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ENHANCING OF REALISTIC MATHEMATICS EDUCATION (RME) LEARNING MODELS ON REASONING ABILITY AND STUDENT CONFIDENCE

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ABSTRACT

This research aims to determine whether there is enhancing of the Realistic Mathematics Education (RME) Learning Model on students' reasoning abilities and self-confidence in learning mathematics. The research methodology used is quantitative research. This research used two classes, one as an experimental group that applied the RME learning model, and one as a control group that used conventional methods. Data was collected through mathematical reasoning ability tests and self-confidence questionnaires before and after learning. Data analysis involved paired t tests to test differences between pre-test and post-test scores in the experimental group. The results of the normality and homogeneity tests show that the data meets the basic assumptions of the t test. Furthermore, The paired t test shows that there is a significant increase in students' reasoning abilities after implementing the RME learning model (Sig. < 0.05). Likewise, analysis of self-confidence questionnaire data shows a significant increase in students' self-confidence levels after learning with the RME learning model. This shows that the Realistic Mathematics Education (RME) learning model positively enhancing students' reasoning abilities and self-confidence in the context of mathematics learning. The implications of the results of this research can support the development of more effective learning strategies in increasing students' understanding and motivation towards mathematics. Analysis of self-confidence questionnaire data shows a significant increase in students' self-confidence levels after learning with the RME learning model. This shows that the Realistic Mathematics Education (RME) learning model positively enhancing students' reasoning abilities and self-confidence in the context of mathematics learning. The implications of the results of this research can support the development of more effective learning strategies in increasing students' understanding and motivation towards mathematics. Analysis of self-confidence questionnaire data shows a significant increase in students' self-confidence levels after learning with the RME learning model. This shows that the Realistic Mathematics Education (RME) learning model positively enhancing students' reasoning abilities and self-confidence in the context of mathematics learning. The implications of the results of this research can support the development of more effective learning strategies in increasing students' understanding and motivation towards mathematics. This shows that the Realistic Mathematics Education (RME) learning model positively enhancing students' reasoning abilities and self-confidence in the context of mathematics learning. The implications of the results of this research can support the development of more effective learning strategies in increasing students' understanding and motivation towards mathematics. This shows that the Realistic Mathematics Education (RME) learning model positively enhancing students' reasoning abilities and self-confidence in the context of mathematics learning. The implications of the results of this research can support the development of more effective learning strategies in increasing students' understanding and motivation towards mathematics.

Keywords: realistic mathematics education, reasoning ability, self-confidence, mathematics learning

1. Introduction

Mathematics as a basic science has a very important role in the progress of science and technology (Kurnia Putri et al., 2019). Mathematics is a subject that must be taught at every level of education because it has a significant impact on everyday life (Habibatul Izzah & Azizah, 2019). Ministerial Regulation no. 21 of 2016 concerning Content Standards explains that skills can be improved through activities such as observation, questions,

experiments, reasoning, presentations and creation (Nurmanita et al., 2019).

Reasoning ability is the ability to understand mathematical concepts. This ability is a basic skill that must be mastered (HİDAYAT et al., 2020). Students' reasoning abilities in mathematics are often low due to inappropriate learning models. As a result, students tend to feel bored by memorizing formulas and solving problems without deep understanding (Darmayanti et al., 2022). Therefore, teachers as learning facilitators must provide an optimal environment for students to develop their reasoning abilities. This reasoning ability will also form students' self-confidence.

Self-confidence is the main key in starting anything, especially in speaking (Lestari et al., 2019). Some students have low levels of self-confidence due to various factors, including discomfort at school, inappropriate learning models, pressure, and excessive anxiety (Vega et al., 2019). In this case, the teacher must act as a facilitator in helping students to become more active by using appropriate learning methods and models so that students feel comfortable (Hidayati & Hidayah, 2020).

Based on the results of observations at MA Ihyaul Islam, the learning model applied is still contextual and not fully in line with students' needs. In this learning process, students become more listeners when the teacher explains the material. Apart from that, students' reasoning abilities are not trained optimally. As a result, the level of students' ability to solve linear programming problems is still low. This is caused by a lack of innovation in learning by teachers, thereby reducing students' interest in mathematics. Students' lack of understanding of the problems in the questions is also an important factor in students' difficulties in overcoming the material.

The initial level of understanding of students in class This is due to students' lack of self-confidence, such as not having the courage to give opinions during discussions. Therefore, apart from improving students' reasoning abilities, teachers also need to innovate to increase students' self-confidence.

