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The Effect Of Motivation And Learning Discipline On Mathematics Learning Achievement Through The Problem-Based Learning Model Of Grade III Students Of State Elementary School II MARIRI LAMA

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This study aims to determine the effect of motivation and learning discipline on mathematics learning achievement through problem-based learning model of third grade students of SD Negeri 2 Mariri Lama. This study uses a quantitative approach with ex post facto research type. The method in this study used correlational method or cause-effect relationship and the sample in this study amounted to 20 students through total sampling technique. Data collection techniques using questionnaires to measure motivation and learning discipline, and teaching treatment using the application of PBL learning model to obtain data on students' mathematics learning achievement. The data obtained were then analyzed using descriptive tests, normality tests, linearity tests, multicollinearity tests, and hypothesis tests which include t tests and F tests. The results of this study indicate that learning motivation and learning discipline have a positive and significant effect on students' mathematics learning achievement both partially and simultaneously as evidenced by the significance value of the F test of 0.048 <0.05. The average value of learning motivation (79.55), learning discipline (77.15) and mathematics learning achievement (81.25). Based on the research results, it was concluded that motivation and learning discipline supported by the problem-based learning (PBL) model had an important influence in improving the mathematics learning achievement of grade III students at SD Negeri 2 Mariri Lama.
Keywords: learning motivation, learning discipline, mathematics learning achievement, Problem Based Learning (PBL)

Abstract

This study aims to determine the effect of motivation and learning discipline on mathematics learning achievement through problem-based learning model of third grade students of SD Negeri 2 Mariri Lama. This study uses a quantitative approach with ex post facto research type. The method in this study uses a correlational method or cause-effect relationship and the sample in this study amounted to 20 students through a total sampling technique. The data collection technique uses a questionnaire to measure motivation and learning discipline, and teaching treatment uses the application of the PBL learning model to obtain data on students' mathematics learning achievement. The data obtained were then analyzed using descriptive tests, normality tests, linearity tests, multicollinearity tests, and hypothesis tests which include t tests and F tests. The results of this study indicate that learning motivation and learning discipline have a positive and significant effect on students' mathematics learning achievement both partially and simultaneously as evidenced by the significance value of the F test of 0.048 <0.05. The average value of learning motivation (79.55), learning discipline (77.15) and mathematics learning achievement (81.25). Based on the research results, it was concluded that the motivation and learning discipline supported by the problem-based learning (PBL) model significantly influenced the mathematics achievement of third-grade students at SD Negeri 2 Mariri Lama.
Keywords: learning motivation, learning discipline, mathematics achievement, Problem-Based Learning (PBL)

1. INTRODUCTION

Education is a conscious and planned effort to create a learning process that enables students to optimally develop their potential. This aligns with the mandate of Law Number 20 of 2003 concerning the National Education System, which affirms that education aims to develop students' potential to become people who are faithful, pious, have noble character, are competent, creative, independent, and become democratic and responsible citizens.One of the subjects that plays a crucial role in primary education is mathematics. Mathematics not only serves as a tool for calculation, but also trains logical, systematic, and critical thinking skills, as well as problem-solving skills that are essential in everyday life.

However, in reality, mathematics in elementary schools is still often considered difficult and uninteresting by students. Internal factors such as learning motivation and learning discipline and external factors such as the family environment, learning methods and models, learning facilities and the social environment can improve students' mathematics learning achievement. Learning that is appropriate to students' needs will increase student motivation (Dapa, 2023). High learning motivation encourages students to study more seriously and learning motivation influences student learning outcomes (Roringpandey, 2022; Najoan, 2024). Learning discipline is a conscious adherence to learning rules to achieve learning success (Tu'u, 2008). Learning achievement is a person's abilities, skills and attitudes after following the learning process. In mathematics, learning achievement shows students' success in understanding and completing mathematical material (Arifin, 2009).

Previous research emphasized that mathematics learning achievement is not only the ability to solve problems or general learning outcomes. However, the problem-based learning approach (PBL) directly links the influence of motivation and learning discipline on mathematics learning achievement in the PBL context. Learning achievement is influenced by internal factors such as motivation, interest, and learning discipline, as well as external factors such as the family and school environment (Dapa, 2019). Based on this study, motivation and learning discipline, as well as the problem-based learning model (PBL), are the main factors in mathematics learning achievement for elementary school students.

This study focuses on third grade students of State Elementary School II Mariri Lama aims to describe the influence of learning motivation on mathematics learning

achievement, the influence of learning discipline on mathematics learning achievement and the influence of motivation and learning discipline on mathematics learning achievement through problem-based learning models or PBL. The results of this study are expected to provide benefits for students, teachers, schools and further researchers to increase insight in the field of education related to motivation, discipline and mathematics learning achievement through problem-based learning models PBL.

