
RESEARCH ARTICLE

The Effectiveness of Role-Playing Model for Arithmetic Operation Learning

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ABSTRACT

Learning models are necessary because one of the purposes of using learning models is to improve students' abilities. One of the learning models that can be used in elementary school is role-playing. This study aims to know the effectiveness of using role-playing in mathematics learning, especially in an arithmetic operation. This research used quantitative research with a pre-experimental design; it's a one-shot case study. This research's subject was Elementary School 278 Padakallawa's fourth-grade students at Pinrang Regency, South Sulawesi. The data were obtained using two instruments: learning achievement test sheets and activity observation sheets. The collected data are analyzed using descriptive statistics. The result showed that the implementation of role-playing in mathematics learning achieved the established effectiveness indicators, which are (1) the percentage of learning activities was in the good category of 61.11%, and (2) learning mastery was classically 90.5% exceeding the set standard of 85%. It can be concluded that role-playing can develop students' character and can be a very effective way to increase their creativity and self-confidence.

KEYWORDS

Arithmetic; Elementary School; Mathematics; Model; Role-Playing

ARTICLE INFORMATION

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1. Introduction

Mathematics is a subject that is considered a difficult subject for students. They are afraid and even don't like Math. Only a small number of students like Math. Mathematics plays an important role in the development of science and technology, for example, in the development of economics, biology, chemistry, and physics.

There are still difficulties in mathematics learning in elementary school, especially in arithmetic operations. The difficulties can be caused by the lack of numeracy skills or not understanding arithmetic operations that should be used first in resolving problems. Mathematics learning in schools is not only intended to achieve material mathematics education goals; Mathematics learning in schools is not only intended to achieve the goals of material mathematics education, equipping students to master mathematics and apply it in daily life. However, mathematics learning is also intended to achieve the goals of formal mathematics education. They organize students' reasoning and construct their personalities (Mustafa, 2021).

Teaching mathematics needs learning theory, teacher creativity, and student readiness. The student's ability and readiness in elementary, secondary, and higher education levels are different, so the teacher is required not only to master the material but also to master the appropriate technique in delivering the learning materials. Mathematics learning in elementary school is one of the studies that is always interesting to be discussed because of the differences between the nature of students and the nature of mathematics.

Elementary school students are generally at the step of concrete operational thinking, but they may still be in the pre-operational step. While at each step, there are characteristics according to the age of readiness. For example, if the student is in the pre-

operation step, then they do not understand the rules of eternity, so if taught the concept of large addition, they probably will not understand. Students who are at the step of concrete operations understand the rules of eternity, but they cannot think deductively, so the proof of mathematical propositions will not be understood.

According to Dienes (2009), there are six steps in learning and teaching the concept of mathematics in elementary school, which are (1) Free play. In this step, the students are given an option to interact with the environment (Post & Reys, 1979). (2) Games. In this step, the students are guided to construct an abstract structure in a game. The game approach is conducted using the same way as students play with their playing equipment. (3) Searching for commonalities. In this step, the teacher directs students to look for similarities like various concrete objects or games in learning. (4) Representation. In this step, the teacher gives freedom to students to express a method to represent all game activities that have the same structure (Post & Reys, 1979). (5) Symbolization. In this step, the students change the form of representation into symbols. (6) Formalization. In this step, the students are expected to understand the abstract mathematical concept from fun activities in games or presented from concrete objects they know.

A learning model is necessary because one of the purposes of the implementation learning model is to improve the students' ability during the learning process. Based on the mathematics learning step proposed by Dienes (2009), one of the learning models that can be used in elementary school is role-playing. This is supported by Nasution et al. (2017) that one of the learning models that can make the students active in the teaching and learning process is the role-playing model.

Uno (2007) explained that role-playing is a learning model that aims to help students to find their self-identity in social interaction and solve a dilemma with the help of a group. It means that through role-playing, the students apply the role concept and realize that there are different roles in thinking about their behavior and the others. This role-playing process can provide life samples of human behavior that are useful as a medium for students to learn: (1) explore their feelings, (2) gain inspiration and understanding that affect their attitudes, values, and perceptions, (3) develop skills and attitudes in solving problems, and (4) explore subjects in various ways. The role-playing model is applied by directing the students to imitate the activity outside or dramatize situations, ideas, and special characters. Role-playing is an effort to solve problems through demonstration, steps of problem identification, analysis, characterization, and discussion. Role-playing is one type of active and participatory learning activity that creates interaction between students and a simulated scenario. (Peter et al., 2015).

