

The Effect of the Role-Playing Learning Model Assisted by Toy Money on Mathematics Basic Arithmetic Learning Outcomes of Fourth-Grade Students at SDN Cibungkul

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Abstract:

Mathematics learning outcomes in basic arithmetic operations among elementary school students remain relatively low due to the predominance of teacher-centered instructional practices that provide limited opportunities for active and meaningful learning. To address this issue, the Role-Playing learning model assisted by toy money was implemented to create contextual learning experiences through buying-and-selling simulations.

This study aimed to examine the effect of the Role-Playing learning model assisted by toy money on the mathematics learning outcomes of fourth-grade students at SDN Cibungkul.

A quantitative approach with a quasi-experimental method and a Nonequivalent Control Group Design was employed. The sample consisted of 36 fourth-grade students, including 18 students in the experimental class and 18 students in the control class. Data were collected through pretests and posttests and analyzed using validity, reliability, normality, and homogeneity tests, followed by hypothesis testing with the Independent Samples t-test using SPSS version 25.

The results indicated that the mean score of the control class improved from 64.28 to 77.67, whereas the mean score of the experimental class increased from 71.56 to 86.89. Furthermore, the Independent Samples t-test produced a significance value of 0.046 ($p < 0.05$), indicating a statistically significant difference in learning outcomes between the two groups.

These findings demonstrate that the Role-Playing learning model assisted by toy money has a positive and significant effect on students' learning outcomes in basic arithmetic operations. Therefore, this instructional model can be considered an effective and engaging alternative for enhancing mathematics learning outcomes at the elementary school level.

Keyword: Role-Playing Learning Model, Toy Money, Basic Arithmetic Operations, Mathematics Learning Outcomes, Elementary School Students, Quasi-Experimental Study.

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Introduction

Mathematics is one of the fundamental subjects that plays a crucial role in developing students' logical, systematic, critical, and creative thinking skills (Abdurrahman, 2022). At the elementary school level, mastery of basic arithmetic operations is an essential competency because it serves as the foundation for understanding more advanced mathematical concepts (Depdiknas, 2006). Furthermore, students' proficiency in basic arithmetic contributes significantly to the development of numeracy skills required at higher levels of education

(Wangge, 2021). Despite its importance, many elementary school students continue to experience difficulties in understanding basic arithmetic concepts, resulting in unsatisfactory mathematics learning outcomes. These conditions indicate the need for innovative, student-centered instructional strategies that facilitate meaningful learning experiences. In addition to innovative instructional strategies, teachers' pedagogical competence is also essential for creating active, meaningful, and student-centered learning environments that improve students' learning outcomes (Zulkarnain et al., 2025).

Basic arithmetic operations, including addition, subtraction, multiplication, and division, are among the mathematical topics that students frequently perceive as difficult. Limited conceptual understanding of these operations often leads to poor academic achievement and hinders students' ability to solve mathematical problems. Considering the developmental characteristics of elementary school students, mathematics instruction should emphasize concrete, contextual, and interactive learning experiences that actively involve students in the learning process rather than relying solely on conventional teacher-centered approaches.

Preliminary observations conducted at SDN Cibungkul revealed that the mathematics learning outcomes of fourth-grade students in basic arithmetic operations were still relatively low. Most students experienced difficulties in understanding arithmetic concepts, as reflected in their classroom assessment results. The initial learning outcomes are presented in Table 1.

Table 1. Initial Mathematics Learning Outcomes of Fourth-Grade Students at SDN Cibungkul

No.	Score	Category	Number of Students	Percentage
1	≥ 70	Achieved Mastery	14	38.89%
2	< 70	Not Yet Achieved Mastery	22	61.11%
Total			36	100%

Source: Preliminary observation data (2026).

As shown in Table 1, 22 out of 36 students (61.11%) failed to achieve the Minimum Mastery Criterion (MMC) of 70, while only 14 students (38.89%) met the expected standard. In addition, the class average score was 59, which was below the school's minimum mastery criterion. These findings indicate that students' learning outcomes in basic arithmetic operations require considerable improvement. One possible reason for this condition is that mathematics instruction is still predominantly conducted through conventional teaching methods, where teachers explain concepts directly and students passively receive information. Such instructional practices provide limited opportunities for students to construct their own understanding through authentic learning experiences. In contrast, elementary school students generally learn more effectively through concrete, contextual, and participatory activities that actively engage them in the learning process (Naldi et al., 2024).

