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## The Effectiveness of The Problem Based Learning on Grade Five Critical Thinking Skills

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### Abstract

*This research aims to analyze the effect of applying the Problem Based Learning model on critical thinking science skills science in fifth grade elementary school students. This study uses a quasi-experimental method by comparing the treatment of the teaching and learning process in the experimental class and the control class. The research design used is the Non-equivalent Control Group Design. The population is all fifth-grade students of public elementary schools in Mijen District, Demak Regency. The sample in this study was taken from 2 elementary schools with a purpose sampling technique. The research instrument was 10 essay questions. Data analysis techniques in the form of instrument testing, prerequisite testing and hypothesis t. The result of the research is that there is a significant effect on the use of Problem Based Learning (PBL) models on critical thinking skills in science. Suggestions on the importance of applying the Problem Based Learning model in the learning process because it is in accordance with education in the context of the 21st century. Where in education today students must be more responsive to changing times.*

### Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh penerapan model *Problem Based Learning* terhadap keterampilan berpikir kritis IPA pada siswa kelas V Sekolah Dasar. Penelitian ini menggunakan metode eksperimen semu dengan membandingkan perlakuan proses belajar mengajar pada kelas eksperimen dan kelas kontrol. Desain penelitian yang digunakan adalah Non-equivalent Control Group Design. Populasinya adalah seluruh siswa kelas V SD Negeri di Gugus Gunung Semeru Kecamatan Mijen Kabupaten Demak. Sampel dalam penelitian ini diambil dari 2 sekolah dasar dengan teknik *purpose sampling*. Instrumen penelitian berupa 10 soal esai. Teknik analisis data berupa uji instrumen, uji prasyarat dan hipotesis t. Hasil penelitian terdapat pengaruh yang signifikan penggunaan model *Problem Based Learning* (PBL) terhadap keterampilan berpikir kritis IPA. Saran pentingnya penerapan model *Problem Based Learning* dalam proses pembelajaran karena sesuai dengan pendidikan dalam konteks abad 21. Dimana dalam pendidikan saat ini siswa harus lebih tanggap terhadap perubahan zaman.

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## INTRODUCTION

Studying is a means to keep up with the progress of the times. The means of studying is education. Education is a teaching and learning activity carried out in schools. School is an important place to teach students to gain various knowledge and skills. In the learning process there is a curriculum as a guide and reference for carrying out learning. The curriculum used today is the 2013 curriculum. Learning in the 2013 curriculum is integrated learning with a scientific approach. (Hidayah et al., 2016) states that thematic learning is integrated learning that uses themes to link several subjects so that they can provide meaningful experiences to students. However, not all subjects can be taught using themes.

One of the subjects that can be integrated is science learning. The purpose of the scientific approach is to improve students' thinking skills, form the ability to solve problems systematically, create learning conditions so that students feel learning is a necessity, train students in expressing ideas, improve student learning outcomes, and develop student character. The learning process uses a scientific approach so that students are able to formulate problems (by asking), not just by answering.

A more meaningful and interesting learning experience is expected to help students understand and remember the knowledge gained over a long time, because a basic understanding of science in elementary schools is important as the forerunner of Physics, Chemistry, and Biology subjects that will be obtained at the next level of education. This means that if the understanding of science is good at the elementary school level, it will have implications for the next level. Given the importance of the role of science for students, especially at the elementary school level, teachers should design innovative learning. In order to develop thinking skills and the ability to solve problems related to everyday life. But in reality this hope is difficult to be realized.

Based on the results of observations, at SDN Mlaten 1 Gugus Gunung Semeru, Mijen District, Demak Regency, in the fifth grade, it was found that learning was still dominated by conventional learning models, especially in the content of science lessons on ecosystem materials. In learning the teacher explains the material and students listen to the teacher giving practice questions on the Student Worksheet and students answer according to the text book. The learning process that takes place in the classroom

is only directed at the ability of students to memorize information, students' minds are forced only to remember and hoard various information. Without being required to understand the information obtained by relating it to situations in everyday life. According to (Tembang, 2017) activities in the classroom are dominated by assignments and memorization shows that students' thinking skills are low in learning. This learning prioritizes science as a product (only theory) and ignores science as a scientific process and attitude. This results in students not having the opportunity to develop their thinking skills so that students' critical thinking skills are low. The low critical thinking skills of students in science are seen by few students who ask and give opinions, have difficulty solving problems, and students are unable to find solutions and conclusions to problems. This can be seen from the low value of daily tests. Of the 24 fifth grade students, only 40% of the students completed (70) and 60% did not finish studying.

According to (Irham, 2016) critical thinking is a reflective thinking ability that focuses on patterns of decision making about what to believe and what to do. Critical thinking includes a number of cognitive skills and intellectual dispositions needed to identify, analyze, and evaluate arguments effectively in order to find solutions, can formulate and present convincing reasons to support conclusions and be able to make rational and appropriate decisions about what to do and believe.

