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THE EFFECT OF RME (REALISTIC MATHEMATICS EDUCATION) AND LEARNING MOTIVATION ON MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

The purpose of this study was to determine the test results: (1) The Effect of RME (Realistic Mathematics Education) and the Expository Method on Students' Mathematics Learning Outcomes, (2) The Effect of High and Low Learning Motivation on Students' Mathematics Learning Outcomes, (3) The Interaction Between RME (Realistic Mathematics Education) and Learning Motivation on Students' Mathematics Learning Outcomes. This experimental research was carried out using a 2x2 factorial design. The subjects in this study were students of class XI which consisted of four classes with 120 students. The subjects that became the focus of the experiment were classically randomized, namely four ABCD classes from SMAN 1 Sangkapura. The research hypothesis was tested using the Analysis of Variant (Anova) statistical test. The calculation results show that: (1) Mathematics Learning Outcomes of students who are taught with RME (Realistic Mathematics Education). Low learning Based on the table it turns out that 0.013 < 0.05 then it can be said to be significant, and (3) Based on the summary of the results of the learning model and students' learning motivation on students' Mathematics Learning Outcomes. RME (Realistic Mathematics Education), Expository Method, and Learning Motivation on Students' Mathematics Learning Outcomes. Based on the results of the study, it was concluded that using RME (Realistic Mathematics Education), Expository Methods, and Learning Motivation could improve students' Mathematics Learning Outcomes.

1. Introduction

The expression mathematics for life and mathematics as a human activities expressed by Freudethal means that mathematics is an activity that is applicable and useful in everyday life (Lo, 2018). Therefore, mathematics is one of the important subjects to be taught in schools. Despite its role, many view mathematics as an abstract, theoretical science, full of confusing symbols and formulas (Ardhanty et al., 2019; Hevriansyah & Megawanti, 2017; Purwanti & Mujiasih, 2021). Abstract mathematical objects become one of the factors causing learning difficulties for students. They assume that what they learn is not useful for everyday life, so that mathematics lessons at school become less interesting for students. The low mathematics learning outcomes of these students indicate the inability of students to solve the problems (problems) they face. This means that the learning that has been implemented so far has not been able to maximize the achievement of learning objectives formulated based on indicators of competency achievement in each subject matter.

This is the basis for applying realistic learning methods to overcome the problems above. Realistic mathematics method is a learning method that prioritizes meaningfulness or real learning (Muktisari et al., 2017; Wahyuningtyas et al., 2016). In the Realistic Mathematics Method, learning must start from something

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real so that students can be involved in the learning process meaningfully (Rewah et al., 2021; Sa'id et al., 2021; Sukmaningthias et al., 2021; Wesna et al. , 2021).

In addition, given the importance of mathematics in everyday life and in the development of science and technology, schools as formal educational institutions should be able to carry out a meaningful and interesting mathematics learning process so that mathematical concepts that seem difficult and abstract can be understood easily by students (Lestari & Syafri , 2021; Mendrofa, 2021; Pakhrurrozi, 2021). However, nowadays students think that mathematics is a difficult and unpleasant subject. In the learning process the teacher still uses the expository learning method. So that students tend to be passive because they are less involved in finding solutions to mathematical problems. These problems lead to a lack of learning motivation of students and low learning outcomes of students' mathematics (Nurjamaludin et al., 2021; Purwati et al., 2021; Witha et al., 2021).

So that the mathematics learning process can be fun, intellectual, optimally involving students and paying attention to the relationship between mathematical concepts and children's experiences, an appropriate mathematics learning method is needed, namely the Realistic Mathematics Education (RME) learning method (Akbar, 2021; Nguyen et al. , 2020; Puspitasari & Airlanda, 2021). The characteristics of the RME learning method are: (1) using contextual problems, (2) using methods in the form of real situations or in the form of teaching aids, (3) the contribution of students, (4) interactions between students and students and students and teachers , and (5) there is a relationship between parts of mathematics with other topics (Mousa, 2021; Nuraina et al., 2021; Sari et al., 2021). While the principle of the RME method according to Darto, (2021); Yulianti & Yulianti, (2021) there are 3, namely guided reinvention through progressive mathematization, didactical phenomenology, and self developed or emergent.

2. Methods

This study is an experimental study using a 2x2 factorial design with the following variables: (1) independent variable, RME (Realistic Mathematics Education), (2) moderator variable, namely learning motivation, (3) dependent variable, namely learning outcomes in mathematics. The population used in this study were all students of class VI, amounting to 120 students. The author deliberately chose the population in this location because it was a place to teach the author and wanted to know the extent of the success of the influence of RME (Realistic Mathematics Education) and Learning Motivation on Mathematics Learning Outcomes.