One instructional alternative that may address this issue is the Role-Playing learning model assisted by toy money. Role Playing is an active learning model that encourages students to perform specific roles within realistic situations designed according to the learning objectives. Through role-playing activities, students actively participate in learning, interact with peers, and gain meaningful experiences that support conceptual understanding. In mathematics learning, toy money can function as a concrete instructional medium that enables students to simulate buying-and-selling activities, thereby helping them understand basic arithmetic operations in situations closely related to everyday life. The use of innovative instructional media has been shown to increase students' engagement and create more meaningful learning experiences, supporting the implementation of effective student-centered learning (Putri & Rofiah, 2025).

Several previous studies have demonstrated the effectiveness of the Role-Playing learning model in improving students' engagement and academic achievement. Research

conducted by Monalisa et al. (2025) and Yusrarti and Suryaningsih (2021) reported that the implementation of the Role-Playing learning model significantly enhanced elementary school students' participation and learning outcomes. Likewise, Handini et al. (2022) found that the use of concrete instructional media improved students' conceptual understanding and mathematics achievement. Furthermore, Tri Q et al. (2024) concluded that integrating play-based learning with manipulative media positively influenced students' mathematical abilities.

Although previous studies have confirmed the effectiveness of either the Role-Playing learning model or concrete instructional media independently, limited research has specifically examined the integration of the Role-Playing learning model with toy money in teaching basic arithmetic operations at the elementary school level. This limitation represents a research gap that warrants further investigation. Therefore, this study seeks to examine the effect of the Role-Playing learning model assisted by toy money on students' mathematics learning outcomes in basic arithmetic operations. The findings are expected to provide an innovative and contextual instructional alternative for elementary school teachers while contributing empirical evidence to the development of mathematics education, particularly regarding active learning approaches supported by manipulative instructional media.

Based on the aforementioned background, this study aims to investigate the effect of the Role-Playing learning model assisted by toy money on the mathematics learning outcomes of fourth-grade students at SDN Cibungkul.

Method

This study employed a quantitative approach using a quasi-experimental method (Sugiyono, 2020). The research design adopted was the Nonequivalent Control Group Design (Creswell & Creswell, 2022), involving two groups: an experimental group and a control group. The experimental group received instruction through the Role-Playing learning model assisted by toy money, whereas the control group was taught using conventional instructional methods. Both groups completed a pretest before the intervention and a posttest after the intervention to measure changes in students' mathematics learning outcomes. The study was conducted at SDN Cibungkul during the second semester of the 2025/2026 academic year.

The population consisted of all fourth-grade students at SDN Cibungkul, totaling 36 students. Because the population size was relatively small, the study employed a total sampling technique, in which all members of the population were included as research participants. The sample comprised 36 students, with 18 students assigned to the experimental class and 18 students assigned to the control class.

Table 2. Research Design

Group	Pretest	Treatment	Posttest
Experimental	O ₁	X	O ₂
Control	O ₃		O ₄

Notes:

O₁ = Pretest of the experimental group

O₂ = Posttest of the experimental group

O₃ = Pretest of the control group

O₄ = Posttest of the control group

X = Instruction using the Role-Playing learning model assisted by toy money

The study involved one independent variable and one dependent variable. The independent variable was the Role-Playing learning model assisted by toy money, while the dependent variable was students' learning outcomes in basic arithmetic operations. Data were

collected through achievement tests and documentation. The research instrument consisted of pretest and posttest questions, which were administered to students outside the research sample to evaluate their validity and reliability before data collection. The results indicated that all test items met the required validity and reliability criteria and were therefore suitable for use in the study. Documentation was used to obtain supporting information related to the implementation of the research.

The research procedure consisted of three stages: preparation, implementation, and data analysis. During the preparation stage, lesson plans and research instruments were developed and validated. The implementation stage included administering the pretest, conducting the instructional intervention according to the assigned learning model in each group, and administering the posttest. In the experimental class, students participated in buying-and-selling simulations using toy money through the Role-Playing learning model, while students in the control class received conventional instruction through teacher explanations, worked examples, and individual exercises. Finally, the collected data were processed and analyzed using SPSS version 25. Data analysis included validity and reliability testing, the Shapiro–Wilk normality test, Levene's Test for homogeneity of variance, and hypothesis testing using the Independent Samples t-test at a significance level of 5% ($\alpha = 0.05$).

