

THE EFFECT OF MURDER LEARNING MODEL (MOOD, UNDERSTAND, RECALL, DIGEST, EXPAND, REVIEW) ON THE MATHEMATICAL PROBLEM-SOLVING ABILITY

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Received: 10-12-2024; **Accepted:** 8-03-2025; **Published:** 30-04-2025

Abstract. This study investigates the impact of the MURDER (Mood, Understand, Recall, Digest, Expand, Review) learning model on the mathematical problem-solving abilities of Phase B students at SD Negeri 158 Pekanbaru. Designed to encourage diverse solutions and thinking strategies, the MURDER model was evaluated using a quasi-experimental approach with a posttest-only nonequivalent control group design. The sample consisted of 80 fourth-grade students selected through purposive sampling: 40 students in class IV.B (experimental group) and 40 in class IV.A (control group). Data were collected via posttest assessments and analyzed using descriptive and inferential statistics. The normality test results were based on the Asymp. Sig. (2-tailed) value, with $\alpha = 0.05$ as the significance level. The Mann-Whitney U test revealed an Asymp. Sig. value of 0.001, indicating a statistically significant difference between the two groups. These findings suggest that the MURDER learning model has a positive effect on students' mathematical problem-solving skills. The results support the adoption of structured and reflective learning strategies to enhance mathematical thinking and performance in primary education.

Keywords: *MURDER Learning Model, Mathematical Problem-Solving Ability, Conventional Learning.*

1. INTRODUCTION

Education in Indonesia has a considerable influence in preparing the nation's generation, especially in preparing them mentally for the times [1]. Therefore, the government pays more attention to education at the elementary, junior high and high school levels [2]. This can be seen in the rules imposed by the government, which initially only required 6 years of education, but until now it has been changed to 9 years [3]. Education is a universal activity in human life, through education students try to develop their potential, namely changing their behavior for the better, and becoming skilled in their respective fields [4]. Mathematics has an important role in making students have the ability to think logically, analytically, systematically, critically and creatively [5].

In the Indonesian education curriculum, one of the subjects taught at the primary, secondary, and strata levels is mathematics. Mathematics comes from the Greek "mathein" or "manthenein" which means to study. The word mathematics is thought to be closely related to the Sanskrit word mudna or widya which means cleverness, knowledge or

intelligence. According to [6] the success of learning is not only realized in the achievement of students in school, but successful learning is learning that is able to develop what has been learned at school and is able to apply it to everyday life. However, in people's lives most people study math but do not know well what math is [7]. In learning activities, one of the lessons that is still a problem is learning math [8]. This is because in general, math is a lesson that is avoided and even disliked by students [9].

The importance of mathematical understanding can be seen in the first goal of learning mathematics according to Depdiknas [10] namely understanding mathematical concepts, explaining the relationship between concepts and applying concepts or algorithms flexibly, accurately, efficiently and precisely in problem solving. In accordance with the objectives of mathematics learning above, after the learning process, students are expected to understand a mathematical concept so that they can use this ability in dealing with mathematical problems [6].

Problem solving skills are very important for students to have in learning mathematics [11]. Problem solving is the only strong reason that mathematics learning continues to develop new innovations [12]. A problem can be defined as a task that learners must solve without routine procedures to be solved by using various ways to get a variety of different answers [13]. Problem-solving ability is the capacity to master a skill, either naturally occurring or developed through repetition and applied to perform an activity. Everyone has a unique capacity to solve the problems they face in everyday life. This is because each person has a unique method of organizing everything they notice, see, remember or think.

Based on the results of pre-research through interviews with mathematics teachers as well as homeroom teachers conducted at SDN 158 Pekanbaru, it was found that the problem solving ability of students in terms of the whole class based on daily test scores and observations by educators was found that mathematics learning was still low. However, the process of learning mathematics in class IV (Phase B) is quite good, but because there is still a lack of enthusiasm for learning students towards learning mathematics so that it causes the learning atmosphere in the classroom to be less active and makes students feel bored in class and has an impact on the lack of understanding of the concept of material conveyed by the educator. This is because educators tend to use learning models with conventional lecture

methods where learning only focuses on educators who are mostly the main source in conveying the concept of the material being taught so that the involvement of students in learning is still relatively minimal. Based on observations and interviews with class teachers, information was obtained that there were still many students who still could not use, utilize and select certain procedures or operations appropriately. Students must think logically when dealing with mathematical puzzles. Therefore, educators must be able to foster a learning environment where students can improve their problem-solving skills when teaching and learning mathematics. Mathematical problem-solving ability is a person's ability to solve non-routine mathematical problems presented in the form of textual or contextual mathematical problems that can measure students' ability to solve problems [14].

