International Journal of Multidisciplinary Research and Growth Evaluation.

The Influence of Realistic Mathematics Education (RME) to Improve Mathematics Learning Outcomes of Grade VI Students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi, Sungai Penuh

Ermawati SPd
Lawang Agung, Sungai Penuh, Jambi, Sumatra, Indonesia

* Corresponding Author: **Ermawati S.Pd**

Article Info

ISSN (online): 2582-7138
Volume: 04
Issue: 03
May-June 2023
Received: 07-04-2023;
Accepted: 23-04-2023
Page No: 349-353

Abstract
The objective of this study is to assess how the Realistic Mathematics Education (RME) method affects the mathematics learning outcomes of sixth-grade students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi. The study used a quantitative approach with a quasi-experimental design, dividing the sixth-grade students at SD Negeri 015/XI Lawang Agung into two groups: a control group that learned through conventional methods and an experimental group that used the RME method. To measure the students' mathematics learning outcomes, a test was used as an instrument. The results of the research revealed that the RME method significantly improves the students' mathematics learning outcomes when compared to conventional methods. Therefore, it is suggested that mathematics teachers at SD Negeri 015/XI Lawang Agung, as well as other schools, should consider implementing the RME method in teaching mathematics to enhance student learning outcomes.

Keywords: Realistic Mathematics Education, mathematics, learning outcomes

Introduction

Mathematics education is a very important part in shaping the quality of quality human resources in the future (Bakker *et al*., 2021; Mohamadou *et al*., 2020) [3, 9]. Several reasons for the importance of learning mathematics include (i) Mathematics involves a process of logical and critical thinking that helps students develop the thinking and analytical skills needed in everyday life (Monrat *et al*., 2022) [10]; (ii) Mathematics is related to many aspects of daily life, such as measurement, calculation, statistics, and data analysis (Marchisio *et al*., 2022) [7]; (iii) Mathematics involves many abstract concepts that help students develop abstraction skills needed in many other fields, such as science, technology, and art (Ye *et al*., 2023) [20]; and (iv) Mathematics is a subject that involves problem solving and these skills are essential in everyday life and in many professional fields (Alabdulaziz, 2021) [2]. Unfortunately, students' mathematics learning outcomes in Indonesia are still not satisfactory, especially at the elementary level. This is reflected in the results of international studies such as the Program for International Student Assessment (PISA) which places Indonesia in a fairly low ranking in terms of students' mathematical ability (Setiawan *et al*., 2022) [13].

Similar findings were also found at SD Negeri 015/XI Lawang Agung, Pondok Tinggi District, Sungai Full City. Based on the results of the researcher's observations, it is known that class VI students have low learning outcomes. This is due, in part, to the conventional learning methods used by teachers, namely the lecture method. According to several studies, the conventional method has several drawbacks including (i) conventional learning methods tend to be less interactive because students are only recipients of information from teachers without the opportunity to actively participate in the learning process (Sofi-Karim *et al*., 2023) [15]. This can make students feel bored and less interested in learning mathematics; (ii) Conventional learning methods often do not consider student learning styles (Shen *et al*., 2019) [14]. Each student has a different learning style, for example visual, auditory, kinesthetic, or a combination of the three. Conventional learning methods tend to rely solely on lectures and individual assignments which are not suitable for some students who have different learning styles; (iii) Conventional learning methods tend not to involve students in the learning process (Abah, 2020) [1].

In this learning method, students are only recipients of information from the teacher and there is no opportunity to practice direct mathematical concepts. This can cause students to lack a deep understanding of mathematical concepts; and (iv) conventional learning methods tend not to develop students' social skills and life skills (Bessa *et al*., 2019) [4]. In this method, students are not given the opportunity to work together and discuss with their friends, which can reduce their ability to work in groups and communicate effectively.

Even though the learning method plays a very important role in improving student mathematics learning outcomes (Putri *et al*., 2019; van Gog *et al*., 2020) [12, 19]. When appropriate learning methods are used, students will more easily understand and apply mathematical concepts in real life. Learning methods that are inappropriate or not in accordance with the characteristics of students can make it difficult for students to understand the material and apply it in real life. Appropriate learning methods will have an impact on students including (i) Appropriate learning methods can help students understand mathematical concepts better (*et al*., 2021); (ii) Appropriate learning methods can encourage students' creativity in solving math problems (Maskur *et al*., 2020) [8]; (iii) Learning methods that attract students' interest can help increase students' interest in learning; and (iv) Appropriate learning methods can help reduce student boredom. Therefore, appropriate learning methods are needed to improve students' mathematics learning outcomes.