The instruments used in this research are 2 kinds of instruments, namely (1) Learning Motivation Test, and (2) Learning Outcome Test. The Learning Outcomes Test Instrument used in this study was a test in the form of an essay with a total of 10 questions. Written tests are used to measure the ability of student learning outcomes after being given treatment so that teachers can measure the level of student success. This study will obtain data in the form of learning outcomes scores obtained through written tests.

The sequence of data collection is carried out as follows: (1) Conducting observations to determine the classes that will be used as groups of research subjects and determine experimental classes that will be treated with problem-based learning, (2) Provide a learning motivation test, (3) Giving treatment (treatment) to the class that is the subject of research with problem-based learning treatment, (4) Providing ability tests in both experimental and control classes with the same questions, (5) Assessing test results obtained from the treatment group, namely the experimental class is taught using RME (Realistic Mathematics Education), and the control class is taught using the Problem Based Learning method for further analysis and preparation of the data obtained. In this study, the statistical analysis used in analyzing the research data was the two-way analysis of variance (ANAVA) technique.

3. Results and Discusion

3.1 Results

To prove the research hypothesis, a two-way analysis of variance was used with the help of SPSS Version 25.0 software for windows. Statistical analysis can be seen in the following table:

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Table 1. Descriptive Test Results

Descriptive Statistics

Dependent Variable: HASIL BELAJAR MATEMATIKA

METODE	MOTIVASI BELAJAR	Mean	Std. Deviation	N
Metode RME	TINGGI	70.3611	6.74072	36
	RENDAH	76.2917	5.17081	24
	Total	72.7333	6.77950	60
Metode Ekspositori	TINGGI	62.3077	1.79743	13
	RENDAH	62.6170	1.87145	47
	Total	62.5500	1.84506	60
Total	TINGGI	68.2245	6.84430	49
	RENDAH	67.2394	7.31625	71
	Total	67.6417	7.11466	120

Statistical data from the calculation of SPSS 25 between learning methods, learning motivation, and learning outcomes with the number of students as many as 120 students obtained the following results: (1) Mathematics learning outcomes towards RME (Realistic Mathematics Education) obtained an average (mean) of 72.7333 and standard deviation 6.77950. While the Expository Strategy obtained an average (mean) of 62,5500 and a standard deviation of 1,84506, (2) High learning motivation in RME (Realistic Mathematics Education) obtained N: 36 and low learning motivation obtained N: 24. While the high learning motivation on the Expository Strategy was obtained N.13 and the low learning motivation was obtained N: 47, and (3) The total results of learning Mathematics with high learning motivation was obtained N: 49 and the low learning motivation was obtained N:71.

Table 2. Results of Data Analysis

Tests of Between-Subjects Effects

Dependent Variable: HASIL BELAJAR MATEMATIKA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3618.452[a]	3	1206.151	58.173	.000
Intercept	439945.851	1	439945.851	21218.611	.000
METODE	2816.137	1	2816.137	135.822	.000
MOTIVASI	232.255	1	232.255	11.202	.001
METODE * MOTIVASI	188.484	1	188.484	9.091	.003
Error	2405.140	116	20.734		
Total	555071.000	120			
Corrected Total	6023.592	119			

a. R Squared = .601 (Adjusted R Squared = .590)

a. Hypothesis testing 1

Based on the results of data analysis using two-way ANOVA, a p value of 0.000 was obtained (value <0.05), which means Ho is rejected and Hi is accepted, meaning that there is a significant difference in student learning outcomes in mathematics between groups of students who learn to apply the RME method with groups of students who apply the expository Learning Method. Thus it can be said that the application of the RME method has a better effect than the expository learning method on learning outcomes.

b. Hypothesis testing 2

Based on the results of data analysis obtained p value of 0.001 (p value <0.05) so that Ho is rejected and Hi is accepted, which means that there is a significant difference in student learning outcomes in mathematics subjects, between groups of students with high learning motivation and groups of students who are motivated to learn. low. Therefore, it can be said that high learning motivation has a better effect than low learning motivation on student learning outcomes.

