Problem based Learning: Its effect on problem solving skills of Islamic Boarding School student

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Article Information	Abstract
	Increasing problem-solving competence is fundamental for students to learn in the future. The application of problem-based learning (PBL) has not been optimal, especially in Islamic boarding schools. This study aims to know the effect of PBL learning model on problem-solving skills of students in Islamic boarding schools. The type of research used is quasi-experimental research. The populations in this study were 4 classes with a total of 108 students. The sample consisted of 2 classes, namely class X IPA A as the experimental class and class X IPA B as the control class, 26 students each. The sampling technique used cluster random sampling. Data collection techniques using test instruments in the form of multiple choice with 25 questions. The data analysis technique used in this study was the normality test, homogeneity test, and hypothesis testing. The results were tested using a paired sample test (t test) on the PBL learning model on problem-solving skills, the significant value was 0.000 (sig. <0.05) then H0 is rejected and Ha is accepted. These results indicate a significant difference using the PBL model compared to conventional learning. PBL is an alternative learning model that encourages student-oriented biological learning and improves students' ability to solve problems, especially in Islamic boarding schools.

Abstrak

Peningkatan kompetensi pemecahan masalah menjadi hal mendasar bagi siswa untuk belajar di masa depan. Penerapan pembelajaran berbasis masalah (PBL) belum optimal khususnya di Pesantren.Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran PBL terhadap kemampuan memecahkan masalah pada siswa di pesantren. Jenis penelitian yang digunakan adalah penelitian eksperimen semu. Populasi dalam penelitian ini adalah 4 kelas dengan jumlah 108 siswa. Sampel terdiri atas 2 kelas yaitu kelas X IPA A sebagai kelas eksperimen dan kelas X IPA B sebagai kelas kontrol, masing-masing kelas terdiri atas 26 siswa. Teknik pengambilan sampel menggunakan cluster random sampling. Teknik pengumpulan data menggunakan instrumen tes berupa 25 soal pilihan berganda. Teknik analisis data penelitian ini menggunakan uji normalitas,uji homogenitas, dan uji hipotesis.Hasil penelitian diuji menggunakan paired sample test (uji t) pada model pembelajaran PBL terhadap kemampuan memecahkan masalah, diperoleh nilai signifikan 0,000 (sig.<0,05) maka H0 ditolak dan Ha diterima. Hasil tersebut menunjukkan adanya perbedaan signifikan dengan menggunakan model pembelajaran PBL dibandingkan dengan pembelajaran konvensional. PBL sebagai alternatif model pembelajaran yang mendorong pembelajaran biologi berorientasi siswa serta meningkatkan kemampuan siswa dalam memecahkan masalah khususnya pada siswa Pesantren.

A. Introduction

Entering the 21st-century education plays a role in determining the quality of the nation's education that is intelligent, peaceful, and democratic. Vera & Wardani (2018), education is an effort to develop students' potential, skills, and personal characteristics to achieve educational goals (Yusri et al., 2018). Learning is one part of education that contains learning elements, including its objectives; materials used; infrastructure; the learning situation; the medium, the environment; the method; and evaluation. All parts affect the learning process where there is an increase in student learning (Elita et al., 2019).

Problem-solving is critical to becoming students who actively participate in the community and their activities (Ulva et al., 2020). The 2013 curriculum requires students to develop problem-solving skills (Permendikbud No. 69 of 2013). However, in Indonesia, students' problem-solving ability is deficient. Based on research by the "Program for International Student Assessment (PISA)" which is measured through scientific literacy knowledge of knowledge and problem identification where the results of the study state, "Indonesia is ranked 62 out of 70 participating countries with an average score of 403 (OECD, 2015), and decreased to 396 (OECD, 2018)". The study "Trends in International Mathematics and Science Study" results in 2015 were known to decrease the learning outcomes of Indonesian students (Simatupang & Ionita, 2020).

Indicators of problem-solving skills include "1) understanding the problem, 2) planning a solution, 3) solving the problem according to plan, 4) re-checking all the steps that have been taken". The PBL model is a learning model related to scientific learning (Zakiah et al., 2019). The PBL model is a learning model related to scientific learning (Fitria et al., 2021). The PBL model was chosen because, based on the results of previous studies, it proved the effect of increasing students' problem-solving abilities (Destalia, 2014). Because in applying the PBL model, students must understand, plan, solve, and check each problem (Pradestya et al., 2019).