According to (Sari, 2017) suggests that critical thinking skills are the ability to solve problems rationally according to logical stages and provide more efficient solutions. Critical thinking is a form of thinking skills that must be possessed by everyone, including students. The critical thinking of students who experienced an increase after PBL learning was also in line with opinion (Ardiyanti et al., 2016). Critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking action (Geçit & Akarsu, 2017).

Critical thinking is one of the abilities that can be developed through a problem solving learning process. According to Costillas (Fasha et al., n.d.) teaching students to have critical thinking skills is a challenge for teachers because many students are weak in critical thinking. then critical thinking needs to be developed by applying various methods, strategies, or innovative science learning that allows students

to develop their critical thinking skills. Furthermore (Malahayati et al. 2015) stated that critical thinking skills can also provide the right direction in thinking and working, as well as helping in determining the relationship of one thing to another more accurately. (Malahayati et al., 2015) are Critical thinking implies a mental activity carried out by a person to can give consideration by using certain measures or standards.

Problem Based Learning learning model is a learning model that can implement a learning process that involves students actively, student-centered and able to improve critical thinking skills, Problem Based Learning learning model is needed as a learning innovation in accordance with the 2013 curriculum. According to (Kono & Mamu, n.d.). Problem Based learning models have an effect on understanding concepts and students' critical thinking skills. According to (Hasmiati, 2016) revealed that the PBL model is very suitable for developing critical thinking skills and students' cognitive learning outcomes in solving problems, because through the PBL model students can develop their knowledge in solving problems and make various kinds of solutions that will improve their abilities. thinking and learning outcomes. This is in line with (Nugraha et al., 2017)

Students with high critical thinking skills are able to analyze problems consistently and are able to develop their thinking so that they can be classified as advanced and superior thinking. one of the studies that examines the Problem Based Learning model is research by (Sabdaningtyas, 2019) in The Development of Integrative Thematic Learning Tools Based on Problem Based Learning to Improve Critical Thinking of Students in Fourth Grade in Elementary School, concluding that the development of thematic learning based on Problem Based learning is very effective for improving critical thinking skills for grade 4 elementary school students. (Setyani & Utomo, 2020) emphasized again in the Effect of the PBL Learning Model on Mathematics Learning Outcomes in SDN Sari 1 Class V students, Gajah Subdistrict, Demak Regency that the PBL learning model can improve student learning outcomes in mathematics lessons on distance, time, and speed class V materials SD Gugus Sultan Agung, Gajah Subdistrict, Demak Regency. Explained by (Rahmadani, 2020) Development of Interactive Multimedia Based on Problem Based Learning (PBL) Models Elementary School Students the result is student activity during

learning very good and learning outcomes show good results.

## METHODS

This experimental design uses the Nonequivalent Control Group. In this design, there are two groups used in the study that were not chosen randomly, either to the experimental group or the control group

**Table 1** Research Design

Group	Pre-test	Variabel	Post-test
Experiment Class 1	O <sub>1</sub>	X <sub>1</sub>	O <sub>3</sub>
Control class	O <sub>2</sub>	X <sub>3</sub>	O <sub>4</sub>

Information :

O<sub>1</sub> : Pre test in experimental class 1

O<sub>2</sub> : Pre test in the control class

O<sub>3</sub> : Post test in experimental class 1

O<sub>4</sub> : Post test in the control class

## RESULT AND DISCUSSIONS

The description of the data is the research data. This data was obtained from the pre-test and post-test scores, in each class in the study. Data on the initial ability of students' thinking skills were obtained from the pre test scores and to determine the level of students' critical thinking skills after the learning treatment was obtained from the post test scores. The following are the results of descriptive analysis

The results of posttest data testing show that the average value of the achievement of the experimental class is higher than the control class, this is in accordance with the opinion of (Luh et al., 2017) revealing that problem-based learning is learning that begins with the existence of a problem, then students use knowledge has to solve the problem. Another opinion from (Dewi, 2017) states that PBL can also improve students' critical thinking skills. One alternative that can be done is by giving questions that can spur the thinking process. According to (Nugraha et al., 2017) the teaching and learning process in the Problem-Based Learning model does not only place students just listening to the teacher's lectures or just playing a role in discussions, but students are also asked to spend time looking for solutions to problems that can be studied can be through books in the library, as well as the environment around students related to teaching materials. This kind of learning process will train students to recognize the initial concepts and will automatically train their critical thinking skills. Problem solving skills include other skills such

as identification and the ability to search, select, evaluate, organize, and consider various alternatives and interpret information (Zubaidah, 2017).

Independent Sample t-Test was used to test the hypothesis. The hypothesis is formulated in the form of a statistical hypothesis (one-sided test). The test criteria are tcount compared to table with a significant level = 5% with dk =  $n_1 + n_2 - 2$ . The t test table shows the t count of 23,318 while the t table with df = 38 is 2, 0244 then  $23,318 > 2, 0244$ . Because tcount > t table, then  $H_0$  is rejected and  $H_a$  is accepted. This means that there is an increase in science critical thinking skills in fifth grade elementary school students. by using learning model problem Based Learning (PBL).

