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The Effect of the Problem-Based Learning Model on Students Critical Thinking Ability

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ABSTRACT

Students' critical thinking skills are still a problem that lecturers in Indonesia still need to overcome. One way to improve student's critical thinking skills is by giving action in class, namely the problem-based learning model. For this reason, this study aimed to determine the effect of problem-based learning models on students' critical thinking skills. This research method uses a quantitative approach. The research design uses quasi-experimental research using two classes as samples with different treatments. The instruments in this study used observation guidelines and tests in the form of descriptive questions to measure students' critical thinking skills. The data that has been obtained is in the form of data from pretest and posttest values. Data were analyzed using SPSS 16.0 to see the normality and homogeneity tests as a condition for conducting the t-test. The results obtained from the normality test with a sig level of $0.200 > 0.05$ mean that the data is normally distributed. Then a homogeneity test was carried out, and the results showed $0.365 > 0.05$, which indicated that the sample data was homogeneous or uniform. After the two test conditions are met, then the t-test is performed. The results of the t-test obtained sig. $0.00 < 0.05$ indicates an influence of the problem-based learning model on the critical thinking skills of students of the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta.

Keywords: *Problem-Based Learning Model, Students' Critical Thinking Ability*

INTRODUCTION

The ability to think critically to produce critical thinking has been one of the main issues since the time of the Ancient Greeks. Over the last decades, definitions of critical thinking have emerged. Critical thinking is assessing and giving proper reasons or identifying wrong arguments (Ennis, 1996). Critical thinking activities can be started by asking the right questions, gathering relevant information, sorting out information effectively and efficiently, reasoning logically, and providing valid and reliable conclusions (Özkan, 2010). Critical thinking skills are high-level thinking skills that include: analysis, evaluating arguments, providing judgments and interpretations, and making decisions that are used appropriately

(Astleitner, 2002; Hitchcock, 2022). Someone can use critical thinking skills to understand, interpret, and evaluate what they hear or read to formulate an appropriate reaction or response (Aghajani & Gholamrezapour, 2019).

Critical thinking is the ability to process information by analyzing comprehensively, involving cognitive aspects to produce accurate and scientific assessments (Li, 2011). Critical thinking is also important in education because it is needed in every aspect of human life if understood substantively (Hale, 2008). This is an important issue, so education and critical thinking are interconnected. Education is a space for students to develop critical thinking skills along with the increasingly rapid flow of information, especially in the era of the industrial revolution 5.0. The strategy that can be used to build students' critical thinking skills in class is to apply the Problem-Based Learning (PBL) model.

Education in the 21st century has undergone significant changes. Changes that occur in the world of education include: the learning process, which was initially teacher-centered, has now shifted to student-centered. One-way learning is now two-way or interactive. Classroom learning develops into learning that utilizes networks, develops collaboration or teams, and trains critical thinking skills. Learning activities are not just conveying knowledge but turning to knowledge transition (Miterianifa et al., 2019). Students are said to be successful if they have 21st-century skills. These skills include critical thinking, creativity, communication, and collaboration skills. The success of education can be seen from the ability to think critically, so this ability must be mastered by students. The ability to think critically becomes a provision for students to solve various problems related to the field of study they are studying and problems they will face in everyday life. Students' critical thinking skills can be developed through problem-based learning by formulating problems or questions. Learning that begins with a problem can be done through a problem-learning model (PBL).

In 1996, PBL was widely used in the learning process. The theoretical foundation of the PBL model is constructivist. PBL is learning that begins with a problem, and students are given time to think together to find information and develop problem-solving strategies (Akinoğlu & Tandoğan, 2007). The PBL model is a learning model based on the principle that problems can be used as a starting point for acquiring or integrating new knowledge (Tan, 2009). Problems are presented at the beginning of learning and serve as a stimulus for learning activities. PBL is characterized by real problems as a context for students to learn critical thinking and problem-solving skills, and acquire knowledge (Duch, 2021). This model places students at the center of learning by equipping students with real problems, asking students to actively participate in problem analysis actively, identifying relevant facts, and constructing new knowledge, solving problems in small teams so that they can improve critical thinking skills. (Nelson, 2008).