Based on these problems, a solution should be needed so that the learning process in the classroom becomes active and there needs to be more extra efforts on the part of the teacher who teaches. One of the alternatives that researchers will do is to innovate the right learning model by indirectly being able to encourage students to be more active in learning math. The right learning model to overcome these problems is the MURDER (Mood, Understand, Recall, Digest, Expand and Review) learning model.

The MURDER (Mood, Understand, Recall, Digest, Expand and Review) learning model can be used as an alternative to the problem of students' low mathematical concept understanding ability [15]. The MURDER learning model is one way that can be used to develop an effective and efficient learning system to activate students by stimulating students' thinking skills [16]. According to [17] states that the MURDER learning model emphasizes the ability to reconstruct information or ideas received, understand them, and then communicate them orally or in writing.

According to [18] MURDER learning model emphasizes the ability to reconstruct information or ideas received, understand them, then communicate them orally or in writing. MURDER type cooperative learning model the teacher will form groups with each group of 4-5 people, this learning model makes students able to understand the concept of the material taught by reading it over and over again and can develop material using the basic concepts that have been given [19].

MURDER is a learning model that is a combination of several words including: Mood, Understand, Recall, Digest, Expand, Review. According to [20] The steps of murder

learning are as follows: *Mood* This is a positive mindset that has an important part in the MURDER strategy. *Understanding* in the learning that will be given, students should be asked to read the material first and understand it. *Recall* after the material has been understood by the students then repeat it with their own sentences. *Digest* is one way that should be done by searching for data from several other sources. *Expand* at this stage students are directed to have the option to be creative from the material they understand. *Review* students are needed to re-familiarize themselves with the material that has been studied.

According to [21] students' mathematical problem solving skills are emphasized on thinking about how to solve problems and process mathematical information. Problem solving ability is a cognitive understanding of parsing and explaining all ideas, information with the thought process that a person has when solving a problem. Learners who have mathematical problem solving skills, can solve problems with the correct mathematical steps and conditions [22]. The steps of problem solving according to Polya in [23] Among others: a) understand the problem; b) plan problem solving; c) implement the problem solving plan; d) look back at the results of problem solving. So that in the end with the mathematical problem-solving skills possessed by students and techniques in solving problems more structured and mathematically logical.

Then based on the results of observations of researchers when participating in Teaching Campus Activities on August 12 - December 01, 2023, researchers saw that students did not understand the mathematics problems given through the pretest and posttest questions of the AKM class conducted, the results obtained in answering mathematics questions were still classified in the category of need for special intervention. This means that students still cannot understand the problems given by solving in a structured manner.

Based on the description above, the researcher is interested in conducting a study entitled "The Effect of the Application of the MURDER Learning Model on the Mathematical Problem Solving Ability of Phase B Students of SDN 158 Pekanbaru".

2. RESEARCH METHOD

This research employs a quasi-experimental design utilizing a Nonequivalent Posttest-Only Control Group Design. This is because the initial ability of students'

mathematical problem solving is the same which can be seen from the characteristics of class IV students of SDN 158 Pekanbaru who have never received learning with the subject matter of data analysis. This research design is used to see the effect of MURDER learning model treatment on mathematical problem solving ability between control class and experimental class. The population and sample of this study were all fourth grade students of SD Negeri 158 Pekanbaru consisting of classes IV A and IV B using purposive sampling techniques totaling 80 students. With the number of control class students (class IV B) as many as 40 students and the experimental class (class IV A) as many as 40 students. The research that researchers do uses two variables. Namely the independent variable and the dependent variable. The independent variable in this study is the MURDER (Mood, Understand, Recall, Digest, Expand, Review) learning model in the experimental class and the conventional model in the control class. The dependent variable in this study is mathematical problem solving ability. The instrument used in this study was a posttest sheet in the form of a description.

