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MASTER (Motivating, Acquiring, Searching, Triggering, Exhibiting, Reflecting) learning model in terms of literacy ability and students' mathematics learning motivation

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ABSTRACT

It is argued that mathematical literacy skills might be improved when learning motivation is high. This study aims to examine the difference in mathematical literacy skills between students who joined a learning model that stimulate motivation, the MASTER learning model (Motivating, Acquiring, Searching, Triggering, Exhibiting, and Reflecting) and those who attended conventional learning in terms of high, medium, and low learning motivation. This is a quasi-experimental study with a population of all seventh-grade students of an Islamic Junior School in South Kalimantan, Indonesia. The sample was selected using the purposive sampling technique with group VII A as the experimental class and group VII E as the control class. The instrument used was a test of students' mathematical literacy skills and a student's learning motivation questionnaire. The data were analyzed using a two-way ANOVA. The results showed that: (1) there were differences in mathematical literacy skills between students who attended the MASTER learning model and those who took conventional learning; (2) there were differences in mathematical literacy abilities between students with high, medium, and low motivation to learn, and (3) there was an interaction between the MASTER learning model and learning motivation on students' mathematical literacy abilities.

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INTRODUCTION

In the current era, students are no longer required to be proficient in arithmetic, but also proficient in reading. The term reading is synonymous with literacy, so that in simple language literacy is defined as the ability to read that a person has. In mathematics, mathematical literacy is defined as an individual's ability to formulate, apply, and interpret mathematics in various contexts (OECD, 2013). The ability referred to here is certainly very complex, but the main thing is the ability to reason mathematically which includes the ability to use concepts, facts, procedures, and principles to describe, explain, and predict an event or phenomenon (OECD, 2013). Simply put, the students' good mastery of mathematical literacy will be directly proportional to their mathematical thinking, logic and reasoning abilities (Masjaya & Wardono, 2018).

The scope of mathematical literacy according to de Lange (2006) includes spatial literacy, numeracy, and quantitative literacy. Spatial literacy is an ability that helps understand the world we live in (3D) including an understanding of the properties of objects, their relative positions and their effects

on our visual perception, the creation of all kinds of two- and three-dimensional paths and routes, navigation practices, shadow. Mathematical literacy skills are important to be built from an early age through various habits. Teachers should be able to familiarize students with formulating, using, and interpreting mathematics in various contexts including mathematical reasoning (Martinah et al., 2019).

In the current era, students are no longer required to be proficient in arithmetic, but also proficient in reading. The term reading is synonymous with literacy, so that in simple language literacy is defined as the ability to read that a person has. In mathematics, mathematical literacy is defined as an individual's ability to formulate, apply, and interpret mathematics in various contexts (OECD, 2013). The ability referred to here is certainly very complex, but the main thing is the ability to reason mathematically which includes the ability to use concepts, facts, procedures, and principles to describe, explain, and predict an event or phenomenon (OECD, 2013). Simply put, the students' good mastery of mathematical literacy will be directly proportional to their mathematical thinking, logic and reasoning abilities (Masjaya & Wardono, 2018)

One of the essential goals of learning mathematics in schools is to develop students' abilities and skills in mathematical thinking. The ability to think mathematically is not only conveying various materials in the form of formulas, which lead students to actively construct their own knowledge, but mathematical thinking means having the insight to convey mathematical ideas or ideas in various ways (Atsnan et al., 2018). Simple logic says that students who have good mathematical literacy mean that they have good motivation and independent learning as well. In the context of learning and learning mathematics, there are still many students who have low motivation or even do not have the motivation to learn mathematics. Motivation has a very big influence on learning, if the teacher is not able to stimulate and increase student motivation, then students will not be able to learn as well as possible, because there is no special attraction for the student. Motivation and learning are two things that influence each other. Learning is a relatively permanent change in behavior and potentially occurs as a result of practice or reinforcement (Rahyudi, 2012). When students' motivation to learn, especially mathematics can be improved, they will be able to achieve the expected mathematics learning achievement (Kurniawan & Wustqa, 2014).