2. RESEARCH METHODOLOGY

This research uses a quantitative approach with an ex post facto research type. The method used in this research is the descriptive method.correlational or cause-and-effect relationship The sample in this study was 20 students through a total sampling technique. The data collection technique used a questionnaire to measure motivation and learning discipline, as well as receiving learning treatment. The data obtained were then analyzed using statistical techniques to see how much each independent variable contributed to learning achievement. The analysis used descriptive tests, normality tests, linearity tests, multicollinearity tests, and hypothesis tests including t-tests and F-tests.

This research was conducted at SD Negeri II Mariri Lama, Poigar District, Bolaang Mongondow Regency, in the even semester of the 2025/2026 academic year covering all 3rd grade students using the total sampling method because the number of samples was relatively small. The research instrument was RPP/Teaching Module given teaching treatment, motivation questionnaire and learning discipline using a Likert scale based on (Sugiyono, 2017). while the mathematics learning achievement test included various indicators in the simple fraction material to obtain data on students' mathematics learning achievement.

This design aims to determine the influence of independent variables, namely learning motivation (X1) and learning discipline (X2), on the dependent variable, namely mathematics learning achievement (Y) of third-grade elementary school students on simple fractions through the application of the Problem Based Learning (PBL) learning model. This study aims to determine the influence of motivation and learning discipline on mathematics learning achievement using the PBL problem-based learning model of third-grade elementary school students at Mariri Lama 2.

3. RESULTS AND DISCUSSION

Research result

The results of this study were obtained from motivation and learning discipline questionnaire data, then given teaching treatment to determine the mathematics learning achievement of students with simple fractions material in grade III of SD Negeri II Mariri Lama. Then the data was analyzed using statistical techniques to see how much contribution each independent variable had on learning achievement analyzed using descriptive tests, normality tests, linearity tests, multicollinearity tests, and hypothesis tests which included t-tests and F-tests.

1) Descriptive Test

Based on the results of descriptive statistical tests on the variables of motivation, discipline and student learning achievement in learning mathematics on simple fractions through problem-based learning models, the following description is obtained. The number of respondents in this study was 20 students. In the learning motivation variable, the minimum value was 30 and the maximum was 48 with an average mean of 40.95 and a standard deviation of 4.915. This shows that in general the level of student learning motivation is in the high category with a relatively homogeneous data distribution. Furthermore, the learning discipline variable obtained a minimum value of 21 and a maximum of 48 with an average of 36.55 and a standard deviation of 6.755. These data indicate that student learning discipline is in a fairly high category. As for the mathematics learning achievement variable, the minimum value was 65, the maximum reached 100, the average was 81.20 and the standard deviation was 9.065.

Overall, the application of the Problem-Based Learning (PBL) model in mathematics instruction on simple fractions has shown positive results. This is evident in the high average motivation and discipline of students, followed by good academic achievement. The Problem-Based Learning (PBL) model can encourage students to be more active, think critically, and be directly involved in the problem-solving process, thus impacting improved learning outcomes.

Table 1

Statistical Test of Motivation and Discipline on Learning Achievement

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Standard Deviation
MOTIVATION	20	30	48	40.95	4,915
DISCIPLINE	20	21	48	36.55	6,755
PERFORMANCE	20	65	100	81.20	9,065
Valid N (listwise)	20				

2) Normality (Shapiro-Wilk)

Table 2

Shapiro-Wilk test results

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
MOTIVATION	.085	20	.200*	.968	20	.708
DISCIPLINE	.177	20	.103	.962	20	.585
PERFORMANCE	.178	20	.095	.940	20	.239

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the normality test using Shapiro-Wilk as seen from the results of table 4.6 with Decision making it is known that the significance value of the variables Learning motivation is 0.708, Learning discipline is 0.585 and Learning achievement is 0.239. All significance values are greater than 0.05 so that the data of this study are normally distributed. So it can be concluded that the data on motivation, learning discipline and learning achievement in mathematics of grade 3 of SD Negeri 2 Mariri

Lama with a sample of 20 students are normally distributed because the Shapiro-Wilk significance value is all greater than 0.05.

3) Linearity Test

Table 3

Linearity Test of Motivation and Learning Achievement

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
ACHIEVEMENT * MOTIVATION	Between Groups	(Combined)	1264,200	14	90,300	1,520	0.339
		Linearity	96,272	1	96,272	1,621	0.259
		Deviation from Linearity	1167,928	13	89,841	1,512	0.341
	Within Groups		297,000	5	59,400		
	Total		1561,200	19			

Linearity Test using ANOVA test Decision based on probability for the influence of motivation and learning discipline on mathematics learning achievement using PBL problem-based learning model in grade III students of SD Negeri II Mariri Lama using a questionnaire test and post-test achievement scores in grade III students Achievement-motivation with Deviation from Linearity 0.341. So based on the table above there is no deviation from the linear line of the relationship between the two variables so it can be concluded that the relationship between the two variables is linear.

