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Improving Mathematical Literacy Ability and Learning Independence of SDN 29 Pardomuan 1 Students through the Application of Realistic Mathematics Learning Approaches

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Abstract

This research was motivated by the low level of mathematical literacy skills and student independence at school. The focus of the problems studied in this research includes 1) Students' mathematical literacy abilities; 2) Student learning independence; 3) Realistic Mathematics Learning Process; 4) Increasing students' mathematical literacy skills and learning independence in the experimental class and control class; 5) The influence of PMR on students' literacy skills and learning independence in the experimental class. The research method used is quasi-experimental, pretest posttest type. The research population included all fifth-grade students at SDN 29 Pardomuan. The treatment given to the experimental class was Building Space learning using a Realistic Mathematical Approach model. Data analysis was carried out using quantitative analysis. The results of data calculations through statistical tests obtained 1) There is a positive (unidirectional) influence between the Educational Learning Model on Mathematical Literacy Ability with the Sig. Educational Learning Model value (0.000) < 0.05 and the calculated t value (3.838) > t table (1.995); 2) There is a positive (unidirectional) influence between the Educational Learning Model on Student Learning Independence and the Sig. Educational Learning Model (0.000) < 0.05 and calculated t value (4.487) > t table (1.995); 3) There is a positive (unidirectional) influence between the Educational Learning Model on Mathematical Literacy Ability and the Sig value. Educational Learning Model (0.000) < 0.05 and calculated t value (3.838) > t table (1.995); 4) There is a positive (unidirectional) influence between the Educational Learning Model on Student Learning Independence with the Sig. Educational Learning Model value (0.000) < 0.05 and the calculated t value (4.487) > t table (1.995).

Keywords: *mathematical literacy, independent learning, realistic mathematics learning*

Introduction

In a nation, education is very important for the survival and growth of the country as a whole (Hwang, 2022). Therefore, the use of information and communication technology in all areas of life is important, including in the education system that continues to develop. Consequently, it is believed that today's education will allow students to acquire the imaginative, flexible, and problem-solving abilities necessary for success both at work and in life.

It is intended that the disciplines taught in schools can help students acquire those skills. Mathematics is one of the disciplines taught in schools (Astuti, 2018; Hasbi et al., 2022). To understand science and technology, mathematics, one of the basic sciences, plays an important role in both practical and analytical aspects. The teacher's conception of mathematics, as well as its teaching and learning, strongly moderators their mathematics teaching practice. The role of this conception and the nature of its relationship to knowledge and training have been analyzed in depth in the mathematics education literature (Rodríguez-Muñiz et al., 2022).

Students need strong conceptual understanding as a foundation for mathematics study if the subject is to have any real impact on their lives (Yulianty, 2019). There were variations in students' mathematical self-efficacy based on issue type (e.g., less confidence when dealing with modeling difficulties compared to problems using made-up terms or intra-mathematical problems), but not by subject (e.g., students' confidence when dealing with the Pythagorean theorem vs linear functions) (Street et al., 2022).

Understanding the concept becomes the foundation for students to teach back to others more deeply (Ike & Suhendri, 2021). The ability to think critically, analytically, systematically, logically, and creatively, as well as the ability to work together in teams, cannot necessarily be achieved easily by students. Some children still struggle with math today. This shows that mathematics education is currently still not optimal in terms of quality. The results of the Program for International Student Assessment (PISA) 2022 research were recently announced on December 5, 2023, and Indonesia is ranked 68th with a score in math (379), science (398), and reading (371).

The Indonesian Realistic Mathematics Education Method (PMRI) is a teaching strategy that helps students relearn mathematical concepts, ideas, and rules that can be applied to solve mathematical problems (Suparni, 2020). From this affirmation, the PMRI learning approach can be used as a substitute to provide opportunities for students to think actively independently, discover for themselves the concepts of solving mathematical problems that exist in real situations, and make mathematics learning more meaningful.