The learning model that is expected to be able to increase students' learning motivation, as well as train students' skills, as well as form student learning independence is the MASTER learning model (Motivating, Acquiring, Searching, Triggering, Exhibiting, and Reflecting) (Santosa et al., 2013). MASTER learning can be implemented in the mathematics learning process because the activities in it are able to make learning more fun for students (Rose & Nicholl, 2009). In addition, MASTER learning also allows students to learn naturally so that they learn happily, effectively, and quickly (Yuniati, 2012), and learn to read data from nearby learning sources, which previously started with collecting data, classifying data, and processing data. associated with the material being studied.

METHOD

The type of research used in this research is Quasy Experiment with the design used is The Nonequivalent Posttest-Only Control Group Design. In this design, there were two groups, the first group was the experimental group that was given treatment (X) and the second group was the control group that was not treated. Then both groups were both given a posttest (O) question. In this design the samples taken, both from the experimental group and the control group were not chosen randomly (Lestari & Yudhanegara, 2017).

This study begins by selecting two homogeneous classes to be used as an experimental class and a control class based on certain considerations. Then each class was given a questionnaire, namely a student learning motivation questionnaire. Then grouped according to high, medium and low learning motivation.

Table 1. Research design

Class	Learning motivation questionnaire	Treatment	*Post-test*
Experiment	√	X	O
Control	√		O

Information:
X: Treatment with MASTER learning model.
O: Posttest to measure mathematical literacy skills

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The relationship between the MASTER learning model and learning motivation with mathematical literacy can be seen in Table 2.

Table 2. Relationship between MASTER's learning model and learning motivation with students' mathematical literacy ability

Treatment (A_i)	Categorization of learning motivation (B_j)		
	High(B_1)	Medium (B_2)	Low(B_3)
MASTER learning model (A_1)	Mathematical Literacy Ability (A_1B_1)	Mathematical Literacy Ability (A_1B_2)	Mathematical Literacy Ability (A_1B_3)
Conventional learning models (A_2)	Mathematical Literacy Ability (A_2B_1)	Mathematical Literacy Ability (A_2B_2)	Mathematical Literacy Ability (A_2B_3)

Information:
A_1 : Students' mathematical literacy ability towards learning models MASTERS.
A_2 : Students' mathematical literacy ability towards the learning model conventional.
B_1 : High learning motivation
B_2 : Medium learning motivation.
B_3 : Low learning motivation.
A_1B_1 : The mathematical literacy ability of students who are highly motivated to learn taught with the MASTER learning model.
A_1B_2 : The students' mathematical literacy ability is moderately motivated to learn taught with the MASTER learning model.
A_1B_3 : Students' mathematical literacy ability is motivated to learn low who are taught with the MASTER learning model.
A_2B_1 : Students' mathematical literacy ability is motivated to learn which is taught with conventional learning models.
A_2B_2 : Students' mathematical literacy ability is motivated to learn being taught with conventional learning models.
A_2B_3 : The mathematical literacy ability of students with low learning motivation is taught with conventional learning models.

The researcher took a sample of class VII A as the experimental class and class VII E as the control class. Sampling was taken by purposive sampling technique, also known as consideration sampling, namely the technique of taking samples from the population for certain considerations. The sample was determined by the principal and adjusted for the seventh grade teacher at MTsN 9 HST. The considerations in question are class VII A and class VII E which are considered to have almost the same ability in mathematics. After that, the data analysis of the daily test scores/students' previous learning outcomes was carried out and the data were normally distributed and homogeneous, then continued with the Independent Sample T Test, the Sig value was obtained. (2-tailed) is 0.486 > 0.05, so there is no significant difference between mathematics learning outcomes in class VII A and class VII E. In other words, both samples have the same ability. While the object in this study is the effect of using the MASTER learning model (Motivating, Acquiring, Searching, Triggering, Exhibiting, and Reflecting) on mathematical literacy in terms of student motivation.

Data collection techniques include motivation questionnaire, mathematical literacy ability test, and documentation. Questionnaire is used to measure the level of student learning motivation. The test was used to measure the level of mathematical literacy ability of class VII MTsN 9 HST students. The type of test used in this research is posttest. Meanwhile, documentation is used to collect student data related to math scores, number of students and conditions at school. Documentation is also used to document the learning process such as photos during the research.