c. Hypothesis testing 3

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From the results of two-way ANOVA, p value = 0.003 (p value <0.05) so that Ho is rejected and Hi is accepted, which means that there is a significant interaction between the application of the RME method and the expository learning method and learning motivation with student learning outcomes in mathematics.
There is a significant result that there is an interaction between the application of the RME method and the expository learning method and learning motivation on mathematics learning outcomes is also strengthened by Figure 1, as follows:

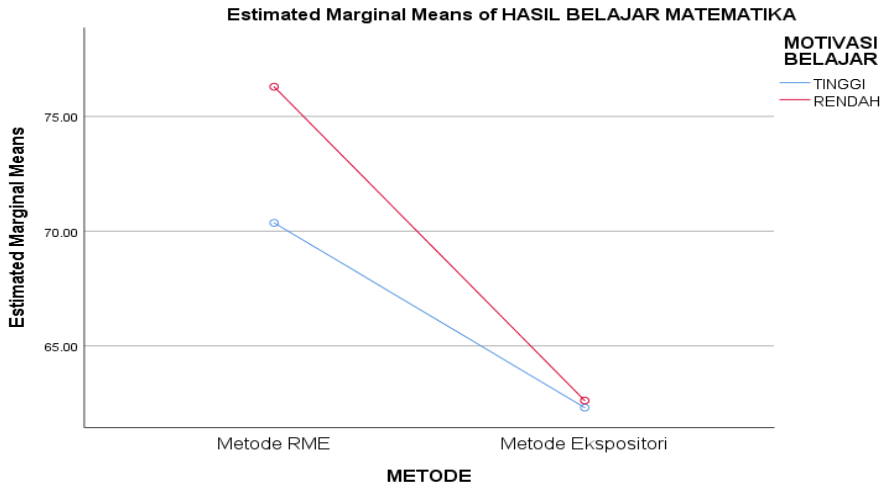

Figure 1. Interaction Results

Figure 1 shows that there is a meeting line or intersection of data on mathematics learning outcomes between low and high learning motivation in the control group (Expository Learning Method) and the experimental RME method.

3.2 Discussion

Based on research reports, data presentation, and data analysis on the Effect of RME Learning with Expository Learning Methods and Learning Motivation on Mathematics Learning Outcomes in class X SMAN 1 Sangkapura, the results showed that classes with the application of the RME method and the expository Learning Method departed from the initial conditions that the same, namely after the Normality test and homogeneity test were held, it showed that the two samples were normally distributed and there was no difference in variance. Furthermore, research can be analyzed and interpreted as follows.

a. Mathematics Learning Outcomes Between Groups of Students Who Apply the RME Method and the Expository Learning Method.

From the results of the study, it was found that the average value of student learning outcomes who were treated with the RME method was 80.15 while students who were treated with the expository learning method had an average value of 69.83. If you pay attention to the maximum score achieved by students using the RME method, it is 95 while the maximum score for students using the expository learning method is 90. In this case, there is a difference of 5 points. And when viewed from the minimum score of students with the expository Learning Method of 40 while the minimum score of students with the RME method of 50. In this case there is also a difference of 10 points. In addition, based on hypothesis testing, there is a significant difference in student learning outcomes in mathematics between the group of students who apply the RME method and the group of students who apply the expository learning method of Fcount = 11.912 with p value 0.002 (p value <0.05). Thus, it can be said that the application of the RME method has a better effect than the expository learning method on student learning outcomes.

From the results of the research above, it can be concluded that learning with the RME method is better than expository learning (Nurjamaludin et al., 2021; Rizqi et al., 2021; Yudianto et al., 2021). Because in learning students are required to be more active and creative. In learning students are required to seek knowledge and problem solving from various available sources (Darto, 2021; State Officers et al., 2021; Septia, 2021). According to Bruner's theory, the search for knowledge by humans will give the best results and produce meaningful knowledge (Lestari & Syafri, 2021; Pakhrurrozi, 2021; Sulastri et al., 2021). Meanwhile, expository learning tends to be boring because in the learning process students only listen to the

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explanation from the teacher (lectures) and continue to work on the questions given by the teacher (Hardiyanto et al., 2018; Oktaviani et al., 2018; Siswondo & Agustina, 2021).

b. There is a significant difference in student learning outcomes in mathematics between groups of students with high motivation and groups of students with low motivation

Judging from learning motivation, based on the results of hypothesis testing, it was found that there was a significant difference in student learning outcomes in mathematics, between groups of students with high learning motivation and groups of students with low learning motivation. This is indicated by the value of Fcount = 2.108 with a p value of 0.048 (p value <0.05). Therefore, students who have high learning motivation have better learning achievements than students who have low learning motivation.