Role-playing is an interested learning model that allows the student to be more enthusiastic about joining mathematics learning, especially in multiplication and division. An example of multiplication is $3 \times 4 = 4 + 4 + 4 = 12$. Multiplication can be referred to as repeated addition. While division can be referred to as repeated subtraction, an example of division is $12:3 = 12 - 3 - 3 - 3 - 3 = 0$, which $12:3 = 4$. This result is indicated by the number 3, which appears as the subtraction number. The example of multiplication and division is one of the samples that can be applied in the role-playing model so it can engage the students to be more active in interacting with friends or teachers in role-playing. It indicates that the role-playing model in the learning of arithmetic operations can be applied effectively.

2. Literature Review

Role-playing is a learning model that involves appreciation, communication, and the development of students' imaginations in understanding the subject matter. The advantage of role-playing is that students are creative in solving the problems they face, practice mathematical communication and memorable knowledge, and are firmly embedded in students' minds. Role-playing has functions of (1) exploring students' feelings, (2) transferring and realizing views about student behavior, values, and perceptions, (3) developing problem-solving skills and behavior, and (4) exploring the subject matter in different ways (Huda, 2013).

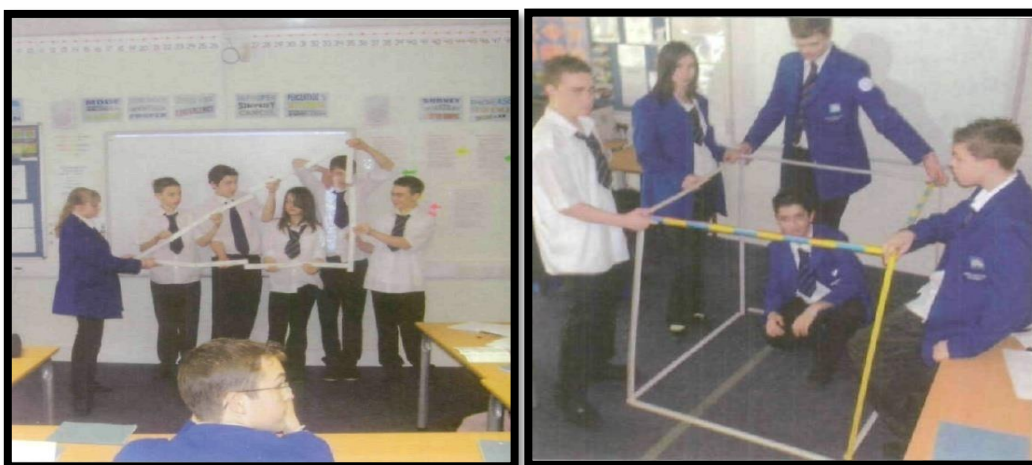
The role-playing model is a learning model that emphasizes students can play a role or certain characters (Rosidah, 2019). By applying the role-playing model, students will be trained to work together in solving a problem. According to Zarkasyi (2017), role-playing is a learning model that needs collaboration with students in the application. The collaboration among students in the learning can be constructed by emphasizing a more fun learning atmosphere, such as group activities and drama play. Through the collaboration among the students, it is hoped that students will be able to work together in developing their abilities, skills, and potential (Rosidah, 2019).

According to Uno (2007), the success of the learning model through role-playing depends on the quality of the enactment followed by an analysis. In addition, it also depends on the student's perception of the role played in a real-life situation. The application of the role-playing model in learning mathematics can be designed through six steps, as follows:

Table 1. The Steps of the Role-Playing Model in Mathematics Learning

Steps	Description
1. Group warming up	In this step, the teacher leads the students to the learning problem that needs to be discussed. It can be conducted by identifying, explaining, and interpreting arithmetic operations. Also, explaining the roles that will be played.
2. The Selection of Participants	In this step, the teacher will analyze the role and select the player who will perform.
3. Preparing the observer	In this step, the students who have no role will become observers. They will observe the scenario that is being demonstrated.
4. The Role	In this step, the teacher and the students start the implementation of role-playing. The role can be stopped if the students have finished their role. p telah cukup melakukan perannya.
5. Discussion and evaluation	In this step, the discussion is conducted by all students, both actors, and observers, after the role-playing.
6. Sharing and generalization of experience	In this step, the teacher relates the situation played with real life and provides a general conclusion.

Examples of role-playing in mathematics learning can be described as follows:

**Figure 1.** Role-Playing in Geometry

Role-playing is a motion game that includes some rules, purposes, and an element of happiness. In role-playing, the students must be guided in a certain situation that they were outside the classroom, despite the fact they are learning in the classroom. In addition, role-playing is also intended as an activity in which the students imagine themselves outside the classroom and act as other people (Istrini, 2021). Joyce et al. (1996) added that role-playing is a teaching model that is derived from the individual and social dimension and that it can be used to practice problem-solving strategies and social values developed in students.

Specifically, in this study, role-playing is applied in arithmetic operations. Research demonstrating the role-playing model using dice and number cards, the two objects will be used by students as props to play a role, as in the following example.

