

Teaching Materials Using the Project Based Learning Model on Learning Outcomes of Elementary School Students

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ABSTRAK

Perangkat pembelajaran harus mendukung pembelajaran guru dan siswa untuk mencapai hasil belajar. Tidak adanya bahan ajar akan menjadi penghalang untuk hasil belajar yang baik. Pendidik diminta untuk berpartisipasi secara aktif dalam pembuatan perangkat pembelajaran yang inventif, termasuk bahan ajar yang menarik, dengan kurikulum bebas ini. Untuk menarik minat siswa untuk belajar. Peserta didik yang senang belajar akan membantu guru dalam proses pembelajaran. Tujuan dari penelitian ini adalah untuk menganalisis seberapa besar pengaruh bahan ajar terhadap hasil belajar peserta didik kelas V Sekolah Dasar. Metode yang dipakai adalah kuantitatif. Instrumen yang digunakan berupa observasi, wawancara, dan angket. Teknik analisis data berupa uji reliabilitas, uji validitas, uji prasyarat analisis, dan uji hipotesis. Sampelnya berjumlah 32 peserta didik yang berada di kelas V Sekolah Dasar. Hasil penelitian ini memperoleh pengaruh bahan ajar sebesar 61% terhadap hasil belajar peserta didik. Sedangkan 39% dipengaruhi dari faktor diluar penelitian ini. Disimpulkan bahwa penggunaan bahan ajar yang menggunakan model pembelajaran berpengaruh terhadap hasil belajar siswa.

ABSTRACT

Learning tools must support teacher and student learning to achieve learning outcomes. The absence of teaching materials will be a barrier to good learning outcomes. Educators are asked to actively participate in creating inventive learning tools, including interesting teaching materials, with this free curriculum. Students who enjoy learning will help teachers in the learning process. The aim of this research is to analyze how much influence teaching materials have on the learning outcomes of fifth grade elementary school students. The method used is quantitative. The instruments used were observations, interviews and questionnaires. Data analysis techniques include reliability testing, validity testing, analysis prerequisite testing, and hypothesis testing. The sample consisted of 32 students who were in class V of elementary school. The results of this research showed that the influence of teaching materials was 61% on student learning outcomes. Meanwhile, 39% was influenced by factors outside this research. It was concluded that the use of teaching materials that use learning models influences student learning outcomes.

1. INTRODUCTION

Education is the arrangement of the curriculum and human efforts to build a personality that is in accordance with society's values or helps students develop and improve knowledge, skills, values, attitudes and behavioral patterns that are useful in life (Mohamad et al., 2018; Sumual & Ali, 2017). Education is the process of learning and developing a person's knowledge, skills, values and attitudes through various methods, such as education, training, research or experience. Education plays an important role in the development of individuals and society because it serves as the basis for improving the quality of life and advancing civilization. Learning outcomes can be influenced by the learning tools used by educators in the learning process, education can run as expected if the student environment is supportive (Marantika, 2021; Tshewang et al., 2017). Education can be divided into several levels, starting from primary education, secondary education, to higher education. Each level has different goals and curricula, designed to meet the developmental needs of students at different stages of their lives. Elementary and junior high schools usually cover basic courses in mathematics, science, languages, and

social studies. Higher education includes universities. The curriculum consists of pre-programmed lesson plans, materials and learning experiences that can be used by all educators to guide their teaching and learning practices (Bradley & Kendall, 2014; Chevalier et al., 2022). Learning devices are various tools and media used by teachers and students to carry out the learning process and must be prepared before learning can take place. The curriculum is often changed and updated to meet educational needs. current education and meet the demands of society. The curriculum functions as a guide for educators in designing and implementing teaching and learning activities to achieve the expected competencies in students (Bringula et al., 2021; Ramdani et al., 2019).

