Proceedings Series on Social Sciences & Humanities, Volume 25
Proceedings of International Conference on Social Science (ICONESS)
ISSN: 2808-103X

The Influence of the Problem Based Learning Model Assisted by Learning Video Media on Problem Solving Ability and Mathematical Reasoning of Third Grade Students at SD Negeri 1 Prendengan

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ARTICLE INFO

Article history:

DOI:
10.30595/pssh.v25i.1668

Submited:
July 22, 2025

Accepted:
August 11, 2025

Published:
August 24, 2025

Keywords:

Problem Based Learning (PBL) Model; Learning Video Media; Mathematical Problem-Solving Ability; Mathematical Reasoning Ability

ABSTRACT

This research aims to determine: 1) The effect of the Problem Based Learning (PBL) model assisted by learning video media on the mathematical problem-solving abilities of third-grade students at SDN 1 Prendengan; 2) The effect of the Problem Based Learning (PBL) model assisted by learning video media on the mathematical reasoning abilities of third-grade students at SDN 1 Pendengan; 3) The effect of reasoning ability on the mathematical problem-solving abilities of third-grade students at SDN 1 Pendengan.This research was conducted on 47 students. Based on its approach, this research is quantitative.The type of research used in this study is quantitative research with a research design that employs Quasi Experimental Design, specifically the Post-test Only Control Design.In this design, both the experimental group and the control group are compared.The results of the implementation of the experimental class learning, which began with the provision of problems, showed a significance value of 0.000, which means less than 0.05.Thus, Ho is rejected, meaning there is an influence of Problem Based Learning on problem-solving ability.From the table, it can be seen that the R square value is 0.685.This means there is an influence of 68.5% from the use of the Problem-Based Learning model. From these findings, it indicates that the PBL model assisted by learning videos can be an alternative learning model to develop students' problem-solving and mathematical reasoning abilities.

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1. INTRODUCTION

Mathematics plays an important role in all aspects of life, especially in enhancing human thinking abilities, which is why mathematics is one of the subjects required at every level of school from elementary to high school. According to (Sumartini, 2016) "Mathematics is a symbolic language whose practical function is to express quantitative and spatial relationships, while its purpose is to facilitate thinking. "In education, students' abilities are honed through problems, enabling them to enhance various competencies they possess. In the *National Council of Teachers of Mathematics* (NCTM, 2000), it is stated that in the implementation of

mathematics education, teachers must pay attention to five mathematical reasoning abilities, namely: connections, reasoning, and communication. Therefore, teachers play a role in fostering students' mathematical reasoning abilities, both through the teaching methods used and in evaluations. One of the tendencies that causes some students to fail to master the main topics of mathematics is their lack of logical reasoning in solving the given mathematical problems. Reasoning is the process of thinking that uses arguments, questions, premises, or axioms to determine the truth or falsity of a conclusion.

This is in accordance with Latif's (2014:261) opinion in (Widiati et al., 2020) which states that reasoning is logical; if the conclusion drawn from an argument or premise is incorrect, it will result in illogical reasoning. From the results of interviews with the third grade teacher, the weakness in problem-solving and mathematical reasoning abilities among the third-grade students at SDN 1 Prendengan occurs because the students are only accustomed to solving routine problems demonstrated by the teacher. Therefore, when faced with more complex mathematical problems or questions, students will struggle to solve them.

Problem-based learning is a type of learning that uses real-world problems as a context for students to learn critical thinking and problem-solving skills, as well as to acquire essential knowledge and concepts from the learning material (Nurhasanah, 2009: 12) in (Sumartini, 2016). Improving problem-solving abilities and mathematical reasoning can be attempted by applying a learning model that facilitates students in developing good reasoning skills, namely the *Problem Based Learning* (PBL) model.The PBL model is both a curriculum and a process.The curriculum includes carefully selected and designed problems that require students' critical efforts to acquire knowledge, solve problems, learn independently, and possess good participation skills (Widiati et al., 2020).

Duch in (Khairani et al., 2023) defines that problem-based learning is an approach characterized by using real problems as a context for students to learn critical thinking, problem-solving skills, and to gain knowledge about the essence of the learning material.Indicators of mathematical problem-solving abilities are also proposed by (Cahyadi et al., 2023) as problem identification, strategy planning, executing the strategy, and reflecting on and reviewing it. Anjar and Sembiring (Rohana and Ningsih, 2019) stated that the activities of studying mathematics, developing, or solving mathematical problems cannot be separated from reasoning activities. Reasoning is a thinking process carried out by humans by connecting data and facts, thereby arriving at a conclusion. Data and facts will undergo a human thinking process that will be reasoned as true or not (Huda, 2018:169) in (Widiati et al., 2020). Indicators of mathematical reasoning according to (Vebrian et al., 2021) are making conjectures, manipulating mathematics, constructing proofs and providing reasoning, drawing conclusions.