The PBL learning model can be divided into eight main steps, namely: 1) strengthening concepts with lecturers presenting material from various sources; 2) determining the fundamental questions which result in an invention or product; 3) formation of small or large groups; 4) preparing project planning; 5) arrange a schedule; 6) overseeing the process of work and progress of the project; 7) assessment of project results with group presentations; 8) evaluation of experiences through individual and group reflection (Norfar & Fancher, 2022; Song & Cheng, 2015; Mulyasa, 2014). The PBL learning model emphasizes constructing students' knowledge independently, developing hypotheses, and finding solutions to make the learning process conducive; students become more independent by developing initiatives and fostering students' enthusiasm for collaboration and innovation (Hairuddin, 2018). The PBL model directs students to discussion activities and work together in solving problems and fosters independent learning so that they have the opportunity to develop critical thinking skills.

Choosing a suitable learning model will direct students to train and find concepts to develop their skills (Mufit et al., 2019). Critical thinking skills can be built through learning activities through interactive classes (Nuryanti et al., 2018). This means that students have a role as thinkers, not someone who only gets information from the lecturer. Lecturers or teachers have a role as a mediator, facilitator, and motivator who helps students in the learning process. Based on this explanation, this research aims to prove the effect of the PBL learning model on students' critical thinking skills. It is essential to build knowledge and provide input for lecturers to design appropriate learning to direct students in developing critical thinking skills.

Facts on the ground show that students' thinking skills in the Indonesian Language and Literature Education Study Program are still in the low category. The results of observations and interviews show that students have yet to be able to identify and understand problems optimally. Students are still very dependent on the lecturer's explanation. In addition, students still need the right strategy for solving problems to conclude. Based on the facts in the field, it is necessary to provide solutions to overcome them. The solution is applying the Problem-Based Learning (PBL) model in learning activities to improve student's critical thinking skills. Based on previous theory and research, this research will answer the problem of whether the PBL learning model affects the critical thinking skills of fourth-semester students in the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta. It is hoped that this experimental action can improve students' critical thinking skills, and the PBL learning model is an alternative that can solve students' problems in critical thinking skills and other problems in learning.

METHOD

This research method uses a quantitative approach. While the research design uses quasi-experimental research using two classes as samples with different treatments. The sample is determined by using simple random sampling. This is because there are equal opportunities. After all, each class chooses the same ability and is free from the researcher's subjectivity.

The treatment was given to two classes as research samples: the experimental class or those who were treated using the PBL model of students of the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta. Then, the control class was treated using a conventional learning model for students of the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta.

Data collection techniques were carried out through the pre-test and post-test stages. The pre-test results on both samples show students' initial ability. The pre-test results in both classes are expected to have the same initial abilities. The purpose of the post-test is to test the hypothesis using the t-test statistical formula with the criteria that H_a is accepted if $t\text{-count} > t\text{-table}$ and H_a is rejected if $t\text{-count} \leq t\text{-table}$. Normality and homogeneity tests must be carried out as a condition for conducting a t-test. The normality test is carried out to determine whether the sample under study is usually distributed. In addition, a homogeneity test was carried out to show that the variations in the two sample groups were the same.

RESULTS AND DISCUSSION

Results

The research begins by testing whether the two samples that have been determined are typically distributed. The two samples are data on the ability to think critically in the experimental class, which was treated using the PBL model, and the control class, which was treated using the conventional learning model. The prerequisites that must be met are to carry

out the normality test and homogeneity test. The purpose of the normality test is to find out whether the data that has been obtained is normally distributed or not. The Kolmogorov-Smirnov Normality Test states that if the sig value is more significant than 0.05, it can be stated that the data is normally distributed if the sig value is smaller, which can be stated otherwise. Calculation of the normality test using SPSS 16.0 according to the Table 1.

Table 1. Normality Test Results in the Experiment Class and Control Class

	Grade	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Score	1	,132	17	,200*	,920	17	,150
	2	,121	25	,200*	,942	25	,166

The normality test results of the posttest values in the experimental and control classes show that the sig. experimental class $0.200 > \alpha (0.05)$. Based on these scores, it can be concluded that the post-test data for the experimental class and the control class are normally distributed. Furthermore, after the normality test is carried out is to do a homogeneity test. Based on the homogeneity test, the sig. $0.365 > \alpha (0.05)$, so it can be concluded that the experimental and control classes' post-test data are declared homogeneous. This means that if the significance value is more significant than 0.05, it can be concluded that the data has the same variance or uniformity of post-test scores between the experimental and control classes. The homogeneity test results can be seen in Table 2.