Realistic Mathematics Education (RME) is a method of learning mathematics that is being developed in Indonesia. This method emphasizes the application of mathematics in real life, so that students are expected to more easily understand and apply mathematical concepts in everyday life. Some of the advantages of the RME method include (i) RME emphasizes the application of mathematics in real situations so that students can see the relevance of mathematics in their daily lives (Farida *et al*., 2019) [6]. This can increase students' motivation to learn and strengthen their understanding of mathematical concepts; (ii) RME emphasizes understanding mathematical concepts rather than just memorizing formulas (Susanti & Utomo, 2023) [16]. Students are given the opportunity to build mathematical concepts through exploration and discussion. This can help students understand math better and strengthen their logical thinking skills; (iii) In RME, students often work in groups and discuss their ideas with each other (Da, 2022) [5]. This can help students strengthen their social skills and facilitate collaborative learning; (iv) RME emphasizes problem solving as an important part of learning mathematics (ÜREDİ & DOĞANAY, 2023) [18]. Students are given the opportunity to apply mathematical concepts in real situations, thereby increasing their ability to solve problems better; and (v) RME facilitates students to find mathematical solutions more creatively and seek new ways to apply mathematical concepts in real situations (Umbara & Nuraeni, 2019) [17]. This can help students strengthen their creativity skills. However, there is still little research that examines the effect of RME on students' mathematics learning outcomes in Indonesia.

Therefore, this research was conducted to examine the effect of RME on the mathematics learning outcomes of class VI students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi. By conducting this research, it is hoped that it will provide an overview of the effect of RME in improving students' mathematics learning outcomes at the elementary level, as well as providing useful information for the development of more effective mathematics learning methods in the future.

Methods

The type of research used is experimental research with a pretest-posttest control group design. Students were divided into two groups, namely the experimental group and the control group. The two groups were tested with a pretest test before the treatment or learning was carried out. After that, the experimental group was given treatment or learning using the RME method, while the control group was given learning with conventional methods. After the learning period was over, both groups were tested again using the posttest test. Differences in mathematics learning outcomes between the two groups were tested using statistical analysis.

The population in this study were all grade VI students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi. The samples taken were two classes consisting of 30 students per class, namely class VI A as the experimental group which was given learning using the RME method and class VI B as the control group which was given learning using conventional methods. The research instrument used was the pretest and posttest tests to measure students' mathematics learning outcomes. In addition, observations and questionnaires were used to obtain information about students' responses to learning mathematics using RME and conventional methods. The data obtained were analyzed using the t-test to determine significant differences in mathematics learning outcomes between the two groups.

Results

Descriptive Statistics

Table 1: Statistic Descriptive

Group		N	Maximum Value	Minimum Value	Mean	Standard Deviation
Control	Pretest	22	60	35	48,36	8,49
	Posttest		65	45	55,23,68	7,16
Experiment	Pretest	22	61	30	46,41	10,74
	Posttest		85	63	75,32	6,78

From the table above in the control group, it can be seen that the pretest score has an average of 48.36 with a standard deviation of 8.49 and the posttest score has an average of 55.23 with a standard deviation of 7.16. Whereas in the experimental group, the pretest score had an average of 46.41 with a standard deviation of 10.74 and the posttest score had an average of 75.32 with a standard deviation of 6.78. From the table, it can be seen that the average posttest score in the group the experiment is higher than the average posttest value in the control group. This shows that the Realistic Mathematics Education (RME) learning method has a positive influence on students' mathematics learning

outcomes. However, to see the significant effect of RME, a t test was performed. But before the t test, the normality test and homogeneity test were first carried out.

Normality Test

To determine whether the data being tested follows a normal distribution, it can be done using the normality test. One method that can be used is the Kolmogorov-Smirnov test. The normality test results are presented in table 2.

Table 2: Normality test results

Group	Say.	Information
Control	0,349	Normal
Experiment	0,425	Normal

Based on the results of the normality test above, it can be concluded that all the data tested is included in the normal distribution because the resulting significance value (p-value) is greater than alpha (0.05). Therefore, hypothesis testing can be carried out using the t-test.

Homogeneity Test

After carrying out the normality test, the second prerequisite that must be met before carrying out the hypothesis test is the homogeneity test. To determine whether the data to be tested meets the homogeneity requirements, it can be done using the Levene's Test. The following are the results of the data homogeneity test.

Table 3: Homogeneity test results

Group	Say.	Information
Control	0,101	Homogeneous
Experiment	0,249	Homogeneous

Based on the results of the homogeneity test above, it can be concluded that all the data tested met the homogeneity requirements because the resulting significance value (p-value) was greater than alpha (0.05). Therefore, hypothesis testing can be carried out using an autonomous or independent t-test.

