JPPIPA 9(3) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Effect of Problem Based Learning on Student Critical Thinking Skills in Plant Reproduction System Material

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Received: January 30, 2023
Revised: March 25, 2023
Accepted: March 28, 2023
Published: March 31, 2023

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DOI: 10.29303/jppipa.v9i3.3454

Abstract: This study aims to determine the effect of PBL on students' critical thinking skills in plant reproduction system material. The method used in this study was a quasi-experimental with the matching-only posttest only control group design research model with the non-random assignment sampling technique consisting of class IX-A as the experimental class (class with PBL) and class IX-B as the control class (non PBL/direct learning model), each of which is 20 students in each class. The results of this study indicate that the control class's critical thinking skills were between pretest and posttest. Criteria for critical thinking skills in the pretest consisted of very critical 0%, critical 65%, quite critical 48%, less critical 26.66%, and uncritical 7.14%. Criteria for critical thinking skills in the posttest consisted of very critical at 87.5%, critical at 70%, quite critical at 52.85%, less critical and uncritical at 0%. The results of testing the hypothesis using the t test obtained results in the experimental class having a significance value of 0.04 which is less than α 0.05, then H0 is rejected and H1 is accepted. This means that there is no effect of the PBL learning model on students' critical thinking skills. It can be concluded that there is no effect of the PBL model learning on the critical thinking skills of students in the plant reproduction system material for class IX at Junior High School Baiturrahim Jambi.

Keywords: Critical thinking skills; PBL; Plant reproduction system

Introduction

Effective learning is usually measured and characterized by the level of achievement of goals by some students (Arends, 2008). This will show some learning experiences that can be accepted by students, such as being able to understand the 21st century education system which aims to awaken intelligence abilities so students can solve the problems around them (Apiati et al., 2020; Suciono et al., 2021). The results of searching data for science learning at Junior High School Baiturrahim Jambi show scores that tend to be low, because not all students achieve the minimum completeness criterion score (KKM). In class IX-A, the average score obtained by students is 74.47, while in class IX-B, it is 73.70.

According to interviews with teachers and students, it can be said that science is a quite difficult lesson, because there are many terms that are not used to being heard, and in the practicum process students are more likely to seeing demonstrations conducted by educators compared to directly doing this, even more so in reproduction material and material relating to plants they have not fully understood the material. Students are not yet skilled in practicum activities because so far practicums have not always been carried out.

Based on the results of measuring students' critical thinking skills and creativity using instruments in the form of a questionnaire, it shows that the percentage of results of measuring critical thinking skills is that 40% choose indicators that provide simple explanations, 35% choose indicators to determine the basis for decision making, 45% choose indicators to draw conclusions, 30% choose indicators providing advanced explanation, and 25% choose predicting and aggregating indicators. While the percentage measurement on the creativity of

How to Cite:
Asokawati, S., Asrial, A., & Hamidah, A. (2023). The Effect of Problem Based Learning on Student Critical Thinking Skills in Plant Reproduction System Material. *Jurnal Penelitian Pendidikan IPA*, *9*(3), 1310–1313. https://doi.org/10.29303/jppipa.v9i3.3454

students obtained 20% on the fluency indicator, 35% on the flexibility indicator, and 30% on the novelty indicator. For this reason, a learning model is needed that can train students' critical thinking skills and creativity, but still focuses on material concepts, one of which is the problem based learning (PBL) (Farisi et al., 2017; Fathurrohman, 2015; Harsanto, 2005; Hidayah, 2015).

The PBL can improve learning if it follows the stages in the learning model, which can empower, hone, and test thinking skills on an ongoing basis based on their experiences so that students can learn actively, creatively and critically (Al-Fikry et al., 2018; Joubert, 2011; Putri et al., 2016). The PBL is a learning model that is able to meet the goals of 21st century education. In the learning scenario, PBL involves the 4C principles, namely, critical thinking, communication, collaboration, and creativity (Fakhriyah, 2014). By using this learning model students will look for solutions and get to know the problems given, students find themselves so that students become more understanding of what they have solved from the problems that have been given (Ariyatun et al., 2020; Cahyaningsih et al., 2016). Therefore, in this article, it will be explained whether the PBL has an effect on students' critical thinking skills in plant reproduction system material. This study aims to determine the effect of the PBL on students' critical thinking skills in plant reproduction system material.

Method

This type of research is quasi-experimental research with the matching-only posttest only control group design research model. In this study using class IX-A as the experimental class and IX-B as the control class, each class has 20 students. This research was conducted at Junior High School Baiturrahim Jambi from October to November 2022. The population in this study was all grade IX Junior High School Baiturrahim Jambi, which consisted of two classes. The sample used in this study was 40 students who were divided into each from class IX-A and class IX-B.

The sampling technique used is total sampling/saturation sampling. The data collection technique used is the results of practicum observation sheets to see the creativity and results of students' critical thinking skills tests. Meanwhile, the research instruments used were observation sheets for practicum implementation and critical thinking skills test questions in the form of descriptions by displaying indicators of students' critical thinking skills. The data analysis technique used is descriptive statistical analysis to analyze the percentage of scores obtained and inferential statistical analysis to calculate the normality, homogeneity and hypothesis tests of the variables studied.

Table 1. Matching-Only Posttest Only Control Group Design

Class	Matching	Treatment	Posttest
Experiment	M	X	O
Control	M	K	O

Description:
X = Problem Based Learning (PBL)
K = Direct Learning
O = Critical Thinking Skills

Result and Discussion

Based on the test results on students' critical thinking skills, the results are in Table 2.

