

Effectiveness Of Problem-Based Learning Model On Students' Understanding Of Concepts In Social Sciences Subjects

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Abstract: This study aims to examine the effectiveness of implementing the Problem-Based Learning (PBL) model in improving students' conceptual understanding in Social Studies at SMP Negeri 3 Sambas, which served as the research site at the junior high school level. The research was conducted at SMP Negeri 3 Sambas, an institution under the supervision of the Sambas District Education Office. The school is located at Jalan Pendidikan No. 278, Sambas Subdistrict, Sambas District, West Kalimantan Province, with the postal code 79162. The main problem underlying this study is the low level of students' conceptual mastery and the suboptimal application of learning models that align with the ideal steps of PBL. This research employed a quantitative method with a pre-experimental design, specifically the One Group Pretest-Posttest Design. The sample consisted of 29 students from class VIIIA selected through Cluster Random Sampling. The research instrument was a multiple-choice test comprising 20 items administered before and after the treatment. Data were analyzed using the Wilcoxon Signed Rank Test due to the non-normal distribution of the data. The results showed a significance value of 0.000 (<0.05), indicating a significant difference between the pretest and posttest scores. The average pretest score of 36.03 increased to 60.00 after the treatment. An effect size of 1.58, categorized as very large, indicates that the PBL model has a strong positive impact on enhancing students' conceptual understanding. Therefore, PBL is considered effective for Social Studies learning at the junior high school level. Teachers are encouraged to prepare thoroughly to ensure successful implementation and the achievement of intended learning objectives.

Keyword: Conceptual Understanding; Problem-Based Learning; Social Studies.

Introduction

Education is a lifelong learning process, where individuals acquire knowledge from various contexts and situations that have a positive impact (Annisa, 2022). Education can be used as a means to create quality human resources (Sabrina & Rusanti, 2022). According to Salsabila et al., (2024) learning is essentially a process undertaken by individuals to achieve new behavioral changes as a result of their own experiences interacting with their environment. Student engagement in learning is one of the most crucial components of educational success. This engagement not only improves academic achievement but also develops important life skills, such as critical thinking and adaptability (Faridah et al., 2024).

Education in Indonesia faces various challenges, particularly in rural areas. Lack of adequate facilities and infrastructure to support diverse learning models may be a challenge. Lack of textbooks, technological devices, and adequate physical facilities are issues that must be addressed (Agustang, 2023). Therefore, a learning model capable of stimulating students' critical and collaborative thinking is needed. One such model is Problem-Based Learning (PBL). PBL engages students in solving real-life problems relevant to their social context (Wahyuni et al., 2020).

Problem-Based Learning (PBL) encourages students to identify problems, analyze information, and formulate logistical solutions, thereby assisting them in addressing and resolving real-life problems that arise during the learning process (Abdurahman et al., 2023; Nuraeni et al., 2025). To support this, PBL has several supporting theoretical perspectives, one of which is constructivism. According to constructivism theory, learning is not merely memorizing but rather the process of creating knowledge from experience. The teaching process in constructivism theory does not simply transmit knowledge from the teacher to students, but rather supports students in creating their own knowledge through activities related to the phenomena and objects they desire to understand (Lathifah et al., 2024).

Researchers' observations found that the learning process at SMP Negeri 3 Sambas has utilized the PBL model. However, the implementation of this model has not fully followed the steps outlined in the Problem-Based Learning concept. The results of the researcher's pre-research, conducted through interviews, encouraged researchers to continue research on the effectiveness of the Problem-Based Learning model by implementing the appropriate steps.

Methods

This study uses a quantitative approach with an experimental method aimed at understanding the influence of independent variables on the dependent variable in a controlled situation (Darwin et al., 2021; Sugiyono, 2021). The type of research used

in this study is Pre-Experimental Designs (non-designs) with a one-group pretest-posttest design. Quantitative Pre-Experimental Designs (non-designs) are a type of experiment that cannot yet be categorized as a true experiment because there are still independent variables that influence the formation of the dependent variable (Sugiyono, 2021). The research design used is a "One Group Pretest-Posttest Design" which involves a pretest before the treatment is given and a posttest after the treatment is given. The following is an overview of this research design:

Table 1. Research Design

$O_1 \times O_2$	
O_1	Pretest value
X	Treatment
O_2	Posttest value

The subjects in this study were eighth-grade students of SMP Negeri 3 Sambas, with class VIII A as the sample selected through cluster random sampling technique, totaling 29 participants. The data collection instrument was multiple-choice questions that had been validated previously. The initial step of the analysis was carried out through a normality test using Shapiro-Wilk, because the number of samples was less than 50. This test aims to determine whether the data has a normal distribution. After that, a homogeneity test was carried out using the Levene Test to ensure the equality of variance between the data. If the data is normal and homogeneous, then the hypothesis analysis was carried out using a paired sample t-test. However, if the data is not normal, then the non-parametric Wilcoxon Signed Rank Test was used. In addition, to determine the magnitude of the influence of the PBM model, an effect size calculation was carried out as an indicator of the level of effectiveness of the treatment given.