Poor math learning outcomes of children demonstrate this. Students also have a negative attitude towards arithmetic. In line with this, SDN 29 Pardomuan, Pangururan District, Samosir Regency, also experienced the same thing; specifically, data were obtained showing student learning outcomes in the midterm examination (UTS) in low mathematics subjects with a minimum completeness criterion (KKM) of 70.00 in the initial observation made in the 2021/2022 school year, namely grade IV.

Students who have not reached KKM are more than students who have reached KKM, which is 61% of students who have not reached KKM compared to 39% of students who have reached KKM. Based on the interview findings, several problems were identified as the root of low student learning outcomes, especially in subjects related to mathematics. The learning outcomes of SDN 29 Pardomuan 1 are now subpar because the class still traditionally teaches mathematics. For most children, mastery of maths is still a scary and uninteresting topic.

The school and teachers of SDN 29 Pardomuan 1 use the Indonesian Realistic Mathematics Education (PMRI) strategy to overcome these problems. Therefore, the researcher wishes to continue his research title, namely "Increasing Mathematical Literacy Skills and Learning Independence of SDN 29 Pardomuan 1 Students through the Application of Realistic Mathematics Learning Approaches in Pangururan District, Samosir Regency".

Method

Using a non-equivalent pretest-posttest group, this study conducted quasi-experimental research to test theories about causal links and the effects of treatment. Questionnaires, observations, and documentation were the three main modalities of data collecting in this research. Using linear regression analysis, we may determine the changes in the dependent variable Y, which is based on a known independent variable X. With linear regression analysis, you may find out how much a dependent variable changes in response to a change in an independent variable. To find out how much of an effect realistic mathematics learning has on boosting students' mathematical literacy and learning independence at SDN 29 Pardomuan,

Pangururan District, Samosir Regency, we use a simple linear regression formula that includes the following:

$$Y_1 = a + bX$$
$$Y_2 = a + bX$$

Information:

Y1: Variable Mathematical Literacy Ability

Y2: Learning Independence Variable

x: variable Application of Realistic Mathematics Learning

a : Regression constant number for x = 0 (value of *y* at time *x* zero)

b: Regression direction coefficient, which shows the number of increases or decreases of variable y when increasing or decreasing by 1 unit.

The values of a and b can be determined using the least squares formula based on the above equation as follows: Formula to find out the magnitude of the value of a (Sugiyono, 2019):

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x^2)}$$

The formula for knowing the magnitude of the value of b:

$$a = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x^2)}$$

Where n: the amount of sample data

Direct regression equations are used to predict changes in variable Y based on the known values of variable X after the calculation is complete and the values of a and b are known. If X is known, the regression equation can be used to forecast the average value of variable Y and calculate the average change of variable Y for each change in X.

Results

Characteristics Respondent

By Gender

Table 1. By Gender

No	Gender	Sum	Percentage
1	Law Law	38	54%
2	Woman	32	46%
Total		**70**	**100%**

Based on data processing, it was found that of 70 respondents, there were 38 respondents, or 54% of male respondents, which were more dominant than female respondents of 32 respondents or 46%.

By Age

Table 2. By Age

Installment-installment Usia	11,6
Min	11
Max	13
Std Dev	0,7

Based on the processing results, it can be seen that from a total of 70 respondents, it is known that the average age of respondents is 11.6 years, with the youngest age being 11 years, the oldest age of respondents being 13 years, and a standard deviation of 0.7 years.

Based on Parents' Jobs

Table 3. Based on Parents' Jobs

No	Parents' Work	Sum	Percentage
1	Farmer	16	23%
2	Wiraswasta	42	60%
3	PNS/ASN	12	17%
Total		**70**	**100%**

Based on the processing of respondents' parents' employment data, it was found that out of 70 respondents, there were 16 respondents, or 23% of respondents, with parental work as farmers, as many as 42 respondents, or 60% of respondents, with parental employment status as self-employed which was the most dominant in this study, as many as 12 respondents or 17% of respondents with parental work as civil servants / civil servants.