The research instrument used is a test in the form of a description question that will be used as a post-test question. The experimental group and the control group were given the same test questions to measure students' mathematical literacy skills. To obtain data on students' mathematical literacy skills, it is necessary to score students' answers for each item. The scoring criteria used in this study are listed in Table 3 below.

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Table 3. Guidelines for scoring mathematical literacy ability

No	Rated aspect	Student's responses	Score	Total score
1	Able to write basic algorithm	No answer	0	3
		Unable to write basic algorithm	1	
		Able to write basic algorithms but less precise	2	
		Able to write basic algorithms correctly	3	
2	Able to modelling	No answer	0	3
		Unable to convert the problem into a mathematical model	1	
		Able to convert the problem into a mathematical model but it is not precise	2	
		Able to convert problems into mathematical models appropriately	3	
3	Able simple procedure	No answer	0	3
		Unable to carry out simple procedures	1	
		Able to carry out simple but not precise procedures	2	
		Able to carry out simple procedures correctly	3	
4	Able to formulate mathematical problems	No answer	0	3
		Unable to formulate mathematical problems	1	
		Able to formulate mathematical problems but less precise	2	
		Able to formulate mathematical problems correctly	3	
5	Able to use concepts, facts, procedures, and mathematical reasoning	No answer	0	3
		Unable to use concepts, facts, procedures, and mathematical reasoning	1	
		Able to use concepts, facts, procedures, and mathematical reasoning but less precise	2	
		Able to use concepts, facts, procedures, and mathematical reasoning appropriately	3	
6	Able to interpret problems and then solve them	No answer	0	3
		Unable to interpret the problem and then solve it	1	
		Able to interpret the problem and then solve it but not quite right	2	
		Able to interpret problems and then solve them appropriately	3	
7	Able to use math skills in solving problems	No answer	0	3
		Unable to use math skills in solving problems	1	
		Able to use mathematical skills in solving problems but less precise	2	
		Able to use mathematical skills in solving problems appropriately	3	
8	Able to express views according to flexible according to context	No answer	0	3
		Unable to express views flexibly according to context	1	
		Able to express views according to flexible according to context but not precise	2	
		Able to express views according to flexible according to context appropriately	3	

The instrument before being used during research must meet the requirements, namely validity test, reliability test, difficulty level test, and differentiating power test. Data analysis techniques include prerequisite tests, namely the normality test of data with chi-square, homogeneity of variance test, and hypothesis testing using the two-way ANOVA test, followed by the Scheffe test.

RESULT AND DISCUSSION

Learning Activities in the Experimental Class

At each meeting for the experimental class, groups were formed in the learning process and given Group Worksheets (LKK) for each group. The following are the stages of the learning process using the MASTER learning model in the experimental class:

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1) Motivating the mind stage, students are given motivation at the beginning of learning which aims to increase student motivation in learning and after being given motivation students are formed groups of 5-6 people and each group is given a group name.

Figure 1. Motivating stage

2) Acquiring the information stage, at this stage students are given material about comparisons in order to obtain information and are given the opportunity to ask questions if they do not understand the material provided. The difference with the motivating stage is that in the motivating stage, the teacher places more emphasis on the importance of learning the material, but at the acquiring stage, the teacher places more emphasis on essential information on the material and provides opportunities for children to ask questions.

Figure 2. Acquiring stage

3) Searching out the meaning stage, at this stage each group is given a Group Worksheet (LKK). Each group works on the LKK with the aim of training students to explore the information that has been obtained.

Figure 3. Searching stage

4) Triggering the memory stage, at this stage each group discusses the problems that have been done and writes the answers in their respective books to trigger students' memories and can store the information that has been obtained.

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Figure 4. Triggering stage

5) Exhibiting what you know stage, at this stage each group presents the results of their work in front of the class.