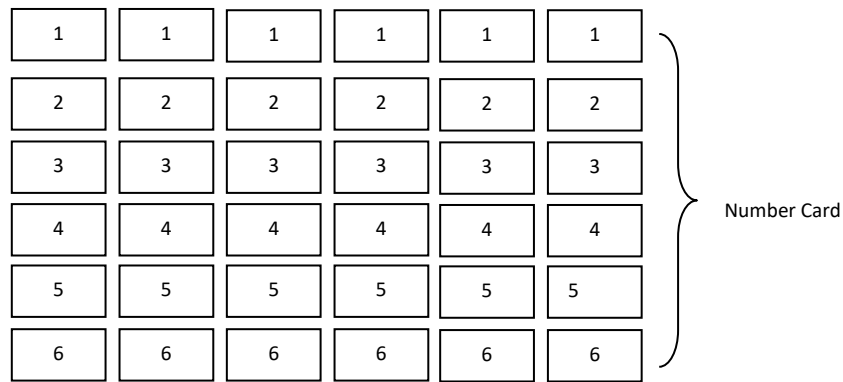


Figure 2. Dice and Number Card Tool

Implementing the role-playing model in mathematics learning is expected to help students achieve the objective of learning effectively by enabling students’ cognitive elements, especially the mind element, to understand stimulation from outside through the processing of information so that it has an impact on learning outcomes. In this research, the effectiveness of the implementation of the role-playing model is measured by: (1) Mathematics learning achievement of students who achieve the minimum criteria, (b) Learning achievement that achieves classical completeness is 85%, and (2) Minimum student activities are in a good category.

3. Methodology

This study uses a quantitative approach with the type of pre-experimental research with a One-Shot Case Study design. An experiment was conducted without a control group and a pretest. The subject of this research is the fourth-grade students of Elementary School 278 Padakkalawa, at Pinrang Regency, South Sulawesi. The data were obtained using an instrument that consisted of learning achievement test sheets and observation sheets of students. Then, the collected data were analyzed using descriptive statistics.

Table 2. Categories of Mathematics Learning Mastery Standards

Score	Category of Learning Completeness
$0 \leq \text{score} < 70$	Not Completed
$70 \leq \text{score} \leq 100$	Completed

Conversion of the percentage of role-playing activities is fulfilled as proposed by Arikunto (2007) as follows.

Table 3. The Interpretation of Learning Activities Percentage

Learning Activities Percentage	Category
$0\% \leq \text{score} < 20\%$	Very Poor
$20\% \leq \text{score} < 40\%$	Poor
$40\% \leq \text{score} < 60\%$	Fair
$60\% \leq \text{score} < 80\%$	Good
$80\% \leq \text{score} \leq 100\%$	Very Good

4. Results and Discussion

4.1 Activity Observation Analysis

The data of students’ activity was obtained by observation sheets. It aimed to verify the students’ activity for each indicator in the role-playing model. There were 6 (six) indicators of activities that were observed in this research, namely: (1) Students listened to the teacher’s explanation related to the role that would be played; (2) Each student knew the role that would be played; (3) the students who didn’t get a role but observed the played scenario; (4) The students played the role based on the scenario; (5) Each student discussed problem given actively; and (6) The students delivered conclusion. Some activities of the students during the learning process are explained in the following figure.

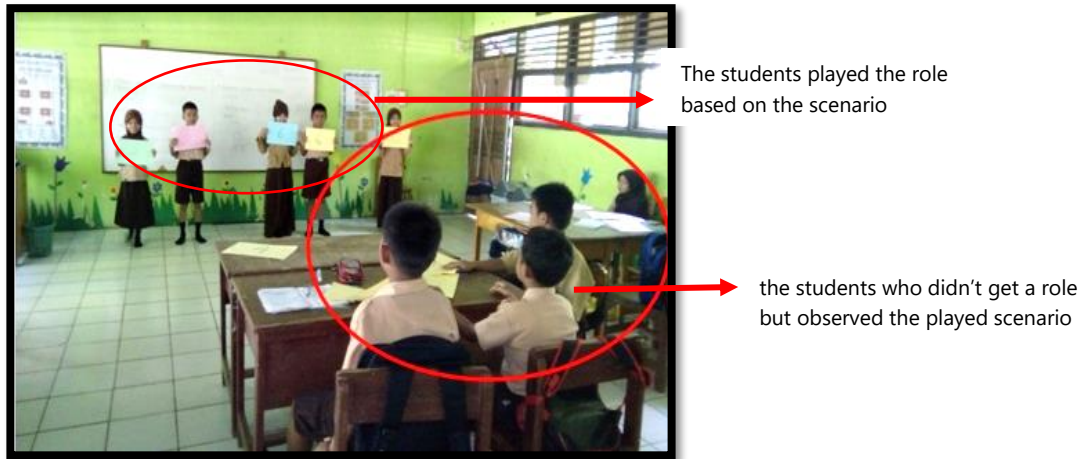


Figure 3. Student Role Playing Activities

Figure 3 shows that the students conducted the third activity, the students who didn't get a role but observed the played scenario, so the students could understand what was being acted and can finish the question given based on the played scenario. The percentage of students' activity during the implementation of the role-playing model in the learning process showed in the following diagram.

