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THE EFFECT OF THE REALISTIC MATHEMATICS EDUCATION (RME) LEARNING MODEL ON STUDENT'S LEARNING OUTCOMES ON SOCIAL ARITHMETIC MATERIALS FOR CLASS VII SMP AL-FURQON PEJAGAN JAMBESARI BONDOWOSO

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ABSTRACT

This study investigated the effect of the realistic mathematic education (RME) learning model, compared with the conventional model on mathematics learning outcomes in social arithmetic material in class VII SMP Al-Furqon Pejagan Jambesari Bondowoso. It uses a quasi-experimental design in the form of a nonequivalent pre-test and post-test. The population in this study were all seventh-grade students of SMP Al-Furqon Pejagan Jambesari Bondowoso, represented by two samples; class VII A as the experimental class and class VII B as the control class. The paired sample t-test resulted in a sig value in pair 1 of 0.000 < 0.05 and pair 2 of 0.289 > 0.05. It implies that the realistic mathematics education (RME) learning model affects the improvement of the student learning outcomes (pair 1), while the conventional learning model does not affect the student learning outcomes (pair 2).

Keywords: Realistic mathematics education (RME), social arithmetic, student learning outcomes.

1. Introduction

Mathematics education, especially in Indonesia, strives to adapt to the development of science and technology and can support other sciences; it is in line with (Mulyati & Pd, 2022a). Mathematics has contributed significantly to the development and civilization of education (Atikurrahman et al., 2019). Math is problem-solving; learning mathematics should start at every opportunity by introducing problems that are appropriate to the situation around us (Zulfah et al., 2022). The rapid progress of science cannot be separated from the critical role of mathematics. We can conclude that mathematics is the main foundation of science and technology. However, things that happen in Indonesia, especially in mathematics studies, have an alarming quality of education, where mathematics is a scourge and a frightening thing for students; it causes students difficulties in learning mathematics(Tohir et al., 2021).

Something that may cause students difficulty in learning mathematics is that the model or method used is inappropriate. There are still some materials using conventional methods, where the teacher delivers material using the explanation method and then gives practice questions or assignments without reinforcement. This causes students to tend to lack understanding of the language of the questions, so students have difficulty in solving problems.

There are three types of connections in learning mathematics; connecting between concepts, mathematical concepts with other sciences, and mathematical concepts with everyday life (Atikurrahman et al., 2019). Problem-solving related to mathematics must be related to reality and activities that occur in everyday life. One example in the seventh grade of social arithmetic material is taught about sales, purchases, discounts, profit and loss, single interest, gross, net, and tare, where these activities are daily activities that occur in human life.

From the description above, the learning process needs to improve, and the mindset has to be changed to explore more optimal, innovative and varied learning. Therefore, selecting methods or models is crucial to support and provide new student experiences. The method is the realistic mathematics education learning model (RME), one of the effective learning models applied to

improve student learning outcomes. It is a learning model related to students' real lives. This explanation is in line with (Lady & Tri, 2018).

This RME approach emphasizes the importance of the real-world context that students know and the process by which they construct their own mathematical knowledge so that the concepts they understand become more meaningful (Safitri et al., 2022). Therefore, this model is expected to be appropriate for implementing mathematics learning at SMP Al-Furqon Pejagan Jambesari Bondowoso.

According to the opinion (Astuti, 2018), Mathematics learning with realistic mathematics education (RME) includes the following aspects: 1) Starting learning by posing real problems to students according to their level of experience and knowledge. 2) The problems given must be directed in accordance with the objectives to be achieved in learning. 3) Students develop or create an informal symbolic model of the problem or problem being taught. 4) Teaching takes place interactively, where students explain and give reasons for the answers given, understand the answers of their friends (other students), agree with their friends' answers, express disagreements, look for other alternative solutions and reflect on each step. Taken or on the resulting study.

Realistic Mathematics Education (RME) benefits include realistic mathematics learning that gives students a clear understanding of everyday life and human uses in general. In addition, RME provides students with a clear understanding that mathematics is a field of study built and developed by students. Realistic mathematics learning is when learning mathematics, the learning process is the main thing, and students try to find mathematical concepts on their own without the help of teachers; opinion (Mulyati & Pd, 2022) suggests that Realistic Mathematics Education (RME) is a learning model mathematics based on reality and the environment around students.

Another term in this study is learning outcomes. It is about students' ability to achieve the objectives in learning through tests both during the learning process and at the end of learning. Student learning outcomes are divided into cognitive, affective, and psychomotor learning outcomes (Iskandar, 2021). (Arwadi, 2021) argued that it is a process to determine the success or failure of learning and the importance of assessment in learning outcomes (Harahap et al., 2021).