As for the distribution of the learning motivation questionnaire, there are items that have the highest score. There are also some extreme items (which have the lowest total questionnaire score) namely item number 13 and number 14 on the indicator of getting bored quickly on routine tasks. Based on this, some students' learning motivation is said to be quite good and must be maintained, for example in terms of being diligent in facing assignments, being tenacious in the face of learning difficulties, showing interest in various problems, being able to defend their opinions and not easily letting go of what they believe in (Djamaan et al. al., 2021; Khoerunisa & Amirudin, 2020; Mardani et al., 2021).

However, there are several students' learning motivations that need to be improved so that students have better learning motivation, such as students should be happier doing their assignments independently, students should be happier doing routine tasks, students should study material repeatedly. repeat, and enjoy doing creative activities that can support their learning activities (Febriandar, 2018; Fitriati et al., 2021; Wulansari & Manoy, 2021).

c. There is a significant interaction between groups of students who apply the RME method with the expository learning method and student motivation on learning outcomes in mathematics.

The result of the third hypothesis test is that there is a significant interaction between the application of the RME method with learning motivation and student learning outcomes in mathematics. This is indicated by the value of Fcount = 2.221 with a p value of 0.0451 (p value <0.05). This shows that there is an interaction of learning and learning motivation on student learning outcomes in mathematics.

Research on the learning model of applying the Realistic Mathematics Education (RME) approach conducted by researchers in learning mathematics reveals that there is an effect of applying the Realistic Mathematics Education (RME) approach to students' motivation to learn mathematics in accordance with the problems expressed in the background. From these problems, teachers must have the ability to manage learning, one of which is to use the Realistic Mathematics Education (RME) approach.

The results of the researchers' observations in the learning process using the Realistic Mathematics Education (RME) approach went well and properly. In this study, using the Realistic Mathematics Education (RME) approach, it was seen that in the classroom students increased their attention in learning.

Learning to use the Realistic Mathematics Education (RME) approach makes students more active in finding solutions to problems given by the teacher (Ndiung et al., 2021; Rahmawati Suwanto & Wijaya, 2021; Zubaidah Amir et al., 2021). Students also learn about the use of mathematics in everyday life and learn about the use of mathematics for the future. This makes students happy and motivated in learning (Hae & Rezeki Patricia Tantu, 2021; Mustika & Royanto, 2021; Santoso, 2021). According to Frankenthal, realistic mathematics education is school mathematics that is carried out by placing students' reality and experience as the starting point of learning. This makes it easier for students to understand the material because they work on the questions using their own way plus the questions given are related to students' daily lives. Students who used to think that mathematics was a difficult subject to understand and did not exist in everyday life, now when students learn to use the Realistic Mathematics Education (RME) approach, students are easier to understand the material and know the use of mathematics in everyday life (Nuraina et al. al., 2021; Witha et al., 2021; Yulianti & Yulianti, 2021). The existence of the RME approach makes students motivated to be even more active in learning (Alfansyur & Mariyani, 2019; Wijayanti et al., 2021; Yana & Sari, 2021). As stated by (Dewi, 2018; Latief & Jamil, 2017; Prihanto & Hawanti, 2021) that motivation is defined as the driving force within a person to carry out certain activities in order to achieve certain goals. So overall or in general it can be concluded that the application of the RME method is learning that can spur student learning outcomes. Besides that, other supporting factors that encourage the achievement of maximum learning outcomes are learning motivation factors because with the application of

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any learning if it is not followed by learning motivation, the achievement of student learning outcomes is less than optimal (Nasrah, 2020; Sahroni et al., 2021).

4. Conclusion

Based on the results of data analysis and discussion above, it can be concluded that: (1) There is a significant difference in student learning outcomes in mathematics between the group of students who apply the RME method and the group of students who apply the expository learning method. Learning mathematics using the RME method produces better student mathematics learning outcomes than the expository learning method, (2) There is a significant difference in student learning outcomes in mathematics between groups of students with high learning motivation and groups of students with low learning motivation. Students who have a high level of achievement motivation produce better mathematics learning outcomes than students who have a low level of learning motivation, (3) There is a significant interaction between the use of the RME method and the expository learning method and students' learning motivation on learning outcomes at math subjects. Learning mathematics using the RME method, students who have a high level of learning motivation have better mathematics learning outcomes than students who have a low level of learning motivation. Learning mathematics using the RME method, students who have a level of motivation.

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