The PBL model has advantages, including according to the lives of students, having concepts according to student needs, being inquiry, having solid ideas, and emphasizing problem-solving. However, there are also weaknesses, including complex learning, difficulty finding relevant problems, and the need for a longer time. Moreover, in solving problems, students must be able to find solutions that form in the actual learning process (Vera & Wardani, 2018). Following the Standardization in the Regulation of the Minister of National Education Number (22) of 2006 regarding problem-solving, including problem-solving ability, making and completing methods, and finding solutions that are the objectives in analyzing these problems. In this case, several researchers have also researched problem-solving skills based on several learning strategies and models, such as the PBL problem-based learning model (Yusri et al., 2018). However, most of these studies are more focused on problem-solving skills for students in high school, as well as research on the effect of PBL on problem-solving abilities (Supiandi & Julung, 2016) and learning outcomes (Janah et al., 2018) in high school.

However, most of these studies focus on problem-solving skills for high school students, as is the case with Pramestika et al. (2020), who examined the effect of PBL on problem-solving abilities in elementary school. In addition, research on the influence of PBL-based learning models was also conducted on subjects other than biology. For example, Farisi et al. (2017) examined the effect of PBL-based learning on Physics subjects. Woa et al. (2018) examine PBL-based learning models' impact on geography subjects.

In comparison, research on PBL on students' problem-solving abilities in biology subjects is still tiny, especially for students in Islamic boarding schools. So there is a need for this research to determine the effect of the PBL learning model on the ability to solve problems in students' ecosystem materials. The results of this study are expected to be a reference for future researchers to develop research on PBL. The results of this study show that there is an effect of PBL on solving problems in learning ecosystem material biology and can be a reference for students, lecturers, and future researchers to develop this research.

B. Material and Method

The type of research used is a quasi-experimental study involving two classes, namely the control and experimental classes. The research design used was a pre-test-post-test control group design. The independent variable in this study is the application of the problem-based learning model, while the dependent variable is the student's problem-solving ability. The researcher carried out the research at the Modern Islamic Boarding School Nurul Hakim Tembung in April 2022. The population in this study was four classes with a total of 108 students. The sample consisted of 2 classes, namely class X IPA A as the experimental

class and class X IPA B as the control class. The researcher determined the sample used in this study through a cluster random sampling technique where only two classes were selected for the experimental and control classes from four classes. The experimental class X IPA A as many as 26 students, and the control class X IPA B has as many as 26 students.

The data collection technique used a test instrument that was compiled based on indicators of problem-solving abilities in the form of 25 multiple choice questions with cognitive levels C1 - C6 given to students. The test instrument was validated by two validators: one content validator and one construct validator. This research's data analysis technique used normality, homogeneity, and hypothesis testing. The normality test is useful for determining the data that has been collected is normally distributed or taken from an average population. Hypothesis testing uses to find the

difference in the average of the two classes, namely the control and experimental classes, with the help of SPSS 16.00 for windows.

C. Results and Discussion

Based on the study's results, a paired sample test determines the learning model's effect on the ability to solve problems with a significant value of 0.000 (Table 1). Because the significant value is far below 0.05, then H_0 is rejected. So at the 95% confidence level, the PBL learning model affects the problem-solving ability of Islamic boarding school students. Descriptively, through the post-test average score, students in the experiment were 80.19, while students in the control class obtained an average post-test score of 65.57 (Table 2). This research result indicates that the PBL learning model can improve problem-solving skills.

Table 1 Paired sample test (t-test) results

| | Paired Differences | | | | | t | df | Sig. (2-tailed) |
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
				Lower	Upper			
Pair 1 Pre-test Experiment - Post-test Experiment	-20.192	6.242	1.224	-22.713	-17.671	-16.495	25	.000
Pair 2 Pre-test Control - Post-test Control	-5.192	4.118	.808	-6.856	-3.529	-6.429	25	.000

Table 2 Post-test result of problem-solving skills

	N	Minimum	Maximum	Mean	Std. Deviation
Post-test of experimental class	26	65	100	80.19	10.147
Post-test of control class	26	50	80	65.58	7.393
Valid N (listwise)	26				

Applying the PBL learning model can improve students' problem-solving skills because students get the facility to develop their problem-solving abilities. This data can be seen from the average value of the experimental class's problem-solving ability, which is higher than the average value of the control class (Figure 1). This is because the experimental class applied a PBL learning model, and the control class used a conventional learning model.