2. Research Methods

This study is quantitative, with a quasi-experimental design in the form of a nonequivalent pre-test post-test control group. The instruments used in this study were interviews, observations, and tests in the form of pre-test and post-test with 5 questions. The population in this study were all seventh-grade students of SMP Al-Furqon Pejagan Jamnbesri Bondowoso, with two samples, namely class VII A as the experimental class and class VII B as the control class. In addition, a validity test was carried out on the instrument (Arikuntoro and Suharsimi, 2013). The instrument validators in this study were three people, namely two Ibrahimy University lecturers and one mathematics teacher at Al-Furqon Pejagan Jambesari Bondowoso Junior High School.

Basuki and Hariyanto, cited in (Nurhalimah et al., n.d.), explained that the criteria for interpreting the degree of instrument validity are as follows:

Table 1. Criteria for Instrument Validity Correlation Coefficient

Correlation coefficient	Correlation	Interpretation Validity
$0,90 \leq r_{xy} \leq 1,00$	Very high	Very valid
$0,70 \leq r_{xy} \leq 0,90$	Tall	valid
$0,40 \leq r_{xy} \leq 0,70$	currently	Quite valid
$0,20 \leq r_{xy} \leq 0,40$	low	Not valid
$r_{xy} \leq 0,20$	Very low	invalid

Basuki and Hariyanto in (Nurhalimah et al., n.d.)

The collection of test data is used to obtain data on learning outcomes. The test is in the form of a description of 5 questions conducted by the control class and experimental class. The data collected was then analyzed using descriptive statistical analysis on SPSS to examine the final results of this study and how the differences between the realistic mathematics education learning model (RME) and the conventional model were affected.

The steps taken are inferential statistical data analysis which is used to analyze the data by making generalizations on the sample data so that the results can be applied to the population. The analysis used in this study is a parametric analysis

used to test the hypothesis so that what must be done is the normality test and homogeneity test.

Data collection was carried out through test observations, then normality and homogeneity tests were carried out; after that, a different test was carried out. The normality test used the Kolmogorov-Smirnov test, while the different test (paired) used the t-test with a significance level of 0.05. If the data is normally distributed and homogeneous, then a t-test is performed. On the other hand, if the data is not normally distributed and not homogeneous, then a non-parametric test is used, namely the Mann-Whitney test.

3. Results and Discussion

Based on the results of research conducted at SMP Al-Furqon Pejagan Jambesari Bondowoso, which was held from May 23 to June 2, 2022. In the study, the researchers used two different classes, one of them was the experimental class that got the realistic mathematics education learning model (RME). The other class is a control class that uses a conventional learning model.

The validation results are obtained after making improvements under the directions of the validators, then interpreted; the following results are obtained:

Figure 1. Validation Results of Learning Outcomes Test Instruments

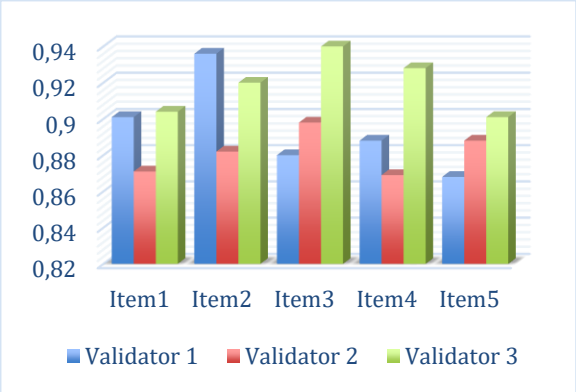
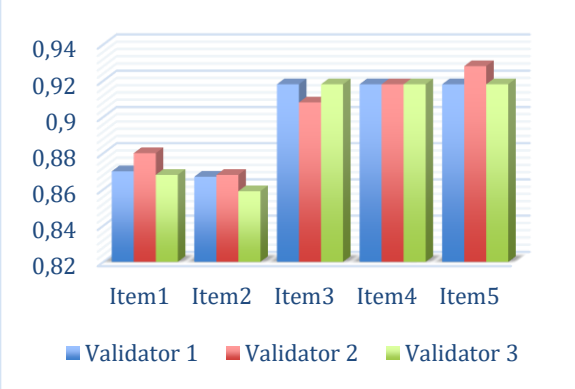


Figure 2. Interview Guide Validation Results



The validation results of the learning outcomes, test sheets, and interviews show that the test validation sheet for learning outcomes and interview guidelines in the high category and the learning outcomes instrument sheets are valid.

Table 2. Conventional model student learning outcomes

Learning outcomes	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Control	22	41	78	59,1818	10,83045
Post-Test Control	22	43	78	61,3182	11,14146

Table 3. Student Learning Outcomes in The Realistic Mathematics Education (RME) Model

Learning outcomes	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Experiment	25	41	88	56,48	12,230
PostTest Experiment	25	44	88	73,80	11,881

Tables 2 and 3 show that the control class and experimental class average post-test is 61% for the control class and 73% for the experimental class. Next, the normality test will be carried out.

