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THE EFFECTIVENESS OF THE PROBLEM-BASED LEARNING MODEL ON GEOGRAPHY LEARNING OUTCOMES

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A B S T R A C T

This research aims to determine the effectiveness of problem-based learning models on geography learning outcomes. The study used a quasi-experimental design with a non-equivalent control group design. The sampling method is purposive sampling with samples of class X IPS 1 as the experiment class and class X IPS 2 as the control class. The techniques in data collection used are tests, questionnaires, observations, and documentation. The data analysis used is descriptive statistical analysis and inferential statistics. The results show a difference between learning outcomes using a problem-based model and learning outcomes without problem-based models. The problem-based learning model is effective in learning outcomes of Geography class X social studies SMA Negeri 1 Rantau Badauh. Student learning outcomes in the experimental type have increased significantly because, in the learning process, students play an active role in finding the concept of learning materials so that students can apply these concepts to identify existing problems. Problem-based learning model provides a more concrete learning experience so that the understanding students get in learning is not limited to textual but to a broader mastery of the material.

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PRELIMINARY

Education is essential in improving a country's quality of human resources. According to *Undang-Undang Sistem Pendidikan Nasional*, education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious, spiritual power, self-control, personality, noble moral intelligence, and the necessary skills for themselves, society, nation, and state (Noor, 2018). Creating quality human resources will make a meaningful change for the Indonesian government. For this reason, in the educational process, there need to be innovations, methods, or learning models that can create new things that can motivate and challenge students to develop their potential optimally.

The Indonesian Government has done various ways to improve the quality of human resources through the education sector, from providing educational facilities and infrastructure, improving teacher competence, and developing a curriculum that adapts to changing times. In 2022 the Indonesian Government, through the Ministry of Education and Culture of Research and Technology, implemented a new curriculum called the Merdeka Curriculum. In the Merdeka Curriculum, learning is more focused on students, while the teacher is a facilitator in education, where students are required to be more active in learning.

Education is not only to prepare students to acquire a profession or position, but students are also required to be able to solve problems in everyday life, as is the case in learning geography, which requires students to develop the ability to think critically in seeing natural or social phenomena based on the point of view of geography (Robinson, 2019). Determining students' success in mastering geography material can be done by looking at student learning outcomes.

However, the reality is that school learning is different from expected. The learning process is just listening, doing assignments, and only focusing on books, so learning in the classroom is very passive (Komariah et al., 2019; Suliyati et al., 2018; Wicaksana et al., 2020). This is in line with the results of observations that researchers, namely have made. There are various problems, including teachers often using expository methods (lectures); students tending to be passive during the learning process, low interest in learning students; and geography learning outcomes are still common. If these problems are allowed, they will hurt the learning process in schools. Therefore, a solution is needed so students are more actively involved in learning. One of the learning models that can be used as a solution is the problem-based learning model.

Problem-based learning is a learning model that begins with problems found in the surrounding environment, then students collect information and integrate it with knowledge newly developed by students independently. In applying the problem-based learning model, students must be active and fully involved in solving each problem by constructing their knowledge and understanding (Fitriyanti et al., 2020; Tarigan et al., 2021). This is so that students can develop their thinking skills because they will obtain information from various learning resources regarding the material being studied. The problem-based learning model is considered to have advantages, including students learning to solve problems by integrating the knowledge they have, students are motivated to find and know the necessary knowledge, improving students critical thinking ability, increased motivation to learn, and can float interpersonal relationships in study groups (Djonomiarjo, 2020a).

This study aims to analyze the effectiveness of problem-based learning models on geography learning outcomes. Researchers assume that students' cognitive learning outcomes can be influenced by applying a problem-based learning model, thus making students more active and able to find solutions to a problem.

RESEARCH METHODS

The method used in this study is a quasi-experiment. Quasi-experiment is a type of comparison that compares the effect of giving a treatment (Treatment) on an object (experimental group) and sees the magnitude of the impact of the treatment. The designs used in this study were pretest and posttest control designs. This design has two groups: the experimental and control classes. At the beginning of learning, students will be given a pretest. At the end of learning, they are given a posttest to find out their understanding of student geography concepts after carrying out the learning process.

The study subjects were students of SMA Rantau Badauh class X IPS 1 as an experimental class (23 students) and students of class X IPS 2 as a control class (22 students). The sampling technique uses a purposive sampling technique. Purposive sampling is a sampling technique based on a specific goal and consideration made by the researcher based on the population's previously known characteristics or traits.

The data collection carried out uses test techniques and documentation. First, test the instrument requirements in this study using a normality and homogeneity test and continue with the t-test used to test the research hypothesis. An effectiveness test used a relative efficiency formula to strengthen the hypothesis test results. The data analysis techniques used are descriptive statistics and inferential statistics.

RESEARCH RESULTS AND DISCUSSION

Learning outcomes are abilities obtained by students after the learning process. Therefore, one of the indicators of achieving a learning process is to look at the learning outcomes achieved by students, however, before the learning process is carried out, a test is first carried out to determine the student's initial ability (pretest) in the experimental class and control class. The pretest determines the average student's ability between the experimental and control classes.