The solution for students to understand the material better requires a learning model that can encourage students' active involvement, while increasing their reasoning abilities and self-confidence (Yetri et al., 2019). One learning model that supports understanding mathematics is Realistic Mathematics Education (RME). In the RME learning model, students are encouraged to actively participate because they will develop mathematical understanding through problems in everyday life (Artika et al., 2019).

The Realistic Mathematics Education learning model is a model for learning mathematics that is carried out by discussing, comparing, analyzing how to solve problems, and concluding (Trimahesri & Hardini, 2019). Based on these learning stages, the application of the RME learning model can support the material on linear equations and inequalities at MA Ihyaul Islam. Based on previous research, it is explained that the use of the Realistic Mathematics Education learning model can improve students' reasoning abilities and self-confidence (Ardina et al., 2019). This is also in line with research (Ekowati et al., 2021) which uses the Realistic Mathematics Education learning model to help improve students' reasoning abilities and self-confidence. Therefore, the aim of this research is to analyze whether the Realistic Mathematics Education learning model can overcome the lack of reasoning abilities and self-confidence at MA Ihyaul Islam.

2. Research Methods

The method in this research is quantitative. The samples used were two classes, each consisting of 17 students and 15 students. Both classes will be measured to measure students' reasoning abilities and confidence in mathematics. The control class studied mathematics using conventional methods. Meanwhile, the experimental class learns mathematics using the RME learning model. Reasoning abilities are tested using a written test designed to measure students' mathematical reasoning abilities. This test will focus on solving mathematical problems that involve critical thinking and analysis. Meanwhile, students' self-confidence was tested using a questionnaire containing statements about students' self-confidence in facing mathematics tasks. The Likert scale is used to measure students' level of self-confidence.

A comparative analysis between the control class and the experimental class will be carried out to measure the effect of the RME learning model on students' reasoning abilities and self-confidence. The statistical test used is the ANOVA test. Indicators of students'

reasoning abilities and self-confidence can be seen in Table 1 below.

Table 1. Indicators of Students' Reasoning Ability and Self-Confidence

No	Indicator	
	Reasoning Ability	**Self-confident**
1.	Ability to make assumptions	Expressing opinions
2.	Mathematical manipulation abilities	Ambition
3.	Ability to collect evidence, reason for making the right decisions	Independent
4.	Ability to draw conclusions	Tolerance
5.	Ability to check the validity of arguments	Think positively

3. Results and Discussion

In this study, researchers divided into two groups, namely the experimental group and the control group. The experimental group consisted of 17 students, while the control group consisted of 15 students. Data to evaluate students' reasoning abilities in solving equations and linear inequalities were obtained from the pre-test. To assess students' level of self-confidence during the learning process, researchers used descriptive analysis. The results of the normality test show that this research meets the assumptions of normality, with a significance value (sig.) > 0.05, which indicates that the data is normally distributed. The results of the normality test can be seen in Table 2.

Table 2. Normality Test

Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Experimental Class Pre-test	,256	17	,009	,899	17	,091
Experimental Class Post-test	,179	17	,200*	,940	17	,385
Control Class Pre-test	,173	15	,200*	,922	15	,209
Control Class Post-test	,205	15	,090	,916	15	,165

From Table 2 showing the results of the normality test in the experimental group which applied the Realistic Mathematics Education learning model and the control group which used conventional methods, it can be concluded that both have normal data distribution because the sig. > 0.05. The average pre-test and post-test results in the experimental class and control class can be seen in Figure 1 below.

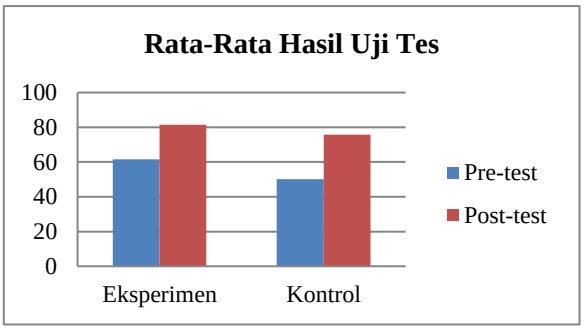

Figure 1. Average Student Test Results

Based on Figure 1, it shows that student test results have increased. The experimental class that applied the RME learning model was better than the control class that used conventional methods. Next, a homogeneity test was carried out in this study to determine whether the two groups had similar or different variants. If the sig value. > 0.05, it can be concluded that the two groups are homogeneous. The homogeneity test results can be seen in Table 3.