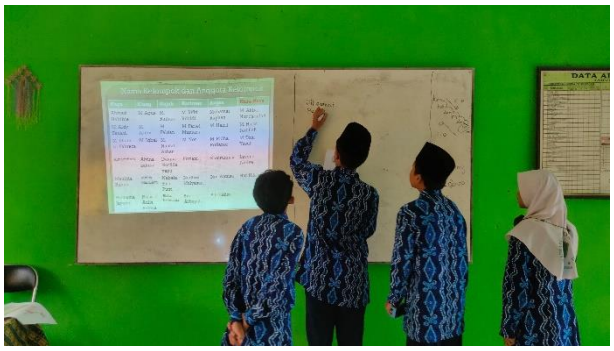

Figure 5. Exhibiting stage

6) Reflecting how you've learned, at this stage the teacher invites students to evaluate, analyze input, responses and corrections from the teacher regarding the ongoing learning about comparative material. At this stage, the teacher gives students the opportunity to conclude what they have learned, especially the comparison material of worth and reverse value, then provides an opportunity to record the important points that have been learned.

Data analysis

The data that the researchers obtained from the study were the results of students' mathematical literacy skills by applying the MASTER learning model to the experimental class and students' mathematical literacy skills by applying conventional learning to the control class. Analysis of mathematical literacy ability data was carried out by using a two-way ANOVA test to answer the first hypothesis, second hypothesis and third hypothesis. Then the grouping of students' learning motivation was obtained from the results of the questionnaire test that had been given to the experimental class students and the control class students.

1. Student learning motivation

Students' learning motivation data was obtained from the results of filling out a questionnaire which amounted to 30 statements obtained from the experimental class students and the control class students.

Table 4. Grouping of students based on learning motivation

Learning model	Learning Motivation			Sum
	High Learning Motivation	Medium Learning Motivation	Low Learning Motivation	
MASTER	5	26	4	35
Conventional	7	22	4	33
Jumlah	12	48	8	68

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2. Mathematical literacy ability

a. Normality test

Normality test is a prerequisite test to determine whether the data is normally distributed or not. The normality test used by the researcher is the Shapiro-Wilk test by finding the residual value of the standard two way ANOVA using SPSS version 26 software. The results of the post-test data normality test of students' overall mathematical literacy ability are to find the standard residual value in Table 5.

Table 5. Results of the post-test normality test of students' mathematical literacy ability

Results of students' mathematical literacy skills	*Shapiro-Wilk*			
	Statistics	Df	Sig.	Interpretation
Standardized Residual Score	0.987	68	0.704	Normal

In the table of normality test results, the standardized residual value with Shapiro-Wilk obtained the value of sig. 0.704 > 0.05, so that at the significance level = 0.05 or 5%, it can be concluded that the post-test data in the experimental class that was treated with the MASTER model and the control class that was treated with the conventional model in terms of learning motivation were normally distributed.

b. Homogeneity test

The next prerequisite test is the homogeneity test. Homogeneity test was conducted to determine whether the sample data was based on a homogeneous population (same variance) or non-homogeneous (different variance). The homogeneity test was carried out by the researcher using Levene's Test of Equality of Error Variances using SPSS version 26 software. The results of the post-test data homogeneity test of students' overall mathematical literacy abilities are shown in the Table 6.

Table 6. Results of post-test homogeneity test of mathematical literacy ability using Levene test

Levene Statistic	df 1	df 2	*Sig.*	Interpretation
1.132	5	62	0.353	Homogen

In the table of homogeneity test results at the significance level = 0.05, it is obtained that the value of sig. 0.353 > 0.05 so that the post-test data in the experimental class treated with the MASTER model and the control class treated with the conventional model in terms of learning motivation came from a homogeneous population.

c. Hypothesis test results

The data that the researcher describes is the result of students' mathematical literacy skills (posttest). In accordance with the data obtained, because the data were normally distributed and homogeneous, the data analysis was carried out using a two-way ANOVA test to answer the first hypothesis, second hypothesis and third hypothesis. The average value (Means) of mathematical literacy test results based on the Learning Model (X_1) and Student Learning Motivation (X_2) can be seen in Table. 7

Table 7. Average score (means) of mathematical literacy ability test results based on learning models (X_1) and learning motivation (X_2)

Learning model (X_1)	Student learning motivation (X_2)	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
MASTER (Experimental Class)	Low	42.750	5.545	31.665	53.835
	Medium	63.577	2.175	59.229	67.925
	High	77.2	4.96	67.285	87.115
Conventional (Control Class)	Low	40.5	5.545	29.415	51.585
	Medium	46.091	2.365	41.364	50.818
	High	75.429	4.192	67.049	83.808

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Table 7 shows that the average value of the mathematical literacy test results in the experimental class is directly proportional to their learning motivation. However, in the control class, there is a significant difference between the results of the mathematical literacy ability test of students with low and moderate motivation, and students who have high motivation in learning. The results of the 2-way ANOVA test are as follows in Table 8.