Results And Discussion

Results

The results of the data analysis were conducted to determine the distribution of pretest and posttest scores using the Problem-Based Learning model. Based on the results using SPSS version 25, these can be seen in Table 2 below:

Table 2. Results of Pretest and Posttest Data Analysis

Test Stage	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	29	15	70	36,03	14.103
Posttest	29	35	90	60.00	15.178

Based on Table 2, the average student score in the pretest was 36.03 with a standard deviation of 14.103. After the treatment, the average score increased to 60.00 in the

posttest with a standard deviation of 15.178. This indicates a change in students' conceptual understanding after using the problem-based learning model.

After obtaining the results of the pretest and posttest data analysis, a normality test was conducted to determine whether the data were normally distributed. In this study, the normality test was conducted using the Shapiro-Wilk test using SPSS version 25. The results of the Shapiro-Wilk normality test can be seen in Table 3 below:

Table 3. Normality Test Results

Test Stage	Shapiro-Wilk		
	Statistic	df	Sig.
<i>Pretest</i>	,922	29	.034
<i>Posttest</i>	,956	29	.263

Based on the results in Table 3, the significance value for the conceptual understanding pretest data was 0.034, which is below the 0.05 threshold. This indicates that the pretest data were not normally distributed. Meanwhile, the significance value for the posttest data was 0.263, which is higher than 0.05, thus

		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	.749	1	56	.390
	Based on Median	.866	1	56	.356
	Based on Median and with adjusted df	.866	1	54.943	.356
	Based on trimmed mean	.842	1	56	.363

concluding that the posttest data were normally distributed. Therefore, the overall data did not meet the assumption of normality.

After the normality test was conducted, the researcher continued with a homogeneity test to determine whether the data variance was homogeneous. The homogeneity test in this study was conducted using SPSS version 25 software using Levene's Test with a significance level of 0.05. The results of the homogeneity test are shown in Table 4.

Table 4. Homogeneity Test Results

	Post Test - Pre Test
Z	-4.604
Asymp. Sig. (2-tailed)	.000

Based on the results in Table 4, the homogeneity test for student conceptual understanding data showed a significance value of 0.390. Because this value is greater than 0.05, it can be concluded that the data variance in this study is homogeneous.

However, the normality test indicated that the data were not normally distributed, as the significance value was below 0.05. Given the homogeneity of the data but not normal distribution, the hypothesis was tested using the non-parametric Wilcoxon Signed Rank Test. This test was conducted using SPSS version 25 software. The results of the Wilcoxon test can be seen in Table 5 below:

Table 5. Wilcoxon Test Results

Based on the calculation results in Table 5, the Asymp. value for signature (2-tailed) was 0.000. This value is below 0.05, thus meeting the criteria for accepting the alternative hypothesis (H_a) and rejecting the null hypothesis (H_0).

Thus, it can be seen that there is a significant difference between the pretest and posttest scores. This finding indicates that the implementation of the Problem-Based Learning model has an impact on improving students' conceptual understanding in eighth-grade social studies at SMP Negeri 3 Sambas.

Next, to determine the extent of the influence and effectiveness of the problem-based learning model, an effect size calculation was performed. The effect size calculation is as follows:

$$\begin{aligned}
 \text{Effect Size} &= \frac{\bar{X}_{\text{post}} - \bar{X}_{\text{pre}}}{SD} \\
 \text{Effect Size} &= \frac{60,00 - 36,03}{15,20} \\
 &= \frac{60,00 - 36,03}{15,20} \\
 &= \frac{23,97}{15,20} \\
 &= 1,58
 \end{aligned}$$

Based on the calculation results above, the effect size value was 1.58. Referring to the effect size interpretation criteria, this value is categorized as very large. This finding indicates that the Problem-Based Learning model is highly effective in improving

students' conceptual understanding of social studies in eighth-grade students at SMP Negeri 3 Sambas.

Discussion

The results of this study showed a significant difference between students' conceptual understanding before and after the implementation of the Problem-Based Learning model. Before the treatment, the average pretest score of students was 36.03, indicating that students' conceptual understanding was still relatively low. This finding is in line with research conducted by Handayani (2024), yang juga memiliki nilai rata-rata pretest pada kelas eksperimen adalah 25,50, which also had an average pretest score in the experimental class of 25.50, while in the control class it was 24.25. In addition, research conducted by Afandi et al., (2024) also showed pretest results that were not much different, where the average pretest score was 57.40, indicating that before being given treatment, students' initial understanding of the material being taught still needed to be through more effective learning methods. From the results of existing research, it shows that basically, students before being given learning treatment had almost the same initial understanding of the material being tested, thus, these pretest results reinforce that students need a more active, contextual, and student-centered learning model.

