

MAGICAL NUMBER STAGE: MATHEMATICAL ADVENTURES IN ROLE-PLAYING LEARNING IN GRADE IV OF SD 38 JANNA-JANNAYA

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ABSTRACT

Mathematics learning achievement among elementary school students is still relatively low, one of the reasons being the predominantly passive teaching approach that minimizes direct student involvement. This study aims to examine the impact of using the *role playing* method as an instructional approach aimed at achieving the mathematical competence of fourth grade students at SD 38 Janna-Jannaya. This study used a quantitative method through a *one group pretest-posttest pre-experimental design*. There were 16 students participating in this study, with multiple-choice questions used for the pretest and posttest. The data were analyzed using a paired t-test. The results of data processing showed an increase in the average score from 58.12 to 85.18, accompanied by an increase in learning completeness from 19% to 87.5%. Statistical tests showed a value (Sig.) of 0.000 (< 0.05), which ultimately led to the conclusion that the role-playing method had a significant impact on students' mathematics learning achievement. These findings indicate that the use of the role-playing method not only strengthens conceptual understanding and calculation skills but also fosters collaboration and communication skills among students during the learning process. This study opens up opportunities for further research on the application of role playing in other mathematics topics, different levels of education, or in combination with digital media to optimize student engagement in more interactive learning.

Introduction

Education plays a fundamental role in honing intelligence and shaping human personality. The future success of a nation is greatly influenced by the quality of education, as education serves as a strategic means of preparing the next generation to compete at the global level. Schools play a major role as institutions in realizing national educational goals, while teachers serve as the driving force behind the learning process. Teachers are required to create learning experiences that make it easier for students to understand the material, create a pleasant atmosphere, and guide them towards achieving clearly measurable goals (Puspitasari & Airlanda, 2021) . (Margiati & Puspaningtyas, 2021) states that education is necessary for the long-term survival of humanity.

Mathematics education plays an important role in improving the quality of human resources, as it develops logical, analytical, and systematic thinking skills. The discipline of mathematics is designed so that students can apply this way of thinking in their daily routines and in various other fields of science (Al Husna et al., 2021) . . Mathematics learning activities are designed to help students apply mathematical thinking to everyday problems and in

various other disciplines. Mathematics itself is a universal science and an important foundation for modern technological advancement (Saidah, 2023) . Mathematics learning is also very important for preparation, both from the environment and the students themselves, because mathematics is a structured subject that requires logical thinking. Therefore, these two influencing factors will certainly cause obstacles in mathematics learning (Asdar et al., 2021).

From elementary school to university, mathematics is considered a subject that must be mastered. The goal of mathematics education at the elementary level is not only to emphasize memorization of formulas, but also to encourage students to understand concepts without direct assistance so that they can apply them when faced with concrete problems that arise in daily life (Maghfiroh et al., 2021) . Another statement that arises is "Mathematics is difficult." This statement is widespread among students. More specifically, students who strongly dislike mathematics often find this subject difficult, confusing, and even frightening, which affects their motivation to learn (Reza Lestari et al., 2024) .

Observations conducted in October-November 2024 in fourth grade classes showed that the mathematics learning process tended to be monotonous and did not actively involve students. Learning activities focused more on noting down formulas, copying sample questions, and doing exercises from books, so that student interaction in group discussions was very limited. As a result, their understanding of the material was not optimal, and most students' scores did not meet the minimum passing grade (KKM) standards, and their learning outcomes were still very low. Of the total 16 students, only 3 or 19 percent were able to meet the KKM of 68, while most of the others did not. This condition calls for renewal and innovation in teaching methods (Elisabeth & Astitin, 2022) . One alternative that can be applied is the *Role Playing* method based on learning theater, where students are given the opportunity to play roles related to mathematical material, such as multiplication and addition operations, so that the learning process appears more dynamic and interactive (Wulandari et al., 2023) . Learning theater is an educational approach that combines elements of drama, dialogue, character roles, and storylines in learning activities. Through this approach, students not only listen to explanations but also play the role of characters or objects in mathematical stories—for example, playing the role of numbers, addition and multiplication operations, or everyday problem situations. Learning turns into a mini theater that involves movement, expression, emotion, and interaction between students. Thus, learning not only touches on the cognitive realm but also the affective and psychomotor realms .