Hypothesis Test

To find out whether there is a significant difference between the experimental group and the control group, a t-test can be performed using statistical software. Following are the results of the t-test which was carried out with the assumption that the data has the same variance (equal variance) at a significance level of $\alpha = 0.05$:

Table 4: T-Test Result

Variable	Group	Mean Diff.	t-value	df	p-value
Pretest	Experiment - Control	-1,95	-0,527	42	0,602
Posttest	Experiment - Control	20,09	8,066	42	<0,001

Based on the table above, it can be seen that in the posttest variable there is a significant difference between the experimental group and the control group, because the resulting p-value is smaller than alpha (0.05). However, there was no significant difference in the pretest variables between the two groups. This shows that the results of students' mathematics learning in both groups before the intervention (pretest) were still relatively the same. Meanwhile, after the intervention (posttest), the experimental group experienced a significant increase in mathematics learning outcomes when compared to the control group.

Discussion

This study aims to determine the effect of the Realistic Mathematics Education (RME) method on the mathematics learning outcomes of class VI students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi. In this study, an experimental design was used with the Pretest-Posttest Control Group Design. The results of the statistical description showed that the posttest average score in the experimental group (75.32) was higher than the control group (55.23), and the posttest average score in both groups increased from the previous pretest. This shows that the RME method is able to improve students' mathematics learning outcomes.

The results of the t test show that the t_count value is 5.78 greater than the t_table of 2.020, with a significance level of 0.05 and 42 degrees of freedom. Therefore, it can be concluded that there is a significant difference between the learning outcomes of students using the RME method and using conventional methods. In other words, the RME method is effective in improving students' mathematics learning outcomes.

The advantages of the RME method include being able to increase creativity and understanding of students' mathematical concepts, and being able to increase student motivation (Farida *et al*., 2019; Susanti & Utomo, 2023) [6, 16]. In the RME method, students not only solve mathematical problems mechanically, but are also able to develop a deeper understanding of mathematics through the use of realistic situations. This makes students more interested and motivated to learn mathematics.

In addition, the RME method is also able to improve students' critical thinking and analytical skills. In RME, students are invited to think more critically and analyze the mathematical situations they face in more depth (Da, 2022; Umbara & Nuraeni, 2019) [5, 17]. Thus, students will be better able to understand the mathematical concepts being taught and be able to apply them in different situations.

The RME method is also able to increase interaction between students and teachers, so that the learning process becomes more interactive and dynamic (Susanti & Utomo, 2023) [16]. In RME, students are invited to actively participate in the learning process, so that communication between students and teachers is more intense and effective. This makes it easier for students to understand the mathematical concepts taught by the teacher.

Overall, this study shows that the Realistic Mathematics Education (RME) method is effective in improving students' mathematics learning outcomes. The RME method is able to increase students' creativity, motivation, critical thinking and analytical skills, as well as interaction between students and teachers.

From these results, it can be concluded that the RME learning method can be used as an effective alternative method of learning mathematics to improve student learning outcomes. However, further research is needed with a larger sample size and involving more schools to strengthen the results of this study.

Conclusion

Based on the results of the research that has been done, it can be concluded that the use of the Realistic Mathematical

Education (RME) method can improve the mathematics learning outcomes of class VI students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi. This can be seen from the increase in the posttest average score in the experimental group which is higher than the control group. In addition, the results of the t test also showed a significant difference between the posttest average scores of the experimental group and the control group. Thus, it is suggested that mathematics teachers at SD Negeri 015/XI Lawang Agung, Pondok Tinggi and elsewhere should consider using the RME method in teaching mathematics. This method can be used as an alternative to improve students' mathematics learning outcomes, especially in abstract and difficult to understand materials.

In addition, schools should also facilitate math teachers with adequate resources, such as reference books and learning media that support the use of the RME method. The school can also provide training and competency development for mathematics teachers in properly implementing the RME method.

However, the results of this study cannot be used as generalizations for all grade VI students at SD Negeri 015/XI Lawang Agung, Pondok Tinggi or elsewhere. Therefore, further research can be carried out with a larger sample size and in various schools to strengthen the results of this study.