The video-assisted problem-based learning model is proposed on the grounds that students will certainly find it easier to understand concepts, thereby being able to solve problems or cases in mathematics learning (Haqiqi & Syarifa, 2021).The video-assisted problem-based learning model helps students to better understand concepts, enabling them to solve problems or cases in mathematics learning (Haqiqi & Syarifa, 2021).

The use of educational videos will further enhance the effectiveness of the learning process because they can overcome the limitations of space and time, help explain abstract concepts, thus making it easier for both teachers and students to fulfill their responsibilities.Educational videos serve as a medium that can provide visual experiences to learners, such as encouraging learning motivation, clarifying abstract concepts, and enhancing learning absorption or retention (Prasetya et al., 2021).Videos have the advantage of being replayable, allowing students to have a thorough understanding of the material. Media dengan hasil kelayakan sangat layak dari segi konten dalam bentuk materi dan wadah dalam bentuk media yang baik yang dapat membuat siswa memahami (Mahfuddin & Parmin, 2022).

2. METHOD

The research was conducted at SD Negeri 1 Prendengan, Banjarmangu District, Banjarnegara Regency in the second semester of the 2023/2024 academic year.The sample taken was the third grade, where class IIIA with 24 students served as the experimental class and class IIIB with 23 students served as the control class.The research method used in this study is the Quasi-Experimental method with a Posttest Only Control Design.In this design, there are two groups, each selected randomly.

Problem-solving and reasoning abilities were tested using a test instrument that was first validated by experts, namely subject teachers. Then, reliability was tested by examining students in the population outside the sample. From the calculation using SPSS, a Cronbach Alpha value of 0.837 was obtained.A questionnaire is considered reliable if the Cronbach Alpha value is > 0.6.From the calculation results with SPSS, a Cronbach Alpha of 0.837 > 0.6 was obtained. Therefore, it can be concluded that the test instrument is reliable.

Reliability Statistics

Cronbach's Alpha	N of Items
.837	5

Next, as a prerequisite for the t-test, normality and homogeneity tests were conducted.From the calculations using SPSS, the results are as follows:

Test of Homogeneity of Variances

Problem Solving Abilities

Levene Statistic	df1	df2	Sig.
.294	1	45	.590

Test of Homogeneity of Variances

Mathematical Reasoning

Levene Statistic	df1	df2	Sig.
1.511	1	45	.225

3. RESULTS AND DISCUSSION

From the results of the prerequisite test, it is known that the data on students' mathematical reasoning abilities are normally distributed and the data variance from the two sample classes is homogeneous.Therefore, the data analysis continued using the t-test for two independent samples.The results of the t-test can be seen in the following table 6.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.016	4.636		3.239	.002
	X	.770	.078	.828	9.904	.000

a. Dependent Variable: Problem Solving Abilities

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.685	.679	5.324

a. Predictors: (Constant), X

The data scores for students' mathematical problem-solving abilities have met the requirements to be tested using the t-test formula, meaning the data comes from a normally distributed population and both datasets are statistically homogeneous. From the calculation with the t-test, a significance value of 0.000 was obtained, which means less than 0.05. Thus, Ho is rejected, meaning there is an influence of Problem Based Learning on problem-solving ability. From the table, it can be seen that the R square value is 0.685.

This means there is an influence of 68.5% from the use of the Problem-Based Learning model.From the above statement, it can be concluded that the problem-solving and mathematical reasoning abilities of students who follow PBM are better than the problem-solving abilities of students who follow conventional learning.

4. CONCLUSION

Based on the above description, it can be concluded that the Problem Based Learning model assisted by educational video media is an appropriate action in fostering students' problem-solving skills and mathematical reasoning. Because in the Problem Based Learning model, students are encouraged to be creative in solving a problem accompanied by good reasoning. From the results of the SPSS calculation, it was found that the significance value obtained was 0.000, which means less than 0.05. Thus, Ho is rejected, meaning there is an influence of Problem Based Learning on problem-solving ability. From the table, it can be seen that the R

square value is 0.685. This means there is an influence of 68.5% from the use of the Problem-Based Learning model on problem-solving and mathematical reasoning abilities.

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