The *role-playing* method is a learning method where students use their imagination to understand the learning material. (Yulianto et al., 2020) Students can develop creativity and understanding through roles as real characters or inanimate objects. These activities usually involve more than one individual, with the number depending on the various roles that must be played in the activity (Yulianto et al., 2020) . The role-playing model is a method for understanding learning material by involving the imagination and feelings of students. In this method, there are certain rules, clear objectives, and elements of fun that accompany the learning activity (Wahyuni, 2023) .

According to Naldince et al (2024) , "*role playing* is a type of movement game that has objectives, rules, and provides enjoyment." In *role playing*, students must act according to situations that are different from the usual, even though the lessons are still conducted in the classroom. Furthermore, *role play* is often interpreted as an activity in which students act as other characters outside the classroom. This teaching model encourages intensive student involvement while fostering a sense of joy throughout the teaching and learning activities. Through the use of *role-playing* methods in the classroom, students can communicate with each other and create a cheerful learning atmosphere (Maria Naldince et al., 2024) . This makes learning more interesting for students (Naldince et al., 2024) .

Previous research on the implementation of *role-playing* methods in learning activities has proven that this strategy is relevant for application in mathematics, especially in the topic

of addition arithmetic operations. This method has also been proven to increase teacher activity by up to 97%. In addition, the use of *role-playing* methods resulted in a 51% improvement in student academic achievement in cycle I, which then increased to 75% in cycle II. Therefore, the application of the role-playing method shows a significant level of success in mathematics learning activities, especially in the early stages of primary education. (Rozak & Fatkhiyani, 2022) . Previous research shows that *role-playing* can increase student activity and learning outcomes (Hariani, 2019) , but not many have integrated theatrical elements into mathematics learning. Furthermore, research such as (Imama et al., 2024) , which applies role-playing in market simulations, does train communication and calculation skills, but it does not specifically guide students to understand number operation concepts in depth. This is the gap that this study aims to fill, namely by presenting a creative, contextual, and imaginative learning method to address the problem of low mathematics learning outcomes in fourth grade.

Previous research has revealed that the role-playing approach is a productive alternative teaching strategy for improving students' mastery of material and academic achievement (Alfiati et al., 2024) . By engaging in role-playing, students have the opportunity to practice their understanding of roles, understand the diversity of social functions that exist in their surroundings, and reflect on their own actions and those of others. The role-playing-based learning process provides encouragement that can foster creativity, imagination, and more intense knowledge, as well as the internalization of values when playing a role. (Naldi et al., 2024) This condition allows the message contained in the *scenario* to be conveyed clearly and understood by others (Aurika et al., 2024) .

Role-playing means acting according to a predetermined character with a specific purpose. This activity helps students gain knowledge through real experiences while emphasizing the importance of place and time in the learning process. The *role-playing* learning method is applied to make it easier for students to understand the material, improve cooperation between students, and facilitate memory of the concepts taught by the teacher (Nurfauzi et al., 2023) . Through the application of this method, students can learn from direct experiences and real situations, thereby encouraging an increase in their interest in exploring mathematics. If students enjoy the subject, they can easily improve their performance in language, especially in speaking skills. The influence of media and learning methods is of high urgency in achieving the set targets. Teachers want students to understand the material, be enthusiastic about learning, be motivated, and have a strong interest in learning . This requires adequate learning facilities at school and interesting teaching methods (Ilmiah & Pendidikan, 2023) .

The novelty of this research lies in the application of learning theater in the role-playing method for number operations material. Unlike previous studies that only applied simple role-playing such as buying and selling simulations or role-playing games without a dramatic storyline, this study developed the concept of "Magic Number Stage," which is mathematics learning through mini theater performances that bring number characters and arithmetic operations to life in a complete story. This approach is expected to not only increase student engagement in learning but also directly impact learning outcomes.