Results and discussions

Results

Validity and Reliability of the Research Instrument

Before being administered to the research participants, the mathematics learning achievement test was piloted on 38 students outside the research sample. The validity of the instrument was examined using the Pearson Product-Moment Correlation at a significance level of 5%, with an r-table value of 0.320. The analysis indicated that all test items obtained r-count values greater than the r-table value, demonstrating that all items were valid and suitable for measuring students' learning outcomes.

The reliability of the instrument was subsequently evaluated using Cronbach's Alpha. The analysis produced a Cronbach's Alpha coefficient of 0.816, which exceeded the minimum acceptable value of 0.60. Therefore, the instrument was considered reliable and appropriate for measuring students' learning outcomes in basic arithmetic operations.

Learning Implementation

The learning implementation was conducted in two groups, namely the control class and the experimental class, over three instructional meetings. Both classes learned the same mathematics topic, namely addition, subtraction, and combined arithmetic operations involving whole numbers up to 10,000. The difference between the two groups was the instructional model used during the learning process.



Figure 1. Learning Activities in the Control Class

Figure 1 illustrates the learning activities in the control class. Instruction was delivered using conventional teaching methods consisting of teacher explanations, question-and-answer sessions, worked examples, and individual exercises. During the lesson, the teacher explained the concepts of addition and subtraction, demonstrated the procedures for solving mathematical problems, and asked students to complete practice questions individually. In this learning process, students primarily acted as recipients of information and followed the examples provided by the teacher. Consequently, learning was predominantly teacher-centered, with limited opportunities for students to participate actively in constructing their understanding.



Figure 2. Learning Activities Using the Role-Playing Learning Model Assisted by Toy Money in the Experimental Class

Figure 2 presents the learning activities implemented in the experimental class. Students learned through the Role-Playing learning model assisted by toy money. At the beginning of each lesson, the teacher introduced a buying-and-selling simulation and explained the learning scenario. Students were then divided into several groups and assigned different roles as buyers, sellers, and cashiers. Each group received toy money and product cards displaying item prices to support the simulation. Buyers selected products and calculated the total purchase price, sellers managed the transaction process, and cashiers calculated the payment and change using basic arithmetic operations. Through these contextual learning activities, students actively applied addition and subtraction concepts in situations resembling real-life experiences. The use of toy money and role-playing activities encouraged active participation, collaboration, and meaningful learning, enabling students to understand mathematical concepts more effectively than through conventional instruction.

Descriptive Statistics of Students' Learning Outcomes

Descriptive statistical analysis was conducted to describe students' learning outcomes before and after the instructional intervention in both the experimental and control groups. The results are presented in Table 3.

Table 3. Descriptive Statistics of Students' Learning Outcomes

Statistics	Control Class		Experimental Class	
	Pretest	Posttest	Pretest	Posttest
N	18	18	18	18
Mean	64.28	77.67	71.56	86.89
Median	68.00	79.00	72.00	86.00
Standard Deviation	14.397	16.417	12.543	9.324
Minimum	27	36	50	72
Maximum	95	100	90	100

As presented in Table 3, the mean score of the control class increased from 64.28 in the pretest to 77.67 in the posttest. Similarly, the experimental class showed an increase from 71.56 to 86.89. The findings indicate that both groups experienced improvements after instruction; however, the experimental class achieved a higher posttest mean score than the control class,

suggesting better learning outcomes following the implementation of the Role-Playing learning model assisted by toy money.

To compare the magnitude of students' learning improvement, the percentage increase in learning outcomes was calculated based on the mean pretest and posttest scores of each group. The results are presented in Table 4.

Table 4. Percentage Improvement of Students' Learning Outcomes

Class	Mean Pretest	Mean Posttest	Improvement
Control	64.28	77.67	20.83%
Experimental	71.56	86.89	21.43%

Table 4 shows that the learning improvement in the experimental class (21.43%) was slightly higher than that of the control class (20.83%). These findings indicate that students who learned through the Role-Playing learning model assisted by toy money demonstrated greater improvement in mathematics learning outcomes than those who received conventional instruction.

Normality Test

The normality of the data was examined using the Shapiro–Wilk test at a significance level of 0.05. The results are summarized in Table 5.

Table 5. Results of the Shapiro–Wilk Normality Test

Group	Sig.	Interpretation
Control Pretest	0.067	Normal
Control Posttest	0.264	Normal
Experimental Pretest	0.113	Normal
Experimental Posttest	0.231	Normal

As shown in Table 5, all significance values were greater than 0.05, indicating that the data were normally distributed. Therefore, the assumption of normality required for parametric statistical analysis was satisfied.

