	t_{table}	t_{count}	Conclusion
Experiment	28	78,821	7,872	2,213	2,007	effective
Control	26	74,077				

Based on Table 6 above, the results of hypothesis testing are obtained that the total value of t_{count} is 2.213 and t_{table} is 2.007, so that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. So, it can be concluded that there is an influence on the use of the Problem Based Learning learning model (PBL) on students' critical thinking skills.

The learning process in the classroom tends to be limited to practicing the ability to remember and understand which is a low order of thinking, even the learning process pays less attention to critical thinking aspects. Classroom learning has not yet optimized training for abilities and efforts to develop higher order thinking skills, in this case critical thinking skills [23]. The PBL learning model provides opportunities for students to overcome problems in the comfort of the classroom, because students are encouraged to monitor the process of finding solutions to problem solving by making effective learning plans in relation to the problems posed based on the advantages and disadvantages of existing knowledge [25]

In addition to the use of learning models, one of the success factors in learning is very dependent on the use of learning resources or media used during the learning process [26]. Problem-based learning with the method of reviewing the effectiveness of student learning can be used as an alternative to improve learning abilities [27].

Science learning at this time has become a model of science education that is oriented towards providing knowledge to the younger generation, how scientists work, the best way for students to learn science, effective learning approaches, and the provision of innovative curricular materials [28]. Learning through a scientific approach is more effective in improving students' critical thinking skills, because the scientific approach facilitates

students to practice observing, asking, trying, reasoning and communicating through the stages [7]. Other learning that is also good to apply is computer-assisted learning. Computer-assisted learning also has a positive effect on students' problem solving [29]. To fix the education aspect, the first step that must be taken is to know and recognize the overall abilities of students from all disciplines, so that teachers can facilitate the development of students' abilities in various disciplines [30].

4. CONCLUSION

Based on the results of data analysis, it is known that the Problem Based Learning (PBL) model is effective in increasing students' critical thinking skills. The value of the effectiveness of the Problem Based Learning (PBL) model is 0.2, it can be concluded that the Problem Based Learning (PBL) model has a low effect on students' critical thinking skills.

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