Regression Analysis X to Y1

Coefficient of Determination

A measure of the extent to which independent factors impact the dependent variable, the coefficient of determination quantifies this effect.

Table 4. Coefficient of Determination

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.422a	.178	.166	4.627	.178	14.730	1	68	.000

a. Predictors: (Constant), Educational Learning Model (X)
b. Dependent Variable: Mathematical Literacy Ability (Y1)

Based on Table 4 above, it can be seen that a correlation value (R) of 0.422 is obtained. This shows a moderate correlation or relationship between the independent variable, namely the Education Learning Model (X), and the dependent variable of Mathematical Literacy Ability (Y1). In addition, an R-Square value of 0.178 was obtained, which showed that the proportion of the influence of all independent variables (Educational Learning Model (X)) on the dependent variable (Mathematical Literacy Ability) was 17.8%. In comparison, the rest (100% - 17.8% = 82.2%) were influenced by other variables that were not in this study or the regression model, such as student gender.

Individual Parameter Significance Test (t-Test)

Whether the independent variable partly influences the dependent variable is partially explained by the data in the Coefficients table, which displays the test results and provides information about the regression equation.

Hipotesis :

H0: The partly bound variable is unaffected by the independent variable.

H1: The dependent variable has a substantial impact on the partly constrained one.

Results Criteria :

If the value of Sig. > 0.05, and the value of t is calculated < the value of t of the table (1.995), then H0 is accepted.

If the value of Sig. < 0.05 and the value of t is calculated > the value of t of the table (1.995), then H1 is accepted.

Table 5. Test t Analysis Results

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Say.
1	(Constant)	27.965	4.203		6.653	.000
	Educational Learning Model (X)	.612	.159	.422	3.838	.000

a. Dependent Variable: Mathematical Literacy Ability (Y1)

The equation for mathematical literacy ability's linear regression in this research is 4,203+0,612(X). With a regression coefficient of 0.612 and a Sig. Educational Learning Model (0.000) < 0.05 and a computed t value (3.838) > t table (1.995), the results show that H0 is rejected and H1 is accepted, as shown in the table above. Thus, Mathematical Literacy Ability is positively (unidirectionally) affected by the Educational Learning Model. The correlation between Mathematical Literacy Ability and the Educational Learning Model is seen here. Inversely, Mathematical Literacy Ability's value will fall or drop if the Educational Learning Model's value is going down.

Regression analysis of X and Y1 against Y2

Model Due Diligence

1. Coefficient of Determination

One way to characterize the extent to which independent factors impact the dependent variable is by looking at the coefficient of determination.

Table 6. Coefficient of Determination

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.801a	.641	.631	2.048	.641	59.874	2	67	.000	2.340

a. Predictors: (Constant), Mathematical Literacy Ability (Y1), Educational Learning Model (X)

b. Dependent Variable: Student Learning Independence (Y2)

Based on the table above, it can be seen that a correlation value (R) of 0.801 is obtained. This shows a high correlation or relationship between the independent variable, namely the Education Learning Model (X) and Mathematical Literacy Ability (Y1), with the dependent variable, Student Learning Independence (Y2). In addition, an R-Square value of 0.641 was obtained, which showed that the proportion of the influence of all independent variables (Educational Learning Model (X) and Mathematical Literacy Ability (Y1)) on the dependent variable (Student Learning Independence) was 64.1%. In comparison, the rest (100% - 64.1% = 35.9%) were influenced by other variables that were not in this study or the regression model.

2. Simultaneous Significance Test (F Test)

The ANOVA table below displays the F test findings. You can see if the independent variable is influencing the dependent variable at the same time or not in this table. A considerable impact

of the independent variable on the dependent variable is present when the estimated value of F is greater than the value of F in the table and the value of Sig. is less than 0.05.