Table 3. Hypothesis 1 Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistics	df1	df2	Sig.
Reasoning Ability	Based on Mean	2,086	3	60	,112
	Based on Median	2,101	3	60	,109

From Table 3 showing the results of the homogeneity test in hypothesis 1, it can be seen that the sig. is 0.112, which is greater than the specified significance level of 0.05. Therefore, it can be concluded that hypothesis 1, which applies the Realistic Mathematics Education learning model, has a good level of homogeneity when compared to before implementing the learning model. Furthermore, the results of the

homogeneity test for hypothesis 2 can be seen in Table 4.

Table 4. Hypothesis 2 Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistics	df1	df2	Sig.
Self-confident	Based on Mean	,227	1	30	,637
	Based on Median	,262	1	30	,613

From Table 4 shows the results of the homogeneity test in hypothesis 2, namely the sig value. is 0.637, greater than the specified significance level of 0.05. Therefore, it can be concluded that hypothesis 2, which compares students' self-confidence after using the Realistic Mathematics Education learning model, has a good level of homogeneity when compared with before. Furthermore, the results of the Paired Sample T-test can be seen in Table 5 below.

Table 5. Paired Sample T-test

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Experimental Class Pre-test - Experimental Class Post-test	-23.29412	6.72463	1.63096	-26.75160	-19.83663	-14,282	16	,000

Based on Table 5 which contains the results of the paired or dependent t test, it is emphasized that in making decisions, the condition that must be met is if the Sig. (2-tailed) < 0.05, then the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This paired or dependent t test is used to evaluate the difference between pre-test and post-test scores in classes that have received treatment with the Realistic Mathematics Education learning model.

The results listed in Table 5 show that the Sig. is 0.000, which is obviously smaller than 0.05. Thus, it can be concluded that there is a significant influence after implementing the Realistic Mathematics Education learning model when compared with the conditions before implementing the learning model. The results of the ANOVA test can be seen in Table 6 below.

Table 6. ANOVA test

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Self-confident Reasoning Ability	924,083	1	924,083	69,169	,000
	400,792	30	13,360		
Total	1324,875	31			

From Table 6 which contains the results of the ANOVA test, it is important to remember that the condition for decision making is if the Sig. < 0.05, then the null hypothesis (H_0) will be rejected and the alternative hypothesis (H_a) will be accepted. Table 6 shows that the Sig. is 0.000, which is obviously smaller than 0.05. Therefore, the conclusion that can be drawn is that students' reasoning abilities and level of self-confidence after implementing the Realistic Mathematics Education learning model are much better compared to conventional methods.

Based on the results of data analysis in this research, the RME learning model can be effectively applied in the mathematics learning process. This research reveals that there is a significant influence between the application of the RME learning model on students' reasoning abilities and level of self-confidence. This application helps students understand the mathematical concepts in the questions. The RME learning model prioritizes learning concepts based on students' real experiences, so that students can more easily relate and apply mathematical knowledge in solving everyday problems.

The results of the research that has been carried out are in line with previous research, namely that after implementing the Realistic Mathematics Education learning model, it was proven that the post-test scores for reasoning ability increased compared to the pre-test scores (Zubaidah Amir et al., 2021). Meanwhile, other

research found that the RME learning model was proven to be able to increase self-confidence. The research results showed that the average self-confidence score with the Realistic Mathematics Education learning model increased (Delina et al., 2018). This is because the RME learning model has realistic guidelines, namely learning related to students' daily lives that is easy for students to understand, so that students can easily solve problems with their abilities and knowledge.

4. Conclusions

Based on the results of hypothesis testing and discussions that have been carried out, it shows that the Realistic Mathematics Education (RME) learning model has quite a big influence on students' reasoning abilities and self-confidence. This is proven by a significance value of 0.00 < 0.05, meaning (H_0) is rejected and (H_a) is accepted.

The RME learning model encourages real-world based problem solving to teach mathematical concepts and is effective in helping students develop their reasoning abilities. The results of this study support previous findings which show that RME can improve students' mathematical problem solving abilities (Antika et al., 2019). In addition, this research also reveals that the use of RME can have a positive impact on students' self-confidence in mathematics. Students who engage in RME learning tend to feel more confident in facing complex mathematical tasks.

However, it is important to remember that the RME learning model is also influenced by factors such as the quality of implementation and support from educators. Therefore, further research is needed to explore the best strategies for integrating RME into the mathematics learning process. Thus, this research provides a strong basis for developing a more effective learning model in mathematics learning, by considering the influence of the Realistic Mathematics Education (RME) Learning Model on students' reasoning abilities and self-confidence.

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