Table 2. Homogeneity Test Results in the Experiment Class and Control Class

Levene Statistic	df1	df2	Sig.
,092	1	40	,365

The last stage in this research is to test the hypothesis. The conditions that must be carried out for the hypothesis test are after carrying out the normality test and homogeneity test. The purpose of testing the hypothesis is to find out the students' critical thinking skills achieved in the experimental and control classes. The hypothesis testing criteria are accepted by H_a if $t_{count} > t_{table}$ and rejected by H_o if $t_{count} \leq t_{table}$, at a significant level of 0.05. The results of the t-test can be seen in the Table 3.

Table 3. T-test Results for the Posttest Class Experiment and Control Class Independent Samples Test

Data _{SEP}	Sig (2-tailed) _{SEP}
Critical thinking skills	0,000

Discussion

The study results show that the PBL learning model influences the critical thinking skills of fourth-semester students at the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta. This is evidenced by a significance value of $0.000 < 0.05$, meaning that H_a is accepted. The PBL model has been influenced so that students'

critical thinking skills become better. The PBL Learning Model applies the primary phase by providing problems to build and develop students' activeness in thinking. The results of the study show that the PBL learning model actively involves students in solving problems so that, through problems that have been solved, students' critical thinking skills develop (Koroh & Ly, 2020; Seibert, 2021). Students tend to be more motivated when learning using the PBL model (Sumitro et al., 2017). The problems presented in the PBL model become the starting point, making learning more exciting and challenging (Rusman, 2014; Masek & Yamin, 2011). Moreover, problem-based learning (PBL), a student-centered approach that emphasizes learning by solving problems, has been suggested and used at the university level to develop students' critical thinking (Liu & Pásztor, 2022; Birgili, 2015). Of course, it contributes to educational improvement, especially in higher education and the job market.

The action's success in improving students' critical thinking skills is because lecturers are more able to control student activities in solving problems. In addition, this success was due to early learning with the PBL model. Students and lecturers discussed concepts. With a strong concept, students can solve problems critically in learning Indonesian. In implementing the PBL model, the lecturer refers to the following learning steps: 1) strengthening the concept by the lecturer presenting material from various sources; 2) determining the fundamental questions which result in an invention or product; 3) formation of small or large groups; 4) preparing project planning; 5) arrange a schedule; 6) supervising the project process and progress; 7) assessment of project results with group presentations; 8) evaluation of experiences through individual and group reflection (Norfar & Fanher, 2022; Song & Cheng, 2015; Mulyasa, 2014). In implementing these eight steps, lecturers must be able to provide concept reinforcement and provide assistance in solving real problems related to graduate profiles.

Further, PBL can help students with nonroutine problem-solving processes by maintaining uncertainty and enhancing creative thinking (Ulger, 2018). It was implemented as a treatment in the learning process. Thus, the PBL model is effectively applied in learning because it can build critical thinking skills. In addition, the starting point of the PBL model is to bring up problems that encourage and foster curiosity, foster flexible and critical thinking processes (Arends, 2012). Learning through the concept of raising contextual problems explains that students' critical thinking skills using the PBL model are improving.

CONCLUSION

Based on the study results, the PBL learning model affected the critical thinking skills of fourth-semester students at the Indonesian Language and Literature Education Study Program, Universitas PGRI Yogyakarta. This is evidenced by a significance value of $0.000 < 0.05$, meaning that H_a is accepted. The success of increasing critical thinking skills is due to the implementation of PBL learning steps as follows: 1) strengthening concepts with lecturers presenting material from various sources; 2) determining the fundamental questions which result in an invention or product; 3) formation of small or large groups; 4) preparing project planning; 5) arrange a schedule; 6) overseeing the process of work and progress of the project; 7) assessment of project results with group presentations; 8) evaluation of experiences through individual and group reflection.

From the results of this study it is hoped that Indonesian language teachers can use the PBL model as a learning model that can be used, not only in improving students' critical thinking skills, but also in improving other abilities, especially in improving students' language skills. The weakness of the results of this study is that it is only limited to improving students'

critical thinking skills using quasi-experimental methods so that other researchers can prove the effect of the PBL method using true experimental methods.

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