Table 4

Linearity Test of Discipline and Learning Achievement

ANOVA Table					
	Sum of Squares	df	Mean Square	F	Sig.

ACHIEVEMENT * DISCIPLINE	Between Groups	(Combined)	1073,533	13	82,579	1,016	0.526
		Linearity	0.189	1	0.189	0.002	0.963
		Deviation from Linearity	1073,344	12	89,445	1,100	0.480
	Within Groups		487,667	6	81,278		
	Total		1561,200	19			

The linearity test was conducted using ANOVA with the decision taken based on the probability of the influence of motivation and learning discipline on mathematics achievement using the PBL problem-based learning model on third-grade students of SD Negeri II Mariri Lama through questionnaires and third-grade students' achievement scores. Achievement-Discipline with a Deviation from Linearity of 0.480. Based on the table above, no deviation from the linear line was found between the two variables, so it can be concluded that the relationship between the two has a linear pattern.

4) Multicollinearity Test

Table 5

Multicollinearity Test

Collinearity Diagnostics						
Model		Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	MOTIVATION	DISCIPLINE
1	1	2,967	1,000	0.00	0.00	0.00
	2	0.028	10,215	0.01	0.16	0.64
	3	0.005	24,950	0.99	0.84	0.36

a. Dependent Variable: ACHIEVEMENT

Residuals Statistics

	Minimum	Maximum	Mean	Standard Deviation	N
Predicted Value	75.99	85.17	81.20	2,338	20
Residual	-16,837	15,611	0,000	8,758	20
Std. Predicted Value	-2,227	1,696	0,000	1,000	20
Std. Residual	-1,818	1,686	0,000	0.946	20
a. Dependent Variable: ACHIEVEMENT					

Based on Collinearity Diagnostics analysis data, the highest Condition Index (CI) value obtained was 24.950, which remained below the limit value of 30. In addition, at that CI value, the proportion of variance for the motivation variable (0.84) and discipline (0.36) did not show a significant dependence pattern simultaneously. This indicates that there is no multicollinearity between the learning motivation and learning discipline variables, so the regression model used meets the classical assumptions and is worthy of further analysis. The Residuals Statistics value, it is known that: The lowest residual value = -16.837 and the highest = 15.611, with an average = 0.000, which indicates a balanced residual distribution around zero. The standardized residual value ranged from -1.818 to 1.686, which remains within the normal limit (±3), so there are no extreme outliers. The predicted value and standard predicted value also show a reasonable data distribution and do not deviate significantly.

So overall, the results of the multicollinearity test and residual analysis show that: There is no multicollinearity between the independent variables (motivation and learning discipline), The residual data is normally distributed and does not show the presence of outliers that interfere with the model, The regression model in this study is suitable for application to test the influence of motivation and learning discipline on students' mathematics achievement.

5) Hypothesis Testing

1) Partial t-test

Table 6

t-test (Partial)

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	57,693	23,928		2,411	0.028
	MOTIVATION	0.488	0.444	0.265	1,100	0.037
	DISCIPLINE	0.096	0.323	0.215	0.205	0.040
a. Dependent Variable: ACHIEVEMENT						

The results of the study showed that the motivation variable had a significance value of 0.037 (<0.05), thus significantly influencing academic achievement. The discipline variable also had a significance value of 0.040 (<0.05), thus significantly influencing academic achievement. Thus, academic motivation and discipline have a positive and significant influence on student academic achievement.The Influence of Motivation on Achievement Sig = 0.037 < 0.05, t count = 1.100, Beta = 0.265. So, motivation has a positive and significant effect on learning achievement. This means that the higher the student's motivation, the higher the learning achievement tends to be.WhereasThe Influence of Discipline on Achievement Sig = 0.040 < 0.05, t count = 0.205, Beta = 0.215. So, discipline has a positive and significant effect on learning achievement. This means that learning discipline also contributes to improving student learning achievement.WithThus, both variables (motivation and discipline) play an important role in improving learning achievement.