Pretest and Posttest Score

Table 1. Pretest and posttest average score

Class	Average
Experiment	
- Pretest	- 49,24
- Posttest	- 79,71
Control	
- Pretest	- 49,41
- Posttest	- 59,95

Source: Primary Data (2022)

Based on Table 1. it can be explained that the average pretest scores of the experimental class and the control class do not differ much. The average value of the experimental class pretest was 49.24, and the average value of the control class pretest was 49.41. Both the experimental and control classes have relatively the same initial ability.

After being given a different learning model treatment between the experimental class (PBL model) and the control class (expository model), students then worked on a posttest to see a picture of learning outcomes after being given the treatment. The post-test results found differences in learning outcomes between students in the experimental and control classes. For example, the post-test data in table 1 shows that students in the experimental class had a more excellent average score (79.71) than the average post-test score of students in the control class (59.95).

Normality Test

A normality test is carried out to determine whether the data used is normally distributed. Normality tests are performed against the control class and the experimental class. The data can be said to be normally distributed if it meets the criteria for normality, namely

Sig.>α (0.05), and it is said that it is not normally distributed if Sig.< α (0.05). The following results were obtained based on data analysis using SPSS version 25.

Table 2. Experimental class and control class pretest normality test with Kolmogorov-Smirnov

Student Learning Outcomes	Class	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
	Pretest Exsperiment	0,142	23	0,200*
	Pretest Control	0,128	22	0,200*

Source: Primary Data (2022)

Based on table 2, the normality test results for the experimental class pretest obtained the value of Sig. = 0.200>0.05, while the control class pretest normality test results obtained the Sig value. = 0.200>0.05. This shows that the experimental and control classes' pretest data meet the normality test's criteria, so it can be said that the pretest data of learning outcomes in the experimental and control classes are normally distributed.

Homogeneity Test

The homogeneity test determines whether the data used are from the same population. This test was carried out on pretest and posttest results in data to find similarities in student learning outcomes (experimental and control classes) before and after treatment. The data is homogeneous if it meets the criteria of homogeneity, namely if Sig.>α (0.05) and if Sig.< α (0.05), then the data is not homogeneous. Based on the results of data analysis using SPSS version 25.

Table 3. Homogeneity test results in the pretest experimental class and control class

		Levene Statistic	df1	df2	Sig.
Student Learning Outcomes	Based on Mean	0,597	1	43	0,444
	Based on Median	0,589	1	43	0,447
	Based on Median and with adjusted df	0,589	1	39,770	0,447
	Based on trimmed mean	0,621	1	43	0,435

Source: Primary Data (2022)

Based on table 3, the results of the homogeneity test on the pretest values of the experimental class and the control class obtained a significant value based on a mean of 0.444 > 0.05 so that it can be concluded that the data on the pretest value of the control class and the experimental class is homogeneous. The results of the homogeneity test calculation of the experimental and control classes' post-test values are presented in table 4 below.

Table 4. Homogeneity test results posttest experimental class and control class

		Levene Statistic	df1	df2	Sig.
Student Learning Outcomes	Based on Mean	3,899	1	43	0,555
	Based on Median	3,803	1	43	0,558
	Based on Median and with adjusted df	3,803	1	40,573	0,058
	Based on trimmed mean	3,930	1	43	0,554

Source: Primary Data (2022)

Based on table 4, it is known that the results of the homogeneity test of the post-test value of the experimental class and the control class obtained a significant value based on a mean of 0.555 > 0.05 so that it can be concluded that the data of the posttest value of the control class and the experimental class are homogeneous.

T-Test

After the prerequisite test is carried out, further hypothesis testing is carried out. Hypothesis testing was carried out with parametric statistics because the experimental and control classes' data were normally distributed. Hypothesis testing was carried out using student learning outcomes obtained from posttest scores. Hypothesis testing is carried out with a t-independent sample test. The following is the data from calculating the independent sample test in the experimental and control classes.

Based on the results of the t-test calculation in table 6, obtained in the equal variances assumed column, the significance value is 0.000, and the calculated t-value = 6.109 with a confidence level of 95% ($\propto$ = 5%). If the significance value (2-tailed) < 0.05, then the hypothesis states there is a difference in learning outcomes between students who are given a problem-based learning model treatment and students who are not given a problem-based learning model treatment. Based on the data in table 6, Sig. Value is known. 0.00<0.05 means that the research hypothesis is accepted.

Table 5. T-Test Results Posttest Scores experimental class and control class

Value			Levene's Test for Equality of Variances		t-test for Equality of Means						
			F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Student Learning Outcomes	Equal variances assumed		3,899	0,055	6,109	43	0,000	20,247	3,314	13,564	26,930
	Equal variances not assumed				6,062	37,394	0,000	20,247	3,340	13,482	27,012

Source: Primary Data (2022)

Effectiveness Test

The effectiveness test determines whether the problem-based learning model is effective in the learning outcomes of Geography class X SMA Negeri 1 Rantau Badauh. Variants of the post-test values of the experimental class and the control class are presented in the following table 6.