There are two data analysis techniques used, namely descriptive statistical analysis and inferential statistical analysis (normality test and Mann-Whitney U test (U- Test).

3. RESULTS AND DISCUSSION

3.1 Results

The research was conducted in class IVA and IV B of SD Negeri 158 Pekanbaru. Class IVA as an experimental class using MURDER learning while IV B as a control class using a conventional learning model. After the second class was given different treatments, a final score (Posttest) was taken which was used to see the effect of the MURDER learning model on students' mathematical problem-solving abilities.

Descriptive Analysis

From the results of the Posttest that has been carried out in both classes, it can be analyzed descriptively as follows:

Table 1. Descriptive Statistics								
	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Post-Test Experiment	40	100	0	100	3045	76.12	28.322	802.112
Post-Test Control	40	100	0	100	2300	57.50	26.367	695.231

Valid N (listwise)	40
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Table 1. Posttest Result Data of Experimental and Control Classes

Based on the table above, describes the posttest data from 40 experimental class students and 40 control class students. The table above shows the final ability (posttest), namely the average mathematical problem solving ability of experimental class students which is better than the control class. This can be seen from the difference in the average value of the experimental class which is 76.12 and the control class is 57.50. The average with a difference of 18.62. This shows the difference between the control class that was not treated with the experimental class that was given treatment using the MURDER (Mood, Understand, Recall, Digest, Expand, Review) learning model. To see more accurate data between mathematical problem solving skills in experimental classes and control classes by providing different learning models. Then an inferential analysis was carried out.

Inferential Analysis

Posttest scores of students were analyzed statistically using the data normality test, because the data was not normally distributed, a non-parametric test was carried out, namely the Man Whitney U test.

Posttest Data Normality Test

The normality test of the posttest data that has been carried out in both classes can be seen in the following table:

Tests of Normality

Table 2. Tests of Normality

	Kelas	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Mathematical Problem-Solving Ability	Post-Test Experiment (MURDER)	.200	40	.020	.785	40	.019
	Post-Test Control (Conventional)	.141	40	.045	.945	40	.050

a. Lilliefors Significance Correction

On the basis of decision-making:

- If the significance value (sig.) $> \alpha$ with $\alpha = 0,05$, then the data is normally distributed.
- If the significance value (sig.) $< \alpha$ with $\alpha = 0,05$, then the data is not normally distributed.

Based on the normality test output above, it can be obtained that the significance value in both the Shapiro-Wilk test for the experimental class Posttest data is smaller than 0.05 (0.019). While the Shapiro-Wilk significance value for the control class Posttest data is greater than 0.05 (0.050). So it can be concluded that the research data is not normally distributed. Because one of the research data is not normally distributed, namely in the experimental class, then the overall data is not normally distributed. So we can use non-parametric statistics (Mann Whitney U Test) to conduct research data

Mann-Whitney U Test (U-Test) Posttest

The Mann-Whitney U test (U-Test) of the posttest data that has been carried out in both classes can be seen in the following table:

Table 3. Mann-Whitney U	
Mann-Whitney U	434.000
Wilcoxon W	1254.000
Z	-3.546
Asymp. Sig. (2-tailed)	.001

a. Grouping Variable: Kelas

Figure 3. Mann-Whitney U Test Results Posttest of Experimental and Control Classes

Basis for decision making:

If the significance value (sig.) $> \alpha$ with $\alpha = 0,05$, then the data is normally distributed.

If the significance value (sig.) $< \alpha$ with $\alpha = 0,05$, then the data is not normally distributed.

Based on the Test Statistics output, it is known that the Asymp.Sig. (2-tailed) of $0.001 < 0.05$. So it can be concluded that H_0 is rejected, H_1 is accepted or "Hypothesis accepted". Thus it can be said that there is a difference in students' mathematical problem solving ability between the Experimental Class (MURDER) and the Control Class (Conventional). Because there is a significant difference, it can be said that "There is an

effect of using the MURDER learning model on the mathematical problem solving ability of phase B students of SDN 158 Pekanbaru".