Table 4. Normality Test for Experiment Class and Control Class

Learning outcomes	Kolmogorov-Smirnov(a)		
	Statistic	df	Sig.
Experiment class pre-test	,171	25	,059
Experiment class post-test	,165	25	,079
Pre-test control class	,180	22	,062
Control class post-test	,180	22	,061

Based on the above data, the pre-test sig value for the control class is 0.062, and the experimental class is 0.059, so both pre-test sig values> 0.05 so that the data is said to be normally distributed, the control class sig value is 0.061, and the control class is 0.061. the experiment is 0.079, so both pre-test sig values > 0.05, so the data is considered to be normally distributed.

Next, the paired sample t-test was used to determine whether there was an effect between the realistic mathematics education (RME) learning model on student learning outcomes.

Table 5. Results of Paired Sample t Test

	Paired Differences			
	Mean	t	df	Sig. (2-tailed)
Pre-test post-test Experiment class	-17,32	11,767	24	.000
Pre-test post-test control class	-2,136	9,218	21	.289

Based on the above output results, the sig value of the Pre-test post-test for the Experiment class is 0.000 <0.05, and the Pre-test post-test for the control class is 0.289 > 0.05. It shows a significant effect on pre-test and post-test learning outcomes in the experimental class, while in the control class, there is no effect between pre-test and post-test.

The homogeneity test is then carried out. The homogeneity test is a test of whether or not the variances of two or more data distributions are equal. A homogeneity test was conducted to determine whether the data between the two classes were homogeneous or not. This test is a requirement to perform inferential analysis. The basis for decision-making in the homogeneity test is if the value of sig < 0.05, then it can be concluded that the variance of two or more groups is not the same (not homogeneous), but if the value of sig > 0.05, then it can be concluded that the variance of two or more groups is the same (homogeneous). The following are the results of the homogeneity test carried out with SPSS.

Table 6. The Results of The Pre-Test Homogeneity Test for The Control Class and The Experimental Class

Levene Statistic	df1	df2	Sig.
,196	1	45	,660

Based on the results above, the sig pre-test value for the control class and the experimental class is 0.660 > 0.05, so the data has the same or homogeneous variance.

Table 7. The Results of The Post-Test Homogeneity Test for The Control Class and The Experimental Class

Levene Statistic	df1	df2	Sig.
,010	1	45	,921

Based on table 7, the sig post-test value for the control class and the experimental class is 0.921 > 0.05, so the data has the same or homogeneous variance.

Hypothesis testing was carried out to prove whether there was an effect on student learning outcomes using the realistic mathematics education (RME) learning model with the conventional learning model,

Table 8. Test Results of Independent Sample Test

		F	Sig.	t	df	Sig. (2-tailed)
Learning outcomes	Equal variances assumed	,010	,921	3,699	45	,001
	Equal variances not assumed			3,715	44,802	,001

Based on the output results above, the P-value for Levene's test is 0.921; because the value is greater than = 0.05, then the variance of the two data is homogeneous. Therefore, the value in column t is count; the value of t from the first row, which is 3,699, is the value of the result of the t-test if the variance of the two data is homogeneous (equal variances assumed). The t-value of the second row, which is 3,715, is the value of the result of the t-test if the variance of the two data is not homogeneous (equal variances are not assumed). Since Levene's test results state that the two variances are homogeneous, the t-value used is based on the t-test value, which is 3.699, with a P-value of 0.01.

The P-value obtained is 0.01 <0.05, then Ho is rejected, and H1 is accepted. It means that there is an effect of the realistic mathematics education (RME) learning model with the conventional model on student learning outcomes on social arithmetic material in grade VII SMP Al-Furqon Pejagan Jambesari.

4. Conclusions

The application of the realistic mathematics education (RME) learning model has a significant effect on the learning outcomes of the seventh-grade students of SMP Al-Furqon Pejagan Jambesari Bondowoso. It is proven by the average pre-test score of 56.48 and post-test of 73.80. The pre-test and post-test results have an average improvement of 17.32, and the test results are significant at 0.00 <0.05. In contrast, the conventional learning model has no significant effect on the learning outcomes of seventh-grade students of SMP Al-Furqon Pejagan Jambesari Bondowoso. It can be viewed from the average value of the pre-test (59.18) and post-test (61,318). Furthermore, what researchers have done has increased an average of 2.136 and a significant test result of 0.289 > 0.05. There is a significant difference in the effect between the realistic mathematics education (RME) learning model and the conventional learning model on the learning outcomes of the seventh-grade students of SMP Al-Furqon Pejagan Jambesari Bondowoso. It is evidenced by the paired sample t-test, which results in a big value in pair 1 of 0.000 < 0.05 and in pair 2 of 0.289 > 0.05. It shows that in pair-1 the realistic mathematics education (RME) learning model affects the improvement of student learning outcomes. In contrast, pair-2 shows that the conventional learning model does not affect student learning outcomes.

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