Teaching materials refer to all materials (both information, tools and texts) that are arranged systematically to comprehensively demonstrate the abilities that students will master and are used in the learning process to plan and study the implementation of learning (I. F. Ahmad, 2020; Alhassan, 2016). Learning devices are tools or resources used by educators to support and facilitate the teaching and learning process. Learning tools include various types of tools and materials intended to help students achieve educational goals, increase their understanding of ideas, and improve their skills. Learning tools also allow for a variety of different learning styles to meet students' needs. Research conducted previously has limitations regarding educators who do not understand technology in the process of making project videos (Li & Chu, 2021). Previous research conducted study about the problem that students were less creative in making posters that were used as projects (Ardhyantama & Widodo, 2020). Research conducted previously experienced problems in the form of students not understanding the material provided by educators, so that researchers experienced difficulties in implementing the project they were going to carry out (Asih & Ramdhani, 2019).

The importance of technology for educational development is very necessary, but development must also be adapted to the capabilities of the human resources around it. Researchers created a Pancasila Education module book by combining technology that is often accessed by educators and students, namely YouTube (Sutrisno & Murdiono, 2017). Before working on the students' worksheets, the researcher also presented teaching materials containing material in the chapters in the students' worksheets. As well as instructions for completing student worksheets that have been adapted to the teaching modules used in the independent curriculum. These learning models include discovery learning, PjBL, and PBL. By implementing the project-based learning model (PjBL), students have the opportunity to participate directly in creativity, solving problems, and creating and using new knowledge in works or products (S. T. Ahmad et al., 2023; Jalinus et al., 2019). The systematic steps in implementing the PjBL learning model are divided into six stages, namely: 1) Asking questions at the beginning, 2) Planning the project, 3) Determining the activity schedule, 4) Supervise the project implementation process, 5) Assessment, and 6). Project evaluation.

Project-based learning is an educational method in which students engage in long, in-depth projects to learn specific concepts or skills. In this method, students work together in teams or small groups to plan, manage, and complete projects that are relevant to the real world. Project-based learning encourages students to actively participate in the learning process, which improves their ability to solve problems, make decisions, and think critically (Bell, 2010; Beneroso & Robinson, 2022). Although they provide necessary guidance and resources, teachers act as facilitators or guides and let students take primary responsibility for their own learning. This method is used to improve important skills such as teamwork, communication, time management, and project technical skills. The advantage of the project-based learning model is that it can improve problem-solving and resource management abilities (Dewi, 2022; Sasson et al., 2018). The disadvantages of the PjBL model are that learning requires a lot of time and money, and changes in behavior experienced by students after learning activities are called learning outcomes. Learning outcomes are the abilities that students have after completing the learning process to convey the extent to which they have mastered the material taught, the academic achievements that students achieve through assessments, assignments, and proactively asking and answering questions that support their knowledge (Ashriah et al., 2020; Jalinus et al., 2019). Learning achievement is influenced by factors within the individual, which include physiological factors such as physical condition and the five senses, and psychological factors, which include talent, interests and intelligence (Koesoemadinata, 2022; Wijaya et al., 2022).

Therefore, there is a need for a learner model that can be used to support the process of learning activities. One of them is PjBL improving students' critical thinking abilities and cognitive skills by solving real life problems. This learning model can be combined with teaching materials and student worksheets. Teaching materials are a collection of learning aids used to achieve basic competencies, determined by educators, to teach basic competencies and abilities. Ineffective teaching materials can damage elementary school students' interest in learning (Prastyaningtyas & Wulansari, 2021; Pratiwi et al., 2023). The ability to analyze, evaluate, and interpret information rationally and logically is a critical thinking skill. These abilities include the ability to question beliefs, spot bias, evaluate evidence, and make good arguments. By thinking critically, a person can make better choices and solve problems in a systematic

and logical way. Critical thinking is the ability to view situations from multiple points of view, consider various possibilities, and evaluate the consequences of decisions made. It also includes the ability to spot and avoid logical errors and faulty reasoning (Kamil et al., 2019; Suastra et al., 2019).