The low level of interest and academic achievement of students in mathematics, especially in fourth grade, is triggered by a boring teaching approach that does not involve student participation. This is evident from the lack of student participation in discussions and the low scores achieved by most students. This study aims to examine how the *Role Play* learning method impacts the mathematics learning outcomes of fourth-grade students at SD 38 Janna-Jannaya.

Method

This research was categorized as a quantitative pre-experimental study that applied a *one-group pretest-posttest* design. The data obtained was then analyzed using statistical techniques to test the validity of the hypothesis that had been previously determined through the formulation of Abd.Mukhid (2021) "there is a significant effect between the application of the Role Playing learning method and the mathematics learning outcomes of fourth-grade students". The population of this study included all fourth-grade students at SD 38 Janna-Jannaya, with a total of 16 students.

Data collection techniques were carried out using a test containing 20 multiple-choice questions and 5 essay questions containing material on integer operations. The test instruments were administered before and after the treatment to assess the improvement in learning outcomes after using the *role-playing* method. The treatment given was the application of a theater-based role-playing method to integer operations, including addition, subtraction, multiplication, division, and mixed operations. This material was chosen because it was a basic competency that fourth graders must master and, based on previous observations, it was one of the causes of low student learning outcomes. The questions were compiled based on competency achievement indicators and guidelines designed in accordance with the Basic Competencies (KD) in the applicable curriculum. A validation process was carried out to ensure that the questions met the criteria for construction, content, and language aspects. The measuring instrument used was a written test in a multiple-choice format with explanations accompanying the pretest and posttest. The information processing was carried out using a paired t-test, a statistical technique used to compare two related samples. The *paired sample t-test* was used in accordance with the research objectives, which were aimed at identifying variations in students' academic achievement between the initial condition and after the implementation of *the Role Playing*.

Results and Discussion

Results

This study involved 16 fourth-grade students at SD 38 Janna-jannaya. The purpose of this study was to evaluate the impact of applying *role-playing* learning strategies on student academic achievement. To assess the improvement in learning outcomes, the researcher first conducted a pretest and posttest. The pretest was conducted before using the *role-playing* model of " " to obtain initial data, then the *role-playing* technique was applied during the teaching process. A final test was then conducted to obtain the latest data. The initial data showed that only 3 of the 16 fourth-grade students at SD 38 Janna-Jannaya achieved mastery. Based on the pretest, the average mathematics comprehension score of fourth-grade students at SD 38 Janna-Jannaya was 58.12. After using the role-playing-based mathematics learning method, the average posttest score increased to 85.18. A summary of the learning success percentage is shown in Figure 1:

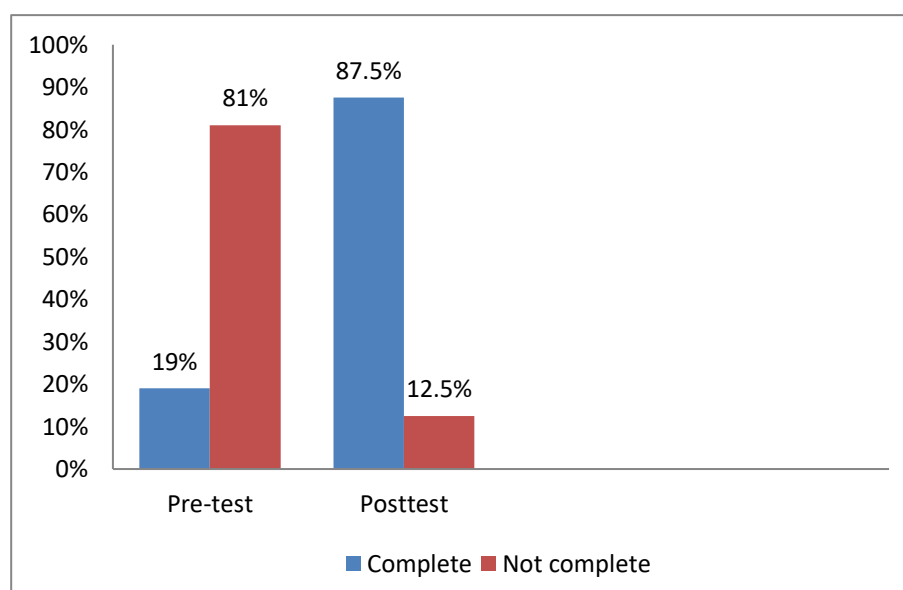


Figure 1. Recapitulation of Learning Mastery

Referring to the data presented in Figure 1, 19% of all students achieved the standard set in the pretest before the *role-playing* learning strategy was used, while 81% of students did not. In the posttest after applying the role-playing learning method, the mastery level reached 87.5%, while those who did not master the material scored 12.5%.

In addition, the results of the normality test related to the development of the academic performance of fourth-grade students at SD 38 Janna-jannaya are shown in Table 1:

Table 1. Normality Test Results

No.	Kelas	Sig.	Signifikansi	Keterangan
1	Pretest	0,042	$0,551 < 0,05$	Normal
2	Posttest	0,167	$0,167 > 0,05$	Normal

The normality test results of the two data groups, namely the pretest with (Sig.) value of 0.042, show that the data meets the normal distribution assumption because the value is higher than 0.05. Meanwhile, the post-test score shows a (Sig.) value of 0.167, which also indicates that the data distribution is normal because it is greater than 0.05.

Table 2. Pretest and Posttest Homogeneity Test Results

No.	Jenis Data	Jenis Uji Homogenitas	Sig*	Keterangan
1	Hasil pretest dan posttest	<i>Lavene test</i>	0,137	Homogen

If the (Sig.) level is > 0.05 , the information is considered to be homogeneous. However, if the (Sig.) level is < 0.05 , the information is considered to be non-homogeneous. Based on Table 2, the homogeneity test using the Lavene test produced a number of 0.137. Because 0.137 is greater than 0.05, it can be stated that the pretest and posttest data are homogeneous.

From the normality test, both the pretest and posttest data are proven to be normally distributed. Furthermore, the Lavene test is used to determine whether the two data sets are homogeneous or not. Since the data show both normal distribution and homogeneity, the analysis continues using the paired sample t-test method. A summary of the paired sample t-test analysis results is presented in the following table:

Table 3. Paired Sample T Test Results

		<i>Paires Differences</i>					<i>T</i>	<i>Df</i>	<i>Sig (2-tailed)</i>
No.		<i>Mean</i>	<i>Std, Deviation</i>	<i>Std, Error Mean</i>	<i>95% Confidence Interval of the Difference</i>				
					<i>Lower</i>	<i>Upper</i>			
<i>Pair 1</i>									
1	<i>Pretest-posttes t</i>	27,062	9,560	2,390	32,156	21,968	11,323	15	0,000

Referring to Table 3, a value of (Sig.) of 0.000 was found, which is clearly below the limit of 0.05. On that basis, the null hypothesis was rejected and the alternative hypothesis was declared true. Therefore, it can be confirmed that the use of the *role-playing* learning model has a significant effect on the mathematics learning outcomes of fourth-grade students at SD 38 Janna-jannaya (Smp & Makmur, 2021).

Discussion

The impact of implementing *role-playing* learning on students' academic achievement in mathematics at SD 38 Janna-jannaya shows meaningful results. Before this method was applied, only 3 out of 16 students passed with an average score of 58.12. After the implementation of the *role-playing* strategy, the pass rate increased to 87.5% or 14 out of 16 students with an average score of 85.18.

Theoretically, the effectiveness of role-playing can be explained through the constructivist theory approach, which states that students build their knowledge through direct experience and interaction with their environment (). In role-playing, students do not simply receive information, but construct understanding through role-playing, dialogue, questioning, and contextual problem solving. This process enables students to learn by doing, so that the concept of number operations is not understood in the abstract, but is internalized through meaningful learning experiences.