Table 7. Test F

ANOVA

Model		Sum of Squares	df	Mean Square	F	Say.
1	Regression	502.137	2	251.068	59.874	.000b
	Residual	280.949	67	4.193		
	Total	783.086	69			

a. Dependent Variable: Student Learning Independence (Y2)
b. Predictors: (Constant), Mathematical Literacy Ability (Y1), Educational Learning Model (X)

Based on the data in the table, we can see that the model count F value (59.874) is higher than the table F value (F(0.05.2/67) = 3.134), and the Sig. Value in the table values is 0.000 < 0.05, thus it's safe to say that the estimated model's linear regression is a viable option. Student Learning Independence is the dependent variable, and the simultaneous impact of the independent variables (Educational Learning Model, X) and Mathematical Literacy Ability, Y1) is explained by this.

3. Individual Parameter Significance Test (t-Test)

Whether the independent variable partly influences the dependent variable is partially explained by the data in the Coefficients table, which displays the test results and provides information about the regression equation.

I hypothesize: If the partly bound variable is unaffected by the independent variable, then (H0) must be true. The null hypothesis states that the dependent variable has no influence on the partly dependent one.

Assessment Requirements: We accept H0 if Sig. > 0.05 and the estimated t-value is less than the table-value of t (1.995). H1 is approved if the estimated t-value is greater than the table-specified t-value (1.995) and the significance level (Sig.) is less than 0.05.

Table 8. Test t

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Say.
1	(Constant)	-.324	2.390		-.135	.893
	Educational Learning Model (X)	.349	.078	.362	4.487	.000
	Mathematical Literacy Ability (Y1)	.384	.054	.578	7.155	.000

a. Dependent Variable: Student Learning Independence (Y2)

The linear regression equation used to draw conclusions from this research is as follows: Mathematical Literacy Ability = -0.324+0.349(X)+0.384(Y1). The model's important results are shown in the table above: a) The educational learning model's significance value (0.000) is less than 0.05, and the estimated t-value (4.487) is more than the t-table value (1.995) with a regression coefficient of 0.349. Consequently, H0 is rejected and H1 is approved. So, the Educational Learning Model has a beneficial (unidirectional) effect on students' ability to learn on their own. As a result, we may deduce that the Educational Learning Model's worth is directly

proportional to the value of Student Learning Independence. The converse is also true: as the Educational Learning Model's value decreases, Student Learning Independence's value will also decrease. Thus, we can reject H0 and accept H1 because the Sig. Value of Mathematical Literacy Ability (0.000) < 0.05 and the calculated t value (7.155) > t table (1.995) with a regression coefficient of 0.384. It may be inferred that the relationship between mathematical literacy ability and student learning independence is positive and unidirectional. This clarifies that the degree of Student Learning Independence is directly proportional to the value of Mathematical Literacy Ability. The inverse is also true: a decline in Mathematical Literacy Ability will lead to a decline in Student Learning Independence.

Indirect Influence

When one variable affects another via intermediary variables, we say that there is indirect effect. You may find this impact by multiplying the standard residual of the dependent variable's mediation variable by the value of the independent variable's standard residual from the mediation variable.

1. The Effect of the Educational Learning Model (X) on Student Learning Independence (Y2) through Mathematical Literacy Ability (Y1)
2. *Educational Learning Model* = (0.422)x(0.578) = 0.244

From the calculation results, it was found that the influence of the Educational Learning Model (X) indirectly on Student Learning Independence (Y2) was 0.244. Sobel Test The Effect of Educational Learning Models on Student Learning Independence.

$$\text{Uji Sobel (z)} = \frac{ab}{\sqrt{\left(b^2SE_a^2\right) + (a^2SE_b^2)}} = \frac{(0,422)(0,578)}{\sqrt{((0.578^2)(0,159^2)) + \left((0,422^2)(0,054^2)\right)}}$$

$$\text{Uji Sobel (z)} = \frac{0,243916}{\sqrt{(0,008446) + (0,000519)}}$$

$$\text{Uji Sobel (z)} = \frac{0,243916}{0,094685} = 2,576$$

From the calculation results of the Sobel test get the value z = (2.576) > 1.995. With a significant rate of 5%. That is, the Mathematical Literacy Ability Variable (Y1) is able to mediate the influence of the Educational Learning Model (X) on Student Learning Independence (Y2) with a regression coefficient of 0.244.