Table 6. Posttest value variance

Variants	Posttest	
	Exsperimen	Kontrol
	89,361	197,402

Source: Primary Data (2022)

Relative efficiency θ_2 towards θ_1 Formulated:

$$R(\hat{\theta}_2,\hat{\theta}_1) = \frac{E(\hat{\theta}_1-\theta)^2}{E(\hat{\theta}_2-\theta)^2} \text{ or } \frac{Var\hat{\theta}_1}{Var\hat{\theta}_2}$$

So that:

$$R(\hat{\theta}_2,\hat{\theta}_1) = \frac{Var\hat{\theta}_1}{Var\hat{\theta}_2}$$

$$R(\hat{\theta}_2,\hat{\theta}_1) = \frac{89,361}{197,402}$$

$$R(\hat{\theta}_2,\hat{\theta}_1) = 0,452.$$

Based on the effectiveness test results, it is known that the value of $R < 1$ ($0.452 < 1$) is relatively θ_1 more efficient than θ_2. This means that the problem-based learning model is effective in learning outcomes of Geography class X IPS 1 SMA Negeri 1 Rantau Badauh.

Based on the study's results, it can be explained that student learning outcomes consist of two values: pretest and post-test scores; pretest scores are obtained before the learning process. In contrast, post-test scores are received after the learning process, and the treatment used in this study applies a problem-based learning model. The results showed that the problem-based learning model could improve students' learning outcomes in class X IPS 1 (as an experimental class).

From the posttest scores, it is clear that students' learning outcomes in the experimental class have increased compared to the posttest scores of the control class. However, student learning outcomes in the experimental class (XI IPS 1) and control class (XI IPS 2) differed, as seen from the t-test scores. Based on the results of the t-test, a value with a significance of 0.000 was obtained, which means that there is a difference in the average value of the pretest and posttest, or there is a difference between the values before and after the application of the problem-based learning model.

The success of learning using a problem-based learning model because this model has specific characteristics such as helping students in developing critical thinking and problem-solving skills and can improve intellectual skills so that in the learning process, students can play an active role in solving problems that have been given by teachers both individually and in groups. As described (Ali, 2019; Moust et al., 2021), the problem-based learning model gives students flexibility in implementing their experiences to solve problems to influence learning outcomes. Moreover, the issues presented in the learning process reflect the natural conditions faced in everyday life (Hmelo-Silver & Eberbach, 2012; Seibert, 2021; Temel, 2014).

In line with the opinion (Wyness & Dalton, 2018), problem-based learning models are designed to foster students' curiosity about a problem to improve students' skills to solve the problem by thinking critically. Strengthening opinions (Wyness & Dalton, 2018), (Hakan, 2018) explained that the learning process through a problem-based learning model would lead students to understand the solution to a problem. The success of a learning process can be seen from the completeness of student learning outcomes supported by the teacher in carrying out learning (Deepak, 2019; Gorghiu et al., 2015; Savery, 2015).

Learning outcomes are the final result of implementing learning activities in schools. Learning outcomes can be improved through systematic conscious efforts, leading to positive changes. Internal and external factors that influence learning outcomes and the model's application are internal and external factors. Internal factors are the teaching and learning activities that can change student behavior, including motivation, concentration, and reactions.

Motivation can arise if students are willing to improve themselves and learn (Khoiriyah & Husamah, 2018; Nurtanto et al., 2020; SİLVİARZA et al., 2020).

Meanwhile, concentration is centered on attention to the learning outcomes achieved. In learning activities, concentration is needed because if students cannot concentrate on learning activities. It will affect learning outcomes that could be more optimal. Therefore, concentration can influence learning activities to achieve the learning objectives themselves. Reactions to the learning process also require physical and mental elements. With the presence of students, the learning process comes to life (Herzon et al., 2018; Suryawati et al., 2020). Students are not just sitting, silent, listening, or simply being objects in learning, but rather as subjects in education.

Based on the research findings, problem-based learning models effectively improve learning outcomes. The problem-based learning model is suitable to be applied because it has many advantages, including: (1) can increase student activities fully, both physically and mentally, (2) can make students learn not by memorization but rather through the process of the student experience in real life, (3) classes in problem-based learning as a place to solve a problem in the field, (4) the students themselves construct the subject matter by being guided by the teacher (Djonomiarjo, 2020b; Harizah et al., 2022; Siahaan et al., 2019).

CONCLUSION

The application of problem-based learning models has a positive influence on improving student learning outcomes. Increased learning outcomes characterize this before and after implementing the problem-based learning model. Furthermore, the results showed that the problem-based learning model was effectively used compared to the expository model. Therefore, it is hoped that teachers will be able to use the problem-based learning model optimally and not only make the problem-based learning model an alternative in learning activities. So that it can improve the quality of education, especially in Geography subjects. The research implies that it can assist teachers in choosing the suitable learning model to enhance student learning outcomes.

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