Critical thinking in the classroom helps students make stronger arguments in writing and discussions and gain a better understanding of the subject matter. Critical thinking skills help employees make better choices, solve problems, and innovate. These skills help me personally make more rational daily decisions and maintain a balanced perspective and be open to new ideas. The availability of teaching materials helps students achieve learning goals and provides a reference for educators to use relevant teaching materials, which are designed to meet learning needs and are adapted to the characteristics of students and their social environment (Howard et al., 2022; Inggriyani & Fazriyah, 2017). This includes textbooks, modules, articles, videos and other digital materials used to support the teaching and learning process. The availability of teaching materials is very important because it affects the quality of education that can be provided and accessed by students, then the learning process can run more smoothly and effectively. Basically, educators only provide teaching materials that are available and ready to use, because they don't want to have difficulty compiling them themselves, and every time educators ask about the material being taught, students become quieter, have difficulty accepting what the educator says, and understand the book less. what they read (Maziyah et al., 2022; Sari, 2017). Even though educators use good learning models during the learning process they do not achieve the expected results, b educator manuals and student development books provided by the Ministry of Education and Culture continue to attract the attention of educators (I. F. Ahmad, 2020; Rudyanto, 2016).

The results of interviews with SD N 2 Brangkal educators revealed that educators had not yet developed PJBL model teaching materials. Apart from that, the results of observations show that students are less active when taught in lectures. Apart from that, the results of observations show that students are less active when taught in lectures. The aim of this research is to analyze the influence teaching materials have on the learning outcomes of class V students at Brangkal 2 Elementary School. The novelty of this study focus on influence teaching materials has on the learning outcomes.

2. METHOD

This research uses quantitative research. Quantitative research is a systematic method for collecting and analyzing numerical data with the aim of explaining a particular phenomenon, testing a hypothesis, or making predictions. This method usually uses instruments such as tests, surveys, and questionnaires to collect data that can be measured objectively.

Data in quantitative research is collected from a larger sample that is representative of the population. T-test, regression analysis, and analysis of variance (ANOVA) are some of the statistical techniques frequently used in data analysis to identify patterns, relationships, and differences between variables. Because it has been used for quite a long time, quantitative methods are referred to as traditional methods (Sugiono S, 2017). The sample in this study was 32 students in class V of SD N 2 Brangkal for the 2023/2024 academic year. The instruments used to collect data for this research used interviews, observations and questionnaires.

The data analysis technique used includes several important tests. First, the reliability test is employed to measure the consistency of the data collection instrument, usually using the Cronbach's Alpha method to assess the correlation between items in the instrument. Next, the validity test aims to ensure that the instrument accurately measures what it is intended to measure. Then, the normality test is conducted to check whether the data follows a normal distribution, which is a prerequisite for certain statistical tests. The linearity test is used to determine whether there is a linear relationship between two variables. Afterward, a prerequisite analysis is performed to ensure the data meets specific conditions before the main analysis is carried out. Finally, the hypothesis test is used to examine significant relationships or differences between the tested variables based on the hypotheses formulated beforehand.

3. RESULTS AND DISCUSSION

Results

The research gap consists of four clusters. The first cluster contains PKN, learning outcomes, and State Elementary School. The second cluster contains elementary schools, learning outcomes, and PJBL models. Cluster of learning outcomes and PKN. The fourth cluster consists of elementary schools, learning outcomes, teaching materials, and PJBL. The visualization of research gap is show in Figure 1.



Figure 1. Research Gap

The process of evaluation by people who have expertise and experience in a field relevant to a particular topic or study is known as expert validation. Expert validation is useful because it ensures that the methodology, results or products developed have been thoroughly checked and can be scientifically justified. It also improves the quality, accuracy, and relevance of research results or products, and reduces the possibility of errors in interpretation or implementation. This process can also offer new perspectives and deeper insights, which can improve people's understanding of the field in question.