Homogeneity Test

The homogeneity of variance between the experimental and control groups was examined using Levene's Test. The results are presented in Table 6.

Table 6. Results of the Homogeneity Test

Variable	df1	df2	Sig.	Interpretation
Pretest	1	34	0.100	Homogeneous
Posttest	1	34	0.099	Homogeneous

The significance values for both the pretest and posttest exceeded 0.05, indicating that the variances of the two groups were homogeneous. Consequently, the data met the homogeneity assumption for conducting parametric hypothesis testing.

Hypothesis Testing

The research hypothesis was tested using the Independent Samples *t*-test to determine whether the Role-Playing learning model assisted by toy money significantly affected students' mathematics learning outcomes in basic arithmetic operations.

Table 7. Results of the Independent Samples *t*-Test

Class	N	Mean	Standard Deviation	t	df	Sig. (2-tailed)
Control	18	77.67	16.417	-2.072	34	0.046
Experimental	18	86.89	9.324	-2.072	34	0.048

The Independent Samples *t*-test yielded a significance value of 0.046, which was lower than the predetermined significance level of 0.05 ($0.046 < 0.05$). Therefore, the null hypothesis (H_0) was rejected, while the alternative hypothesis (H_1) was accepted. These findings indicate that the Role-Playing learning model assisted by toy money had a statistically significant effect on the mathematics learning outcomes of fourth-grade students at SDN Cibungkul in basic arithmetic operations.

Discussion

The findings of this study indicate that the Role-Playing learning model assisted by toy money has a significant positive effect on students' learning outcomes in basic arithmetic operations among fourth-grade students at SDN Cibungkul. This conclusion is supported by the results of the Independent Samples t-test, which yielded a significance value of 0.046 ($p < 0.05$), indicating that the research hypothesis was accepted. In addition, the experimental class achieved a higher mean posttest score (86.89) than the control class (77.67). These findings suggest that integrating the Role-Playing learning model with toy money is more effective in improving students' mathematics learning outcomes than conventional instructional methods.

The improvement in the experimental class can be attributed to the characteristics of the Role-Playing learning model, which actively engages students in the learning process. Rather than passively receiving information from the teacher, students participated directly in buying-and-selling simulations using toy money as a concrete learning medium. Through these activities, students applied basic arithmetic concepts in authentic situations that closely resembled everyday experiences. Such contextual learning experiences enabled students to develop a deeper understanding of mathematical concepts while increasing their participation and engagement during classroom instruction.

These findings are consistent with Piaget's theory of cognitive development (as cited in Monalisa et al., 2025), which states that elementary school students are in the concrete operational stage, during which they understand concepts more effectively through concrete objects and direct experiences than through abstract explanations. Likewise, Piaget (1952) emphasized that children's numeracy development at the elementary school level is fostered through hands-on activities, interaction with concrete materials, and social engagement. Therefore, implementing the Role-Playing learning model assisted by toy money provides meaningful and concrete learning experiences that facilitate students' understanding of basic arithmetic operations.

The results of this study also support previous research demonstrating that the Role-Playing learning model improves students' participation and learning outcomes (Yusnarti & Suryaningsih, 2021). Through role-playing activities, students have opportunities to interact, communicate, collaborate, and solve problems in an enjoyable learning environment. These experiences increase students' learning motivation and classroom engagement, which ultimately contribute to improved academic achievement. Compared with conventional teacher-centered instruction, the integration of role-playing activities and toy money encourages students to construct mathematical concepts through direct experience and active participation. Therefore, the Role-Playing learning model assisted by toy money can be considered an effective and contextual instructional strategy for improving elementary school students' learning outcomes in basic arithmetic operations.

Conclusion

The findings of this study demonstrate that the Role-Playing learning model assisted by toy money has a positive and significant effect on the mathematics learning outcomes of fourth-grade students in basic arithmetic operations at SDN Cibungkul. This conclusion is supported by the results of the Independent Samples t-test, which yielded a significance value of 0.046 ($p < 0.05$), indicating that the research hypothesis was accepted. Furthermore, the experimental class showed a higher improvement in learning outcomes than the control class, with the mean score increasing from 71.56 on the pretest to 86.89 on the posttest, whereas the control class improved from 64.28 to 77.67. The percentage of learning improvement was 21.43% in the experimental

class compared with 20.83% in the control class. These findings indicate that integrating the Role-Playing learning model with toy money provides meaningful and contextual learning experiences that effectively enhance students' understanding of basic arithmetic operations.

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