Table 8. Results of 2-way ANOVA test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10040.336[a]	5	2008.067	16.325	0
Intercept	128836.606	1	128836.606	1047.393	0
Model	499.119	1	499.119	4.058	0.048
Motivasi	6466.913	2	3233.457	26.287	0
Model * Motivation	838.638	2	419.319	3.409	0.039
Error	7626.429	62	123.007		
Total	242952	68			
Corrected Total	17666.765	67			

R Squared = 0,568 (Adjusted R Squared = 0.534)

Table 8 shows that the MASTER learning model and learning motivation have an impact on students' mathematical literacy test results. The results of further tests, Scheffe test and Homogeneous Subsets can be seen in Tables 9 and Table 10.

Table 9. Scheffe test results for student mathematical literacy ability (Y)

(I) Student learning motivation (X_2)	(J) Student learning motivation (X_2)	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
Low	Medium	-13.94*	4.235	0.007	-24.56	-3.31
	High	-34.54*	5.062	0	-47.24	-21.85
Medium	Low	13.94*	4.235	0.007	3.31	24.56
	High	-20.60*	3.580	0	-29.58	-11.63
High	Low	34.54*	5.062	0	21.85	47.24
	Medium	20.60*	3.580	0	11.63	29.58

Based on observed means.
The error term is Mean Square (Error) = 123,007.
*. The mean difference is significant at the 0,05 level.

Table 10. Output homogeneous subsets student mathematical literacy ability test results (Y)

Scheffe[a,b,c]

Student Learning Motivation (X_2)	N	Subset		
		1	2	3
Low	8	41.63		
Medium	48		55.56	
High	12			76.17
Sig.		1	1	1

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 123.007.

a. Uses Harmonic Mean Sample Size = 13.091.
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
c. Alpha = 0.05.

Based on the results of these tests, it can answer the following hypotheses.

a. First Hypothesis

H_a : There are differences in mathematical literacy skills between students who follow the MASTER learning model and students who take conventional learning.

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H_0 : There is no difference in mathematical literacy ability between students who follow the MASTER learning model and students who take conventional learning

In the Table 8, the sig value is obtained. In the learning model that is 0.048 < 0.05, then H_0 is rejected and Ha is accepted. That is, there are differences in mathematical literacy skills between students who follow the MASTER learning model and students who take conventional learning.

b. Second Hypothesis

H_a : There are differences in mathematical literacy skills between students who have high, medium and low learning motivation

H_0 : There is no difference in mathematical literacy ability between students who have high, medium and low motivation to learn

In the Table 8 obtained the value of sig. on learning motivation is 0 < 0.05, then H_0 is rejected and H_a is accepted. This means that there are differences in mathematical literacy skills between students who have high, medium and low learning motivation. Because it has a significant difference, it is necessary to carry out a further test, namely the Scheffe test to find out which groups are different from each other. In the table of Scheffe test results obtained the value of sig. on low learning motivation with moderate learning motivation that is 0.007 < 0.05, then H_0 is rejected and H_a is accepted. This means that there is a significant difference in mathematical literacy skills between students who have low learning motivation and moderate learning motivation. Also obtained the value of sig. on moderate learning motivation with high learning motivation, namely 0 < 0.05, then H_0 is rejected and H_a is accepted. This means that there is a significant difference in mathematical literacy skills between students who have moderate learning motivation and high learning motivation. So there are significant differences in mathematical literacy skills between students who have high, medium, and low learning motivation.

c. Third Hypothesis

H_a: there is an interaction between the MASTER learning model and learning motivation on students' mathematical literacy

H_0: There is no interaction between the MASTER learning model and learning motivation on mathematical literacy

In the table of 2-way Anova test results obtained the value of sig. on the interaction of the learning model with learning motivation that is 0.039 < 0.05, then H_0 is rejected and H_a is accepted. That is, there is an interaction between the MASTER learning model and learning motivation on mathematical literacy. This can also be seen in the Profile Plots of the interaction between the average value (Means) of mathematical literacy abilities of students who take part in the MASTER model learning, whether those who have high, medium or low learning motivation are higher than students who follow conventional learning models and have learning motivation. high, medium or low.