An important process in research known as questionnaire validation involves evaluation by experts who have expertise in the relevant field to ensure that the instrument used can measure the variables or constructs to be studied accurately and reliably. This expert will examine each question in the questionnaire to ensure that they are clear, relevant, and worthy of research. In addition, questionnaire validation also involves testing it on a small group of people to ensure that the questions can be well understood by the intended target population. The results of this pilot test can be used to make further adjustments to the questionnaire. After the adjustment stage, validity and reliability analysis was carried out. Reliability analysis aims to analyze how consistent the questionnaire is in measuring the same variables if used on the same sample repeatedly. A validity test result is show in Table 1.

Table 1. Validity Test Results

No	t _{count}	t _{table}	Information	No	t _{count}	t _{table}	Information
1	0.782	0.296	Valid	6	0.437	0.296	Valid
2	0.785	0.296	Valid	7	0.534	0.296	Valid
3	0.647	0.296	Valid	8	0.725	0.296	Valid
4	0.573	0.296	Valid	9	0.554	0.296	Valid
5	0.902	0.296	Valid	10	0.551	0.296	Valid

Base on Table 1, this research obtained quite good results in data processing. The validity results in this study were declared all valid, and the reliability was 0.848 which was declared reliable. To test the prerequisites, normality and linearity tests are used. The normality test results have normal distribution results and the linearity test has a relationship between variables X and Y. The hypothesis test uses a simple linear regression test and a determination test. The simple liner regression test H_0 is accepted and the determination test has an r square of 61%.

Validity test on student questionnaire data results, obtained valid results. The significance level is 5% with a t table of 0.296 and a total of N 32 students. In the table above we can see that all 10 questions in the questionnaire were declared valid. The results of this calculation will be used to calculate the reliability test. Reliability tests assess how consistent and stable a measuring tool or research instrument is for measuring certain variables. Reliability shows how trustworthy and reliable the results produced by the tool are. A reliable instrument will produce consistent results under the same conditions every time it is used.

Table 2. Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
	10

Base on Table 2, the reliability test on this data was declared reliable. Calculation results using the SPSS version 27 application with a Cronbach's Alpha of 0.848. This decision was taken from the results of Cronbach's Alpha $0.848 > 0.06$. After carrying out the validity test and reliability test, the researcher carried out the analysis prerequisite tests, namely the normality test and linearity test.

The p value is usually used to indicate normality test results. The p value must be greater than the significance level, for example 0.05. If the p value is less than the significance level, the null hypothesis cannot be rejected, which means there is no strong evidence that the data deviates from a normal distribution. If the p value is lower than the significance level, the null hypothesis is rejected, which means the data most likely does not come from a normal distribution. In statistical analysis, normality tests are

very important because many statistical methods, such as t tests, ANOVA, and linear regression, assume that data follows a normal distribution. Knowing whether the data is normal or there are deviations from normality helps researchers choose the right analysis method and interpret the results more accurately. Normality test results is show in [Table 3](#).

Table 3. Normality Test Results

One-Sample Kolmogorov-Smirnov Test			Questionnaire
N			32
Normal Parameters ^{a, b}	Mean		44.91
	Std. Deviation		3,286
Most Extreme Differences	Absolute		0.188
	Positive		0.188
	Negative		-0.175
Statistical Tests			0.188
Asymp. Sig. (2-tailed) ^c			0.006
Monte Carlo Sig. (2-tailed) ^d	Sig.		0.005
	99% Confidence Interval	Lower Bound	0.003
		Upper Bound	0.007

a. Test distribution is Normal; b. Calculated from data; c. Lilliefors Significance Correction; d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 926214481

Base on [Table 3](#), testing the normality of student questionnaire data obtained results which were stated to be normally distributed. The decision maker was obtained from the asymp sig result of 0.06. It is stated to be normally distributed because the asymp sig result is $0.06 > 0.05$. 0.05 is a significant level.