Table 2. Average Results of Critical Thinking Skills

Class	Pretest	Posttest
Experiment	25.25	26.50
Control	63.50	66.50

In Table 2, the average value of the pretest results for critical thinking skills in the experimental group is 25.25 and the average posttest result is 63.50. Whereas in the control group the average pretest result is 26.50 and the average posttest result is 66.50. This study uses 5 indicators of students' critical thinking skills according to Ennis (2011).

An indicator providing a simple explanation is an attempt made to give the meaning of a word. This indicator is trained because students can answer correctly because the answer is by finding out independently so that they understand more about the definition of a word. The problems presented are not just presented, but students are required to find solutions to solving these problems that are sought together with other group members.

The feeling of being involved with the group makes students able to face the challenges that face them. With this, students will be more motivated in learning, especially in terms of providing conclusions or solutions (Ibrahim et al., 2000).

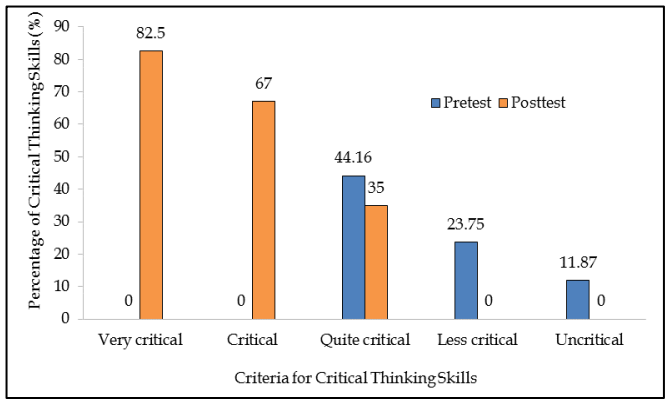

Figure 1. Percentage of critical thinking skills in experimental class

Based on Figure 1, there is a difference in the percentage of critical thinking skills in the experimental class between pretest and posttest. Criteria for critical thinking skills in the pretest consisted of 0% very critical, 0% critical, 44.16% quite critical; 23.75% less critical; and 11.87% not critical. Criteria for critical thinking skills in the posttest consisted of very critical at 82.50%, critical at 67.00%, quite critical at 35.00%, less critical 0% and not critical at 0%.

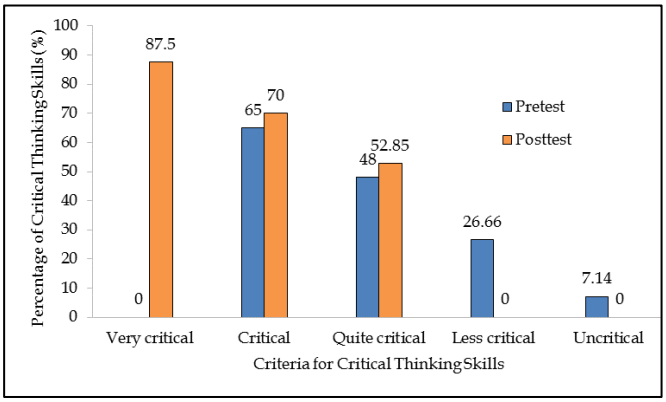

Figure 2. Percentage of critical thinking skills in control class

Based on Figure 2, there is a difference in the percentage of critical thinking skills in the control class between pretest and posttest. Criteria for critical thinking skills in the pretest consisted of very critical 0%, critical 65%, quite critical 48.00%, less critical 26.66%, and uncritical 7.14%. While the criteria for critical thinking skills in the posttest consisted of very critical at 87.5%, critical at 70.00%, quite critical at 52.85%, less critical and uncritical at 0%. Based on the data above, it can be concluded that there are differences in the improvement of critical thinking skills between the experimental and control classes.

The results of testing the hypothesis using the t test obtained the learning outcomes of the PBL model applied to the experimental class having a significance value of 0.04 which is smaller than the alpha value of 0.05, because 0.04 < 0.05, then H0 is rejected and H1 is accepted. This means that there is no effect of the PBL on students' critical thinking skills in the plant reproduction system material for class IX at Junior High School Baiturrahim Jambi. This is in line with the results of observations during the study, that students in the experimental class using the PBL were less serious in carrying out learning (Ali et al., 2006). If analyzed from the shortcomings of this learning model such as, students' understanding of a problem that exists in real life and society is still lacking so that it will be hampered by these factors, it takes time for preparation if educators do not prepare appropriately for this learning model so that learning objectives will not be achieved, and if students do not have interest and see that the problems observed are very difficult so they will not feel like trying it (Azizah et al., 2018; Rachmantika et al., 2019). If viewed from the indicators of critical thinking, it is still very far below the average for students in the experimental class and control class who can answer correctly, but if seen from individual acquisition there are only a few students who score above the Minimum Completeness Criteria.

The results of this study are in line with the research of Yoasthin et al. (2018) which shows that there are differences between students' critical thinking skills using the PBL and direct learning. The critical thinking skills of students in class X IPA who were taught by direct learning were in the sufficient category, while the critical thinking skills of students in class X IPA who were taught by the PBL learning model were in the less category. So that it can be said that there is a direct learning effect on students' critical thinking skills in the material for class X environmental changes at Senior High School 1 Mamasa.

Conclusion

In this study it can be concluded that there is no effect of the PBL learning model on students' critical thinking skills.

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