3.2. Discussion

The results showed an increase in the mathematical problem solving ability of students who received learning using the MURDER learning model better than students who received conventional learning models in the control class. This statement can be proven from the posttest score, it is known that students who get treatment with the MURDER learning model are higher than students who get conventional learning models. This is also evidenced by the increase in the average score of students who obtained the MURDER learning model higher than students who obtained the conventional learning model.

The activities of students who are given the treatment of the MURDER learning model consist of six steps, namely student activities such as activities starting from creating a good student mood to start learning, providing understanding to students to learn, reading back the material that has been presented, further examining the material provided, developing the material provided, and studying it again.

In the control class, the teacher's activity is very different from the experimental class, where students are seen only listening and recording the explanation that has been explained in front of the class by the teacher. This resulted in students becoming passive or in other words inactive who only rely on the explanation given by the teacher. Sometimes students only talk to each other while listening to the teacher's explanation, and actively do something in their desk. This is due to the learning method that uses the lecture method carried out by the teacher so that it makes the class atmosphere monotonous by doing activities only writing and answering the questions given. Centered and dominant learning activities carried out by the teacher make students only as spectators receive what is conveyed by the teacher, and only memorize the formulas of example problems so that during the problem practice activity makes students have difficulty answering questions due to differences given by the teacher. This makes the meaning of learning cannot be understood by students. It can be concluded that the way to answer questions on the posttest test of experimental and control class students is very different from that done by students. The following is presented in the picture of one of the answers above, describing the results of the answer of one of the students in solving the mathematical problem solving ability problem.

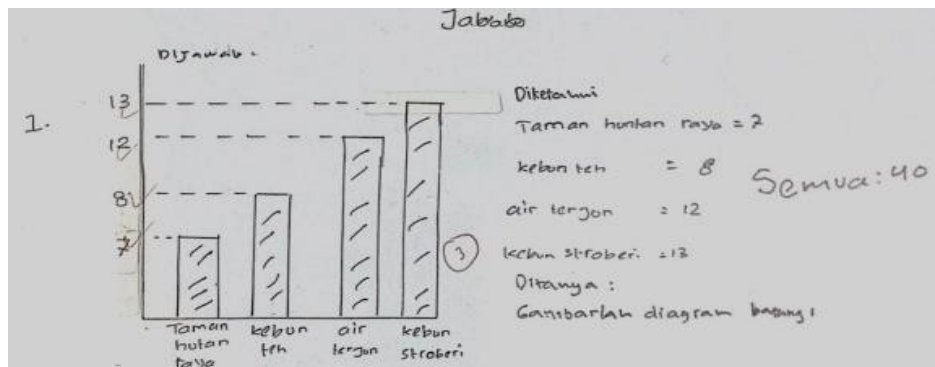


Figure 1. The Answers to Posttest Questions for Experimental Class

Based on the answer picture above, describing the results of the answer of one of the students in solving the problem of mathematical problem solving ability, it can be seen that the experimental class is able to solve the problem well, students can understand the problem of the problem given by restating what is known and asked completely according to the problem. So that applying systematic steps used in answering is correct. Learners have the ability to relate the concept of tables to the presentation of data in solving the problems given. The difference occurs in the control class most students are not able to make information known and what is asked, so that students do not succeed in answering as expected. As presented in the following figure:

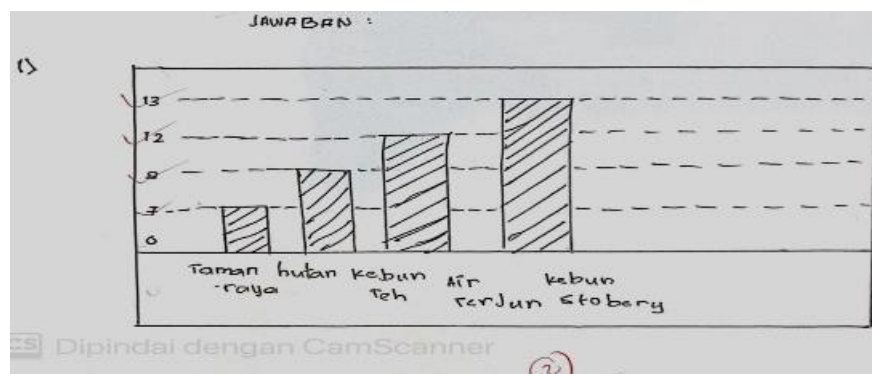


Figure 2. Control Class Posttest Answer Picture

Whereas in the control class from the picture above, describing the answer of one of the students has not been able to solve the problem properly and there are still errors in answering the problem. The planning made by students to solve problems is still not correct, so that the answers are not as expected. The lack of students' ability to plan problem solving is caused by their mathematical problem solving skills in understanding the problem is still not correct and the lack of analyzing the problems given.

This statement illustrates that the MURDER learning model is able to improve students' mathematical problem solving skills. Based on observations made by researchers on the ongoing activities of the experimental class, students generally fall into the criteria and steps of the MURDER learning model. Learners cooperate with each other in following the learning process well according to the steps of the MURDER learning model, namely the development of work. The activities of students in the class play an active role in asking questions at the step of examining problem solving during the learning process compared to the activities in the control class, students only rigidly listen to the teacher's explanation and record the explanation written by the teacher in front of the blackboard that applies the conventional learning model. This comparison is very much different from classes using conventional learning models. Learners are only as spectators to listen, pay attention and record the subject matter and sample problems presented by the teacher in front of the class. So that making the learning process monotonous causes students to be bored in participating in math learning in class. Activeness is only carried out between two or three students who answer the practice questions that the researcher gives.

Based on the research results obtained and then the two classes were given different treatments in the experimental class using the MURDER learning model while the control class used a conventional learning model. Then test the mathematical problem solving ability of students in the experimental class and control class by conducting a posttest. The experimental class average was 76.12 while the control class obtained an average value of 57.50. It can be seen that the average posttest score in the experimental class is 27 students who are complete and 13 others are not complete. In the control class with a total of 14 students who were complete and 26 others were not complete. The statement concluded that the mathematical problem solving ability of experimental and control class students was different, then the class was given different treatments with the experimental class using the MURDER learning model and the control class using the convention learning model. This is in accordance with the statement (Herdianto 2014) that the MURDER learning model makes students active in the learning process, able to work together and convey opinions and can solve problems encountered. This means that the MURDER learning model is meaningful in student learning because the teacher provides real-life problems so that students develop problem-solving skills in solving the problems given.

After being given treatment, then both classes conducted a Posttest and after analyzing and obtaining the results, it was concluded that there was an effect of the MURDER learning model on students' mathematical problem solving skills. The diagram above shows that after calculating the inferential analysis of the two classes with abnormal distribution, the average value of the posttest is continued with the Mann Whitney Test, it is known that the value of Asymp.Sig. (2-tailed) of $0.001 < 0.05$. So it can be concluded that H_0 is rejected, H_1 is accepted or "Hypothesis accepted". Thus it can be said that there is a difference in students' mathematical problem solving ability between the Experimental Class (MURDER) and the Control Class (Conventional). Because there is a significant difference, it can be said that "There is an effect of using the MURDER learning model on the mathematical problem solving ability of phase B students". This means that the MURDER learning model has an effect in the learning process, especially mathematics.

4. CONCLUSION

Based on the results of research and data analysis that has been obtained, namely from the results of posttest data analysis with Test Statistics, it is known that the Asymp.Sig value. (2-tailed) of $0.001 < 0.05$. So it can be concluded that H_0 is rejected, H_1 is accepted or "Hypothesis accepted". Thus it can be said that there is a difference in the mathematical problem solving ability of students between the experimental class using the MURDER learning model and the control class using the learning model in phase B of SD Negeri 158 Pekanbaru. Because there is a significant difference, it can be said that there is an effect of using the MURDER learning model on the mathematical problem solving ability of students on pictogram material and phase B bar charts of SD Negeri 158 Pekanbaru.

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