After measuring students' initial abilities through a pretest, a posttest was administered to determine their conceptual understanding after implementing the Problem-Based Learning model. The posttest results showed an average score of 60.00. This finding aligns with research conducted by Ardi et al., (2023) which demonstrated that implementing the Problem-Based Learning model can improve student learning outcomes in social studies. In their study, students' average posttest scores increased significantly, from 54.44 in the pretest to 77.41. A similar finding was found in research conducted by Rosmita et al., (2020) where the average posttest score after implementing the Problem-Based Learning model reached 60.23, an increase from the pretest score of 50.52.

Based on the data obtained, student scores increased after implementing the Problem-Based Learning model. This increase in average posttest scores reflects that most students demonstrated a better understanding of the material after participating in the learning process with this approach. Thus, Problem-Based Learning can be used as an appropriate alternative learning model, particularly in social studies. This model not only improves students' conceptual understanding but also encourages active involvement, collaboration, and analytical thinking skills in addressing real-life problems.

Furthermore, based on the analysis using the Wilcoxon test with SPSS version 25, the Asymp. Sig. (2-tailed) value was 0.000. This value is smaller than the 0.05 significance

level, thus concluding that there is a significant difference between the pretest and posttest results. Thus, the Problem-Based Learning (PBL) model influences eighth-grade students' conceptual understanding of social studies at SMP Negeri 3 Sambas. These results align with research conducted by Sari & Ahmad (2025), who also used the Wilcoxon test and found that the alternative hypothesis (H_a) was accepted. These findings indicate that PBL is an effective learning model for improving student understanding.

The implementation of the PBL model has a positive impact because it actively engages students in the learning process. In this model, students act not only as passive recipients of information but also as active subjects in identifying and solving problems. Theoretically, PBL is also relevant to the constructivist approach, which emphasizes that learning will be more effective when students construct their own knowledge through direct experience. In the context of social studies learning, this approach helps students understand social phenomena contextually and critically. Therefore, based on the results of this study, the Problem-Based Learning model is worthy of recommendation as an innovative learning strategy that social studies teachers can implement to improve the quality of learning processes and outcomes at the junior high school level.

To determine the effectiveness of the Problem-Based Learning model on students' conceptual understanding in social studies, further analysis was conducted using effect size calculations. Effect size is used to measure the extent to which a given treatment influences student learning outcomes. The larger the effect size, the greater the impact, and thus can be used as a basis for declaring the effectiveness of a learning model. The calculation resulted in an effect size of 1.58, which falls into the very large effect category. This finding aligns with the results of research by Aldila & Mukhaiyar (2020) which obtained an effect size of 1.28, which falls into the large category. Both results indicate that the Problem-Based Learning model has a strong practical impact on improving students' conceptual understanding, particularly in social studies. This means that it is not only statistically significant but also demonstrates a significant real impact on student learning outcomes.

This finding corroborates the previous Wilcoxon test results, which showed a significant difference between pretest and posttest scores. Therefore, based on the effect size analysis, it can be concluded that the Problem-Based Learning model is highly effective in improving students' conceptual understanding in social studies in eighth-grade students at SMP Negeri 3 Sambas. Therefore, this model is worthy of being recommended as an alternative innovative learning strategy in order to achieve more optimal learning outcomes at the junior high school level.

Conclusion

Based on the previous results and discussion, it can be concluded that students' conceptual understanding before implementing the Problem-Based Learning (PBL) model was still relatively low. This is reflected in the pretest results, which showed an average score of 36.03, indicating that most students did not fully understand the material. After implementing the PBL model, there was a significant increase in students' conceptual understanding, as demonstrated by the posttest results, with an average score of 60.00. This increase reflects a significant improvement in students' mastery of the material after participating in the PBL learning process.

To determine the extent of the effect of the PBL model, a hypothesis test was conducted, which showed a significance value of 0.000 (<0.05). These results indicate a significant difference between the pretest and posttest scores, thus accepting the alternative hypothesis (H_a) and rejecting the null hypothesis (H_0). The PBL model has been shown to improve students' conceptual understanding because it encourages active involvement in the learning process, develops critical thinking skills, and builds knowledge through contextual problem-solving. Furthermore, based on the effect size calculation of 1.58, the model's effect is categorized as very large. This not only demonstrates statistical significance but also a strong practical impact on student learning outcomes.

Thus, the Problem-Based Learning model is effective in social studies, particularly in improving eighth-grade students' conceptual understanding at SMP Negeri 3 Sambas. This model also aligns with the constructivist approach, which emphasizes active student involvement in constructing knowledge. Recommendations for future research include considering the strengths and limitations of the Problem-Based Learning model and designing more optimal implementation times, for example, by more systematically separating the pretest, treatment, and posttest. This aims to maximize the implementation of learning strategies and allow for a more in-depth study of students' conceptual understanding.

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