2) F test (simultaneous)

Table 7

F test (Simultaneous)

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	103,861	2	51,931	0.050	0.048b
	Residual	1457,339	17	85,726		
	Total	1561,200	19			
a. Dependent Variable: ACHIEVEMENT						
b. Predictors: (Constant), DISCIPLINE, MOTIVATION						

The results of the study indicate a significance value of 0.048 (<0.05), so it can be concluded that simultaneously the variables of motivation and discipline have a significant effect on learning outcomes. This shows that both variables together can explain variations in student learning achievement. Therefore, the regression model applied in this study is declared to meet the requirements. F Test Results (Simultaneous), F count = 0.050, Sig = 0.048 <0.05. So simultaneously, the variables of motivation and discipline have a significant effect on learning achievement. The interpretation is: Sig <0.05 (0.048) then: H_0 is rejected and H_1 is accepted Meaning: Motivation and discipline together are able to explain changes in learning achievement significantly.

Discussion

The results of the analysis research conducted, this study shows that the instruments used in the form of a motivation questionnaire, a learning discipline questionnaire and a learning achievement test through teaching treatments that have been tested for validity and reliability. Validity tests with Pearson product moment correlations show that all items are declared valid and reliability tests with Cronbach's alpha through the SPSS instrument program are consistent and reliable. The results of the instrument research obtained that motivation and learning discipline play a crucial role in improving students' mathematics learning achievement. The analysis shows that motivation and learning discipline have a significant effect on achievement in mathematics subjects. This is proven by the significance value of 0.048 <0.05, which indicates that both independent variables together contribute to improving students' mathematics learning achievement through the application of the PBL problem-based learning model in grade III students of SD Negeri II Mariri Lama with a total of 20 students with an average value of motivation 79.55 learning discipline 77.15 and mathematics learning achievement 81.25.

The results of the normality test using the Shapiro-Wilk test show that the significance value of the motivation variable decision making is 0.200, learning discipline is 0.186, learning achievement is 0.174, all significance values are greater than 0.05, so the research data is normally distributed.

The results of the ANOVA data linearity test of the motivation and discipline and achievement tables show that the decision is taken from the probability of the influence of motivation and learning discipline on mathematics learning achievement through the PBL problem-based learning model of grade III students of SD Negeri II Mariri Lama with values of 0.214 and 0.198. It was found that there was no deviation between the two variables from the linear line so that it can be concluded that both have a linear pattern because the significance value is greater than 0.05.

The results of the hypothesis test strengthen the findings that the influence of learning motivation on mathematics learning achievement obtained a significance value of 0.037> 0.05 and the influence of learning discipline on mathematics learning achievement obtained a significance value of 0.040> 0.05 and the significance value of motivation, discipline and mathematics learning achievement was 0.048> 0.05 so that H0 was rejected Ha was accepted. Thus, learning motivation and discipline had a significant and positive influence on mathematics learning achievement of grade III students of SD Negeri II Mariri Lama through the PBL problem-based learning model on simple fraction material.

So, overall, the research hypothesis stating that motivation and learning discipline influence mathematics learning achievement can be accepted. In theoryLearning achievement is influenced by internal factors of motivation, interest and learning discipline, as well as external factors of the family and school environment (Dapa, 2019).Learning motivation encourages students to be more active, persistent, and enthusiastic in math lessons. Learning discipline reflects a student's ability to manage time, comply with regulations, and maintain consistency in learning. These two factors reinforce each other, resulting in an efficient learning process.

In addition, the implementation of the problem-based learning model (PBL) also strengthens the learning process, as students are actively involved in solving real-life problems. PBL increases student engagement in mathematics learning and can improve elementary school students' mathematics learning outcomes (Lumapow, 2023; Roringpandey, 2023). This model increases student motivation and discipline in participating in learning, which has a positive impact on mathematics learning

achievement. Thus, it can be concluded that motivation and discipline in learning encouraged by the implementation of the PBL model have a significant impact on the mathematics learning outcomes of third-grade students at SD Negeri 2 Mariri Lama.

4. CONCLUSION

Based on the results of the study entitled "The Effect of Motivation and Learning Discipline on Mathematics Learning Achievement using the PBL Problem-Based Learning Model in Grade III Students of SD Negeri 2 Mariri Lama", it can be concluded that: Learning motivation has a positive and significant effect on students' mathematics learning achievement. This shows that the higher the student's motivation, the better the mathematics learning achievement achieved. Learning discipline has a positive and significant effect on students' mathematics learning achievement. This means that students who have good learning discipline tend to achieve higher learning outcomes. Motivation and learning discipline simultaneously have a significant effect on mathematics learning achievement.

The application of the problem-based learning model supports increased student motivation and learning discipline, thus impacting improved mathematics learning achievement. Thus, it can be concluded that the motivation and learning discipline supported by the PBL learning model have a significant influence in improving mathematics learning achievement of third-grade students at SD Negeri 2 Mariri Lama.

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