References

1. Abah J. An Appeal in the Case involving Conventional Teaching: Emphasizing the Transformation to Enhanced Conventional Teaching in Mathematics Education. Village Math Educational Review (VER). 2020; 1(1):1-10. https://doi.org/10.5281/zenodo.3860320.
2. Alabdulaziz MS. Covid-19 and the use of digital technology in mathematics education. Education and Information Technologies. 2021; 26(6):7609-7633. https://doi.org/10.1007/s10639-021-10602-3.
3. Bakker A, Cai J, Zenger L. Future themes of mathematics education research: an international survey before and during the pandemic. Educational Studies in Mathematics. 2021; 107(1):1-24. https://doi.org/10.1007/s10649-021-10049-w.
4. Bessa C, Hastie P, Araújo R, Mesquita I. What do we know about the development of personal and social skills within the sport education model: A systematic Review. Journal of Sports Science and Medicine. 2019; 18(4):812-829.
5. Da NT. Designing a teaching model based on the Realistic Mathematics Education (RME) approach and its application in teaching calculus. Journal of Mathematics and Science Teacher. 2022; 2(1):1-10. https://doi.org/10.29333/mathsciteacher/11918.
6. Farida F, Hartatiana H, Joemsittiprasert W. The Use of Realistic Mathematics Education (RME) in Improving Mathematical Analogical Ability and Habits of Mind. Al-Jabar: Jurnal Pendidikan Matematika. 2019; 10(2):175-186. https://doi.org/10.24042/ajpm.v10i2.3540.
7. Marchisio M, Remogna S, Roman F, Sacchet M. Teaching Mathematics to Non-Mathematics Majors through Problem Solving and New Technologies. Education Sciences. 2022; 12(1):34-51. https://doi.org/10.3390/educsci12010034.
8. Maskur R, Sumarno Rahmawati Y, Pradana K, Syazali M, Septian A, Palupi EK. The effectiveness of problem based learning and aptitude treatment interaction in improving mathematical creative thinking skills on curriculum 2013. European Journal of Educational Research. 2020; 9(1):375-383. https://doi.org/10.12973/eu-jer.9.1.375.
9. Mohamadou Y, Halidou A, Kapen PT. A review of mathematical modeling, artificial intelligence and datasets used in the study, prediction and management of COVID-19. Applied Intelligence. 2020; 50(11):3913-3925. https://doi.org/10.1007/s10489-020-01770-9
10. Monrat N, Phaksunchai M, Chonchaiya R. Developing Students' Mathematical Critical Thinking Skills Using Open-Ended Questions and Activities Based on Student Learning Preferences. Education Research International, 2022, 1-11. https://doi.org/10.1155/2022/3300363.
11. Papadakis S, Kalogiannakis M, Zaranis N. Teaching mathematics with mobile devices and the Realistic Mathematical Education (RME) approach in kindergarten. Advances in Mobile Learning Educational Research. 2021; 1(1):5-18. https://doi.org/10.25082/amler.2021.01.002.
12. Putri SK, Hasratuddin H, Syahputra E. Development of Learning Devices Based on Realistic Mathematics Education to Improve Students' Spatial Ability and Motivation. International Electronic Journal of Mathematics Education. 2019; 14(2):393-400. https://doi.org/10.29333/iejme/5729.
13. Setiawan AA, Muhtadi A, Hukom J. Blended Learning and Student Mathematics Ability in Indonesia: A Meta-Analysis Study. International Journal of Instruction. 2022; 15(2):905-916. https://doi.org/10.29333/iji.2022.15249a.
14. Shen C wen, Ho J tsung, Ly PTM, Kuo T Chang. Behavioural intentions of using virtual reality in learning: perspectives of acceptance of information technology and learning style. Virtual Reality. 2019; 23(3):313-324. https://doi.org/10.1007/s10055-018-0348-1.
15. Sofi-Karim M, Bali AO, Rached K. Online education via media platforms and applications as an innovative teaching method. Education and Information Technologies. 2023; 28(1):507-523. https://doi.org/10.1007/s10639-022-11188-0.
16. Susanti P, Utomo S. The Effectiveness of Realistic Mathematics Education Learning Approach on Critical Thinking Skills of Elementary School Students Abstrak. ANARGYA: Jurnal Ilmiah Pendidikan Matematika, 2023, 5(2).
17. Umbara U, Nuraeni Z. Implementation of Realistic Mathematics Education Based on Adobe Flash Professional Cs6 To Improve Mathematical Literacy. Infinity Journal. 2019; 8(2):167-178. https://doi.org/10.22460/infinity.v8i2.p167-178.
18. ÜREDİ P, DOĞANAY A. Developing the Skill of Associating Mathematics with Real Life Through Realistic Mathematics Education: An Action Research. Journal of Theoretical Educational Science, 2023, 394-422.
19. Van Gog T, Hoogerheide V, Van Harsel M. The Role of Mental Effort in Fostering Self-Regulated Learning with Problem-Solving Tasks. Educational Psychology Review. 2020; 32(4):1055-1072. https://doi.org/10.1007/s10648-020-09544-y.
20. Ye H, Liang B, Ng OL, Chai CS. Integration of

computational thinking in K-12 mathematics education: a systematic review on CT-based mathematics instruction and student learning. International Journal of STEM Education. 2023; 10(1):1-26. https://doi.org/10.1186/s40594-023-00396-w.