The results of the t-test showed that there was an increase in the use of the Problem Based Learning (PBL) learning model on students' critical thinking skills in science lessons in sixth grade elementary school students. PBL helps students to develop thinking skills and coping skills problems, as well as facilitating students to become active and independent learners (Imandala et al., 2019). PBL also can improve students' mathematical communication skills (Hima, 2006). The results of the t-test are the same as the results of research by (Kamil et al., 2019) entitled Students' Critical Thinking Skills in Islamic Schools: The Effect of Problem-Based Learning (PBL) Model, on Students' Critical Thinking Skills in Islamic Schools: The Effect of Learning Models Problem Based (PBL). Explain that the PBL model affects students' critical thinking skills.

Normalized gain or N-Gain is the difference between the post-test and pre-test scores. The gain value will indicate whether there is an increase in the understanding of Pancasila values in sixth grade elementary school students after the learning is carried out by the teacher. The implementation of the gain test is carried out in each class, both the control class, and the PBL model, while the results of the Gain test in each class are as follows.

Based on the table of N gain values obtained the results:

a. Problem based learning (PBL) experimental class.

The N-Gain value is 0.8426. It means that the Problem Based Learning experimental class has increased critical thinking skills through learning outcomes in the high category because the n-gain value is included in g) 00.70. The N-Gain % value is 84,263 which is interpreted to mean that the Problem Based Learning model of learning is effectively used to improve science critical thinking skills in fifth grade elementary school students.

b. Control Class

The N-Gain value is 0.38386, the N-Gain value is included in g) 0.3. This means that the control class does not experience an increase in critical thinking skills through learning outcomes because the gain value is in the low category. The N-Gain % value is 38,386 which is interpreted to mean that conventional learning models are not effectively used to improve science critical thinking skills in fifth grade elementary school students.

The N-Gain % value is 84,263 which is interpreted to mean that the Problem Based Learning model of learning is effectively used to improve creative thinking skills in style materials in elementary school students in grade VI elementary school. The results of this study are in accordance with research conducted by (Anugraheni, n.d.) with the title "Meta Analysis of Problem Based Learning Models in Improving Critical Thinking Skills in Elementary Schools". Based on the results of the analysis, it turns out that the Problem Based Learning learning model is able to improve students' thinking skills starting from the lowest 2.87% to the highest 33.56% with an average of 12.73%. creative thinking. (Ferdiana & Fathurohman, 2020) explained again in "The Need of teaching materials Based on Problem Based Learning to Improve Students' Learning Outcomes At Elementary School." can improve student learning outcomes

**Table 2** N-Gain Test Result

No	Score	Problem Based-Learning Class	Control class
1	Mean	84.263	38.386
2	<b>N-Gain</b>	0,8426	0,38386
3	Criteria	High	Medium
4	N-Gain %	84,263	38.386
5	Interpretation	Effective	Not effective

The research is also relevant to the research conducted by (Yanti et al., 2017) with the title "Problem Based Learning Model, Guided Inquiry, and Mathematical Critical Thinking Skills". Information was obtained that there were differences in mathematical critical thinking skills between students who received mathematics learning using the PBL model and students who received mathematics learning using guided inquiry models.

Furthermore, the average mathematical critical thinking skills among students who receive mathematics learning using a problem-based learning model is higher than the use of conventional models. The same research was also conducted by (Zulifah, 2020) in "Developing Problem Based Learning (PBL) Oriented Pictorial Story Materials Assisted By Android to Improve Science Learning Outcomes" that Android-assisted PBL-oriented comic book teaching materials are effectively used to improve science learning outcomes. In the practicality test, it is known that the PBL-oriented teaching materials with Android-assisted PBL get a good response from students and teachers. Add more from (Priska et al., 2021) Development of IPS –Based Interaktif Learning Media Problem Based Learning and Snakes based on the results of field trials which show the teacher's response and student responses were 89.28% and 81.06% respectively with an average percentage of 85.17%. This interactive learning media is suitable for use in social studies subjects fourth grade elementary school.

The use of problem based learning models has an effect on student learning outcomes more increasing compared to conventional models (Masriah et al., 2021). This opinion was strengthened by (Imama et al., 2021) those who found that The PBL was proven to be effective and could increase students' activity and mathematics learning outcomes.

## CONCLUSION

Based on the results of the research and discussion that has been carried out with the title of the effect of Problem Based Learning and Project Based Learning models on critical science thinking skills in fifth grade elementary school students in the Gunung Semeru cluster, Mijen District, Demak Regency, it can be concluded that: there is a significant effect on the use of the Problem Based model. Learning (PBL) on science critical thinking skills in fifth grade elementary school students in the Gunung Semeru Cluster, Mijen District, Demak Regency.

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