This result is in line with Woa et al. (2018), where the PBL model helps improve student problem solving, including; 1) training students' PBL skills and analyzing problems, (2) building teamwork to solve problems, (3) students must practice their ability to find solutions to problems.

Compared with previous research, there are consistent results. Khoiriyah & Husamah (2018) reported that applying the PBL model could improve students' problem-solving skills, but it is recommended that teachers pay attention to the cognitive style of each student. Hidayati & Wagiran (2020) reported moderate aspects of problem-solving skills. Sari et al. (2021) also reported a significant increase in problem-solving ability.

The PBL model emphasizes that students learn independently and are directly involved in the learning process, and the teacher is only a facilitator (Maryati, 2018). Constructivism theory is in line with the character of the PBL model, which emphasizes problems in improving cognitive abilities (Yuliani et al., 2021). According to Pradestya et al. (2019), problem-solving syntax

includes (1) understanding problems in the form of remembering (C1) and understanding (C2). (2) Problem-solving planning means students can solve problems according to the plan. In this stage, the ability to analyze (C4) and evaluate (C5) is needed. (3) Looking back at problem-solving means enabling self-identification. So at this stage, creativity (C6) is the last step in solving the problem.
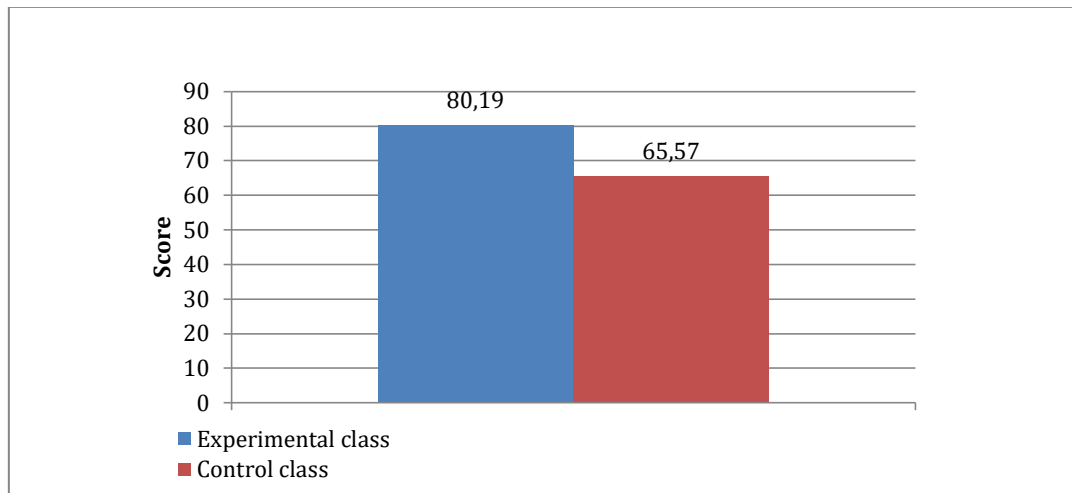

Figure 1
Diagram of the Post-test Average Score of Problem-Solving Ability in the Experiment and Control Class

Learning outcomes using the PBL learning model are better than conventional learning activities (Sahyar et al., 2017). This difference is because the learning stages of the PBL model support student activities independently, actively, and critically (Faudiah et al., 2018). Learning the PBL model affects problem-solving skills in each syntax (Kadir et al., 2016; Zakiah et al., 2019). Characteristics of students who are given problem-based learning become more active than in classes with conventional learning (Sari et al., 2021). Students, through problem-solving, explore examples, propose hypotheses, describe findings, and make conclusions (Letsoin, 2021; Hannania et al., 2022).

D. Conclusion

The study concluded that the PBL model affects the problem-solving ability of Islamic boarding school students. It describes a significant difference between learning outcomes using the PBL and conventional learning models. Problem-solving skills are acquired because PBL syntax supports independent, active, and critical activities. This learning model can be the basis for future learning activities because it affects Islamic boarding school students. However, further analysis is still needed, especially since teachers need to understand each student's cognitive characteristics to carry out more appropriate learning activities.

E. References

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