Research Diagram Path

Based on the model regression outputs of both models 1 and 2, in the *coefficients section,* it is known that the value of each influence of the independent variable of the Educational Learning Model (X) on the mediating variable of Mathematical Literacy Ability (Y1) and the influence of the independent variable of the Educational Learning Model (X) on the dependent variable Student Learning Independence (Y2) through the mediation variable of Mathematical Literacy Ability (Y1) can be seen in the column *Standardized Coefficients.* The influence of other factors outside of research or symbolized by the letter "e" can be seen in the magnitude of the value of R2, where the value of e1 in the model equation 1 is 0.906 (e1 =). The value of e2 in the model 2 equation is 0.599 (e2 =).$\sqrt{(1-0,178)} = 0,906\sqrt{(1-0,641)} = 0,599$

Hypotheses 3 and 4

Normality Test

Before comparing any two groups, we make sure they are normally distributed. By comparing the significant values of the two data sets—samples from traditional media courses and samples from integrative learning media classes that were treated—the Kolmogorov-Smirnov Normality

test was used to ensure that the data was normal. Each data set is considered to have regularly distributed data if and only if the Sig value is greater than 0.05.

Table 9. Normality Test

Tests of Normality

	Sample	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Say.	Statistic	df	Say.
Students' Mathematical Literacy Skills	Conventional	.122	70	.011	.932	70	.001
	Realistic Learning Method	.121	70	.013	.936	70	.001
Student Learning Independence	Conventional	.112	70	.030	.950	70	.007
	Realistic Learning Method	.121	70	.013	.943	70	.003

a. Lilliefors Significance Correction

Based on the table above, it can be seen that both sample groups have a Sig. A value smaller than 0.05, so it can be concluded that the data group of the data sample data is not normally distributed. Descriptive Statistics

Table 10. Descriptive Statistics

Descriptive

		N	Mean	Std. Deviation
Students' Mathematical Literacy Skills	Conventional	70	10.23	3.519
	Realistic Learning Method	70	16.06	2.536
	Total	140	13.14	4.230
Student Learning Independence	Conventional	70	12.10	2.372
	Realistic Learning Method	70	16.57	2.124
	Total	140	14.34	3.173

The data in the table show that out of 140 respondents, 70 on traditional media and 70 on realistic learning methods, were asked 20 questions about students' mathematical literacy. The results showed that the conventional media group averaged 10.23 with a standard deviation of 3.519, while the realistic learning methods group averaged 16.06 with a standard deviation of 2.536. On one hand, students using actual learning techniques had an average score of 16.57 (standard deviation=2.124), while those utilizing traditional methods had an average value of 12.10 (standard deviation=2.372).

Independent T Test

The Independent t-test is a parametric statistical test conducted to test whether there is a significant difference between 2 groups of samples that are not paired with each other if they have met the normality requirements in each data group.

Hypothesis 3 :

Ho: $\mu 1 \leq \mu 2$ (the average score of mathematical literacy ability of students who use conventional approaches is less or equal to the average value of realistic learning approaches)

H1: μ1 > μ2 (the average value of mathematical literacy ability of students who use conventional approaches is more than the average value of realistic learning approaches)
Hypothesis 4 :
Ho: μ1 ≤ μ2 (the average value of learning independence of students who use conventional approaches is less or equal to the average value of realistic learning approaches)
H1: μ1 > μ2 (the average value of student learning independence using conventional approaches is more than the average value of realistic learning approaches).
Information:

μ1 is the population average of group 1
μ2 is the population average of group 2
Decision Criteria with one-tailed:

1. If the value of Sig. *one-tailed* = $\frac{\text{Asymp.Sig.}(2-\text{tailed})}{2} \leq$ 0.05 then H0 is accepted.
2. If the value of Sig. *one-tailed* = > 0.05, then H1 is accepted.$\frac{\text{Asymp.Sig.}(2-\text{tailed})}{2}$

Table 11. Difference Test

Test Statistics

	Students' Mathematical Literacy Skills	Student Learning Independence
Mann-Whitney U	507.500	422.500
Wilcoxon W	2992.500	2907.500
Z	-8.120	-8.488
Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: Sample

Based on the SPSS output in Table 11 above, in the column of students' mathematical literacy ability, a Sig value is obtained. *One-tailed* = where less than 0.05, then H0 is accepted, meaning that the average score of mathematical literacy ability of students who use conventional methods is less than or equal to the average value of realistic learning methods. This answers the hypothesis that the average score of mathematical literacy ability of students who use realistic learning methods is higher than the average value of conventional methods, which is 16.06, greater than the average value of traditional methods of 10.23.$\frac{\text{Asymp.Sig.}(2-\text{tailed})}{2} = \frac{0{,}000}{2} = 0{,}000$

In the column of student learning independence, a Sig value is obtained. *One-tailed* = where less than 0.05, then H0 is accepted, meaning that the average value of learning independence of students who use conventional methods is less than or equal to the average value of realistic learning methods. This answers the hypothesis that the average value of student learning independence using realistic learning methods is higher than the average value of conventional methods, which is 16.57, greater than the average value of traditional methods of 12.10.$\frac{\text{Asymp.Sig.}(2-\text{tailed})}{2} = \frac{0{,}000}{2} = 0{,}000$

Discussion

The effect of the application of realistic mathematics learning on improving mathematical literacy skills in students

By demonstrating that the Educational Learning Model's Sig. Value (0.000) is less than 0.05 and that the computed t value (3.838) is more than the t table value (1.995) with a regression coefficient of 0.612, this research led to the rejection of H0 and the acceptance of H1. This indicates that the Educational Learning Model has a positive and one-way effect on mathematical literacy ability. This elucidates the relationship between Mathematical Literacy Ability and the Educational Learning Model's worth (Takaria et al., 2020). The inverse is also true: when Mathematical Literacy Ability's value declines, the Educational Learning Model's value rises (Sohaimi et al., 2022).

The effect of the application of realistic mathematics learning on student learning independence in students

After reviewing the information provided, it can be concluded that the study's findings support the rejection of H0 and acceptance of H1: the Sig. Educational Learning Model value (0.000) is less than 0.05, the computed t value (4.487) is more than the t table value (1.995), and the regression coefficient is 0.349. So, the Educational Learning Model has a beneficial (unidirectional) effect on students' ability to learn on their own. The correlation between the Educational Learning Model's value and Student Learning Independence's value is seen here. (Afendi et al., 2022). On the other side, a decline in the Educational Learning Model's worth will lead to a decline in Student Learning Independence's worth (Desiana et al., 2022).

Differences in Improving Students' Mathematical Literacy Ability

In the results of this study, students' mathematical literacy skills obtained Sig scores. *One-tailed* = where less than 0.05, then H0 is accepted, meaning that the average score of mathematical literacy ability of students who use conventional methods is less than or equal to the average value of realistic learning methods. This answers the hypothesis that the average score of mathematical literacy ability of students who use realistic learning methods is higher than the average value of conventional methods, which is 16.06, greater than the average value of traditional methods of 10.23.$\frac{\text{Asymp.Sig.(2-tailed)}}{2} = \frac{0{,}000}{2} = 0{,}000$

Differences in Increasing Student Independence

In the results of this study, students' learning independence obtained Sig scores. *One-tailed* = where less than 0.05, then H0 is accepted, meaning that the average value of learning independence of students who use conventional methods is less than or equal to the average value of realistic learning methods. This answers the hypothesis that the average value of student learning independence using realistic learning methods is higher than the average value of conventional methods, which is 16.57, greater than the average value of traditional methods of 12.10.$\frac{\text{Asymp.Sig.(2-tailed)}}{2} = \frac{0{,}000}{2} = 0{,}000$