Based on the results of the study, it appears that there are differences in mathematical literacy ability and motivation for the control and experimental classes. The characteristics of the fun MASTER learning model (Rose & Nicholl, 2009; Yuniati, 2012) have positive implications for mathematical literacy skills and student motivation. The experimental class that applies the MASTER learning model, students have better mathematical literacy skills. This shows that there is an effect of the MASTER learning model on students' mathematical literacy skills (Martinah et al., 2019). When students' mathematical literacy is good, the main goal of learning mathematics will be achieved (Abidin et al., 2017), which means that students' conceptual understanding abilities in the experimental class with MASTER learning are better than the control class (Tanjung, 2015).

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The estuary of good literacy and motivational skills is good learning outcomes which in this study are influenced by the MASTER learning model (Shoum et al., 2021). In particular, learning outcomes in the form of mathematical literacy skills are currently still low when compared to other countries, due to many factors including the lack of presenting real everyday problems that can foster student problem solving skills (Jupri et al., 2014). Especially for mathematical literacy skills that will help someone to understand the role and usefulness of mathematics in everyday life as well as implement it in appropriate and accurate decisions (Kuswidi, 2015). However, mathematical literacy skills require accurate, precise information, not only contextual (linking to everyday life), but also realistic (Wijaya, 2016). So, to polish students' mathematical literacy skills, they must start from real problems, namely in the form of context and content (Oktiningrum et al., 2016).

It is also interesting to conduct further research, whether this MASTER learning model at a higher level can have a significant effect on students' mathematical literacy abilities, because if you use other models such as PBL, the effectiveness will be higher on students' mathematical literacy skills (Paloloang et al., 2020). In addition, it is also interesting to see not only from the aspect of motivation, but also from gender/gender, whether their mathematical literacy abilities are also different or not (Özkan & Özaslan, 2018), can also look at the mathematical literacy ability of students' learning styles (Akinyode, 2016).

In addition, students' mathematical literacy skills are not only influenced by motivation, the ability of teachers to teach (van der Wal et al., 2019), but many aspects that actually support mathematical literacy abilities. Some mathematical abilities that must be improved if you want good mathematical literacy skills include mathematical communication, mathematical representation, reasoning, and mathematical problem solving abilities (Utami & Nirawati, 2018). All for the sake of increasing literacy skills which play an important role in the world of education, because literacy is the basic knowledge and skills needed by everyone (Nilasari & Anggreini, 2019).

CONCLUSION

Based on the data analysis and hypothesis testing that have been carried out, it can be concluded that (1) there are differences in mathematical literacy skills between students who take part in learning with the MASTER learning model (Motivating, Acquiring, Seracing, Triggering, Exhibiting, and Reflecting) and students who take part in learning conventional. The mathematical literacy ability of students who received the MASTER learning model was better than students who received the conventional learning model. (2) there are differences in mathematical literacy skills between students who have high, medium and low learning motivation. The mathematical literacy ability of students who have high learning motivation is better than students who have medium and low motivation. Likewise, the mathematical literacy ability of students who have moderate learning motivation is better than students who have low motivation (3) there is an interaction between learning models and learning motivation on mathematical literacy abilities. In both learning models, students who have high learning motivation have high mathematical literacy skills, as well as students with moderate and low learning motivation, respectively. Seeing these results, the teacher can implement the MASTER learning model to build students' mathematical literacy skills, as well as foster motivation to learn mathematics. Teachers should use the MASTER learning model so that the classroom atmosphere can be fun, so that students can be fully involved in learning mathematics and are motivated in learning mathematics.

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