Statistical tests for linearity include regression analysis and ANOVA tests. Regression analysis evaluates the residuals or residuals from the regression model. The values that differ between the predicted and observed values by a regression model are known as residuals. A linear probability relationship if the plot of residuals against predicted values shows a random pattern, or no clear pattern. However, if the residual plot shows a systematic pattern, then the relationship is likely not linear. The result of linearity test is show in [Table 4](#).

Table 4. Linearity Test Results

ANOVA Table						
		Sum of Squares	df	Mean Square	F	Sig.
Learning outcomes * Teaching materials	Between (Combined) Groups	50.960	5	10.192	12.614	0.000
	Linearity	44.515	1	44.515	55.092	0.000
	Deviation from Linearity	6.446	4	1.611	1.994	0.125
Within Groups		21.008	26	0.808		
Total		71.969	31			

Base on [Table 4](#) known that the result value of the linearity test obtained a deviation from linearity of 0.125. It can be concluded that the deviation from linearity is $0.125 > 0.06$. So that between variable X and variable Y there is a linear relationship. The results of the linearity test have met the requirements, so we can carry out hypothesis testing. The hypothesis test is in the form of a simple linear regression test and a determination test.

The simple linear regression test is a statistical technique used to evaluate the relationship between two quantitative variables, the independent variable (X) and the dependent variable (Y). The main purpose of this test is to find out whether there is a linear relationship between the two variables and how strong the relationship is. The simple linearity regression is show in [Table 5](#).

Table 5. Simple Linearity Regression Test Results

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	8.680	1.984		4.375	0.000
Teaching materials	0.615	0.088	0.786	6.974	0.000

a. Dependent Variable: Learning outcomes

Based on [Table 5](#), the constant result is 0.000. Testing with a significance value of 0.000 is smaller than 0.05, then on the basis of decision making, H_a is accepted and H_o is rejected. From the significance results, it can be concluded that H_a is accepted, which means that there is an influence between teaching materials on the learning outcomes of class V students at SD N 2 Brangkal for the 2023/2024 academic year. The result of determination is show in [Table 6](#).

Table 6. Determination Test Results

	Measures of Association			
	R	R Squared	Eta	Eta Squared
Learning outcomes * Teaching materials	0.786	0.619	0.841	0.708

Base on [Table 6](#), in statistical analysis, the determination test is used to measure how well the independent variable can explain the dependent variable in the regression model. The results of this test are usually shown in the form of a coefficient of determination (R^2), whose value ranges between 0 and 1. The R^2 value shows the proportion of variability in the dependent variable that can be explained by the independent variable. The closer the value is to 1, the better the model explains the variability of the data. Conversely, lower values indicate that the model is less able to explain the variability of the data. To evaluate the accuracy and suitability of a regression model in predicting outcomes, a test of determination is generally used.

The results of the determination test obtained an r squared of 0.619 or 61%. These results show that teaching materials influence as much as 61% of the learning outcomes of classroom students. Meanwhile, 39% was influenced by factors outside this research. Teaching materials have a significant influence on student learning outcomes. Good and appropriate teaching materials can help students understand the subject matter more easily and effectively, and this can increase students' motivation to learn because the material presented is relevant and interesting. In addition, well-designed teaching materials can also help students improve their ability to think critically and analytically, because they can see how the concepts are discussed in the lesson. When students have access to comprehensive and well-structured teaching materials, they can gain a deeper understanding of the topics studied. Teaching materials also play a role in building a strong knowledge base. This helps them remember and apply the lessons better in the future.

Good learning outcomes reflect optimal achievement of educational goals. This includes improved critical and analytical thinking skills, a deep understanding of the material studied, and the ability to apply knowledge in real situations. Students' ability to integrate new knowledge with existing knowledge also shows good learning outcomes. This shows progress in their cognitive, affective and psychomotor aspects. Good learning outcomes can also be characterized by increased motivation, positive attitudes, and the ability to adapt to difficulties and changes that occur during the learning process. Many methods, such as tests, observations, and portfolio assessments, are usually used in evaluating good learning outcomes to determine student development and achievement.