Challenges and solutions faced in applying a realistic mathematics learning approach

The challenges of implementing the Realistic Mathematics Learning Approach (PMRI) in elementary schools and solutions for improving mathematical literacy and student learning independence are as follows:

a. Teacher Readiness:

1) Requires intensive training and mentoring to understand and implement PMRI effectively.
2) Teachers must be able to design contextual and creative learning and facilitate the active learning process of students.
3) Teacher workload can increase in preparing teaching materials and learning activities in accordance with PMRI.

b. Resource Availability:
1) Requires textbooks and teaching materials that support PMRI.
2) Adequate school facilities and infrastructure to support contextual learning, such as teaching aids and internet access.
3) Additional costs for the procurement of teaching materials and learning media.

c. Student Study Habits:
1) Requires adaptation from students accustomed to traditional learning.
2) Students may find it difficult to solve complex contextual problems.
3) Student learning motivation needs to be encouraged to be active and independent in the learning process.

d. Parental Support:
1) Requires parents' understanding of PMRI and their role in supporting students' learning process.
2) Parents need to assist students in completing contextual tasks related to daily life.

The Solutions for Improving Mathematical Literacy Skills and Student Learning Independence are as follows:

a. Teacher Capacity Building:
1) Carry out ongoing teacher training and mentoring on PMRI.
2) Provide training modules and practical guidance to assist teachers in implementing PMRI.
3) Provide opportunities for teachers to learn and share experiences in the PMRI community of practitioners.

b. Resource Provisioning:
1) Develop textbooks and teaching materials that are contextual and in accordance with PMRI.
2) Utilize information and communication technology (ICT) to support contextual learning.
3) Allocate funds for the procurement of teaching materials and learning media that support PMRI.

c. Fostering Student Study Habits:
1) Carry out active and fun learning to attract students.
2) Provide opportunities for students to learn independently and collaborate with peers.
3) Reward students' efforts and learning progress.

d. Parent Engagement:
1) Provide information and education to parents about PMRI.
2) Encourage parents to be involved in students' learning at home.
3) Build effective communication between teachers and parents to support student learning progress.

Conclusion

Conclusions based on the results and discussants, several things are known, namely 1) there is a positive influence (unidirectional) between the application of the Realistic Mathematics Learning model on improving mathematical literacy skills in students of SDN 29 Pardomuan 1 in Pangururan District, Samosir Regency with a value of Sig. Educational Learning Model (0.000) < 0.05 and calculated t value (3.838) > t table (1.995); 2) there is a positive (unidirectional) influence between the Application of Realistic Mathematics Learning on student learning

independence in students of SDN 29 Pardomuan 1 in Pangururan District, Samosir Regency with a value of Sig. Educational Learning Model (0.000) < 0.05 and calculated t value (4.487) > t table (1.995); 3) the increase in mathematical literacy ability of students who use realistic learning methods is higher than the average value of conventional methods, which is 16.06, greater than the average value of traditional methods of 10.23 with a value of Sig. One-tailed 0.000 where smaller than 0.05, then H0 is accepted. That is, increasing students' mathematical literacy skills with Realistic Mathematics Learning is better than conventional learning; 4) the average value of learning independence of students who use realistic learning methods is higher than the average value of traditional methods when testing normality, which is 16.57, greater than the average value of conventional methods of 12.10 with a value of Sig. One-tailed 0.000 where smaller than 0.05, then H0 is accepted. That is, student learning independence with Realistic Mathematics Learning is better than conventional learning; 5) the challenges of implementing the Realistic Mathematics Learning Approach (PMRI) in elementary schools include teacher readiness, availability of resources, student learning habits, and parental support. At the same time, the solutions to improving mathematical literacy skills and student learning independence are teacher capacity development, provision of resources, fostering student learning habits, and involving parents.

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