In addition, the success of role-playing learning is in line with Vygotsky's social learning theory, particularly the concept of the zone of proximal development (ZPD). In role-playing, there is social interaction between students, peers, and teachers. This interaction provides scaffolding that enables students who initially did not understand the concept to learn from other students or teacher guidance, allowing them to move from their actual zone of ability to their potential

zone of ability. This explains why there was a significant increase in understanding and learning outcomes after applying this method.

These results are related to the findings of " , which revealed that "the *role-playing* method can improve student learning outcomes by up to 75% in cycle II, with an increase in teacher activity of up to 97%." This finding supports the idea that learning methods that actively involve students can create more effective learning experiences. Additionally, research by (Yulianto et al., 2020) confirms that "this method improves conceptual understanding through students' imagination and creativity, which in turn can increase their motivation and interest in learning."

However, the conclusion of this study deviates from the findings of Naldince et al (2024) , which notes that "although *role playing* is effective in increasing student engagement, some students who have difficulties in group work do not benefit significantly." These findings also suggest that the application of *role-playing* strategies requires adjustments to suit the characteristics and individual needs of students.

Therefore, this study confirms that the *role-playing* approach is proven to be effective in improving academic achievement, but its implementation must still be tailored to the needs of students to avoid creating obstacles in the learning process.

Conclusion

This research focused on the effect of *role-playing* learning strategies on the mathematics achievement of fourth-grade students at SD 38 Janna-jannaya. According to statistical calculations using a paired sample t-test, the (Sig.) value recorded was 0.000 (< 0.05), proving that there was a significant difference between achievement before and after the implementation of *role playing*. Thus, the research objective was achieved, namely to prove that *role playing* has a positive impact on improving mathematics learning outcomes.

The main finding shows an increase in the average student score from 58.12 on the pretest to 85.18 on the posttest. In addition, the proportion of students who achieved learning completeness also increased from 37.5% to 87.5% after using the *role-playing* strategy. These results confirm that this approach is able to encourage conceptual understanding, increase learning motivation, and strengthen student engagement during mathematics learning activities.

The findings from this study indicate that the *role-playing* method serves as one of the proven learning approaches to encourage an increase in students' academic achievement, especially in mathematics, which is often perceived as difficult by many students. Through a more enjoyable method that involves active participation , this strategy is able to foster creativity, social interaction skills, and a deeper and more meaningful understanding of concepts for students.

This research still has limitations in terms of the small number of respondents and the fact that it was only applied in one educational institution, so the findings cannot be generalized comprehensively. In addition, the scope of this study is still limited to certain materials in mathematics learning, so the effectiveness of applying the *role-playing* method to other topics or different levels of education cannot be comprehensively ascertained.

In practical terms, the results of this study have implications for elementary school teachers, especially mathematics teachers, that role-playing methods can be implemented in learning through simple but structured steps. Teachers can create learning scenarios that are relevant to mathematics material, such as the story "The Magic Stage of Numbers," which features characters representing numbers, arithmetic operations, or everyday situations such as buying and selling, games, or life at the market. Teachers assign roles to students, give them

time to practice, and then present a short play in class. Through these steps, students not only understand the material through the teacher's explanation, but also experience the mathematical thinking process firsthand through dialogue, movement, and expression. These implications show that role playing can be an alternative method that is easy to apply in everyday learning without requiring complicated facilities. Teachers only need creativity, time management, and the ability to direct students to stay focused on learning objectives. For this reason, further research is recommended to involve a larger number of participants and be applied in various schools with different backgrounds so that the research results are more representative and can be generalized. Further research could also examine the application of role playing in other subjects or combine it with interactive learning technologies such as theatrical videos, digital animations, or educational platforms to produce more innovative results. In addition, teachers are expected to be able to design varied role-playing scenarios that are tailored to student characteristics and can be applied continuously so that the benefits of this method are not only temporary but become part of a creative and enjoyable learning culture in the classroom.

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