Discussion

The results obtained show that teaching materials have a significant influence on the learning outcomes obtained by students at SD N 2 Brangkal, with an influence of 61% and 39% influenced by other factors. It can be concluded from the results of these calculations that teaching materials are very helpful in the learning process carried out by students ([Cookson & Stirk, 2019](#); [Taqwina et al., 2022](#)). Good teaching materials usually have a clear structure, language appropriate to the desired level of understanding, and a variety of presentation methods to serve students' various learning styles. The main purpose of teaching materials is to help students understand and master the subject matter effectively ([Annisah et al., 2020](#); [Fadilah et al., 2023](#)). Teaching materials must also be in accordance with the applicable curriculum or learning program and in accordance with the needs and characteristics of students. This includes providing information that is accurate, up-to-date and in line with developments in knowledge.

Effective teaching materials are used in the learning process, and teaching materials are an important component of the Competency-Based Education Unit Level Curriculum, which helps provide quality learning experiences ([Angiolini et al., 2020](#); [Imam et al., 2018](#)). Continuously perfecting teaching materials is very important to keep up with educational developments, ensuring relevant and interesting content, as well as well-designed materials will create a more effective learning environment, which leads to better results ([Maziyah et al., 2022](#); [Shanks et al., 2017](#)). Pjbl teaching materials are able to improve communication between students. Specifically, at the midpoint of the project there was a statistically significant interaction between the efficacy of proxies involving coordinators and communicators ([Afriana et al., 2016](#); [Syah et al., 2019](#)). This creation process requires students to work together to find solutions

to authentic problems in the process of integrating knowledge, application, and construction. Innovative teaching methods that integrate technology and practical project work can lead to improved educational outcomes in the subject (Makarova & Makarova, 2018; Mynbayeva et al., 2018). Teaching materials that use the PjBL learning model and combine it with technology will improve learning outcomes for the better.

This study provides several important implications in the context of elementary school education. First, the use of Project-Based Learning (PjBL)-based teaching materials has been proven effective in improving student learning outcomes. This shows that the application of PjBL can help students not only master the subject matter, but also develop critical thinking skills, collaboration, and creativity. By actively involving students in real projects, this learning model can create a more meaningful and relevant learning environment, which ultimately increases student motivation and engagement. In addition, this study provides a basis for teachers and educational policy makers to consider integrating PjBL into the curriculum, given its positive impact on learning outcomes. Teachers can be more innovative in compiling teaching materials and teaching strategies that directly involve students, so that the learning process is more enjoyable and effective.

However, this study also has several limitations that need to be considered. First, the implementation of PjBL requires longer preparation and adequate facility support, which may not be available in all schools. Not all elementary schools have adequate resources and infrastructure to implement PjBL effectively, such as access to technology or project materials. Second, this study was only conducted in the context of elementary schools in a particular area, so the results may not be generalizable to all schools with different conditions. Variations in students' socio-economic backgrounds and teachers' skills in implementing PjBL may also affect the results of the study. In addition, this study focuses more on academic learning outcomes, while the impact of PjBL on non-academic aspects, such as students' social-emotional development, has not been explored in more depth. Further research needs to be conducted to see the long-term effects of implementing this model in a wider range of educational contexts.

4. CONCLUSION

Based on the data analysis, it can be concluded that the use of Project-Based Learning (PjBL) teaching materials significantly improves student learning outcomes. The findings indicate a clear positive impact of PjBL on the learning achievements of fifth-grade students at SD Negeri 2 Brangkal. Furthermore, the power analysis results confirm that this instructional approach plays a crucial role in enhancing student performance. Thus, it can be concluded that implementing teaching materials based on the PjBL model effectively influences and improves the learning outcomes of elementary school students. This highlights the importance of incorporating innovative and student-centered teaching methods in the classroom to foster better academic achievement.

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