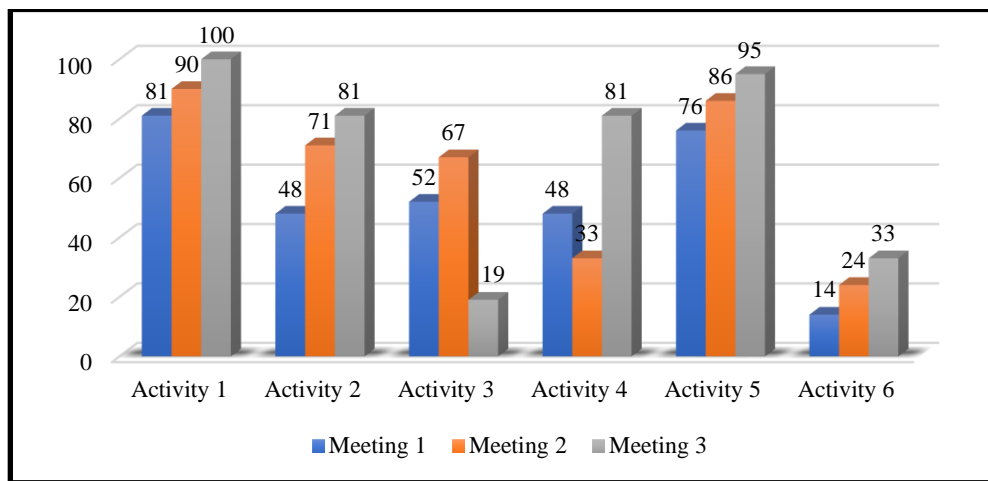


Figure 4. Percentage of Student Activity with Role-Playing Model

Figure 4 indicated that the implementation of the role-playing model could activate students in learning the arithmetic material. The average student activity in learning using the role-playing model is 61.11%. Therefore, based on the activity interpretation criteria, it was categorized as "Good".

4.2 Study Completeness Analysis

The learning activity ended by giving a test to students. The test was given to determine how the implementation of the role-playing model can improve the students' understanding of arithmetic operations material. One of the results of student work on the worksheet can be seen in the following figure.

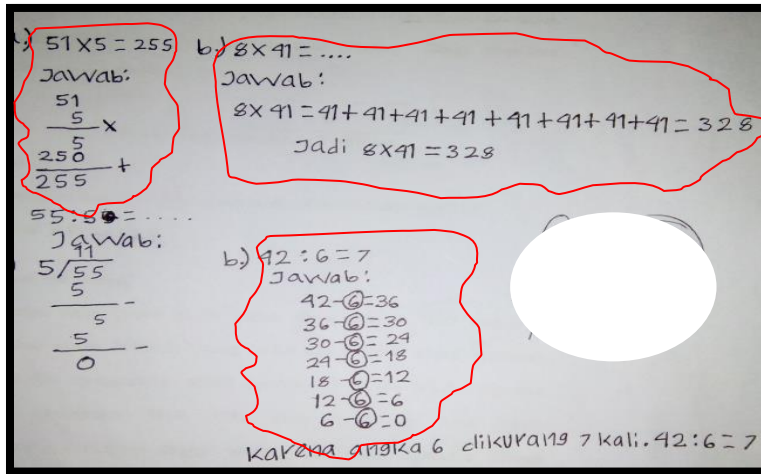


Figure 5. Students' Worksheet

Figure 5 was assumed as the students' worksheet representative. This result indicated that the process of answering questions could be completed correctly. This result indicated that the students understood the material well. If it was associated with the result of the percentage value of the activity, which is also in a good category, it could be concluded that the application of the role-playing model has a positive impact on student learning outcomes and quantitatively has exceeded the set minimum mastery. The descriptive statistics of students' learning results in the implementation of the role-playing model in arithmetic operations are presented in Table 4.

Table 4. Descriptive Statistics of Students' Learning Results

Statistics	Statistics Score
Mean	83.48
Range	31
Modus	94
Standard deviation	9.434
Variance	89.007
Minimum	66
Maximum	97

If the student learning achievement data are grouped into categories, the frequency distribution and percentage will be obtained, as shown in Table 5.

Table 5. The Frequency Distribution and the Percentage of Learning Results

No.	Mastery Level	Category	Frequency	Percentage
1.	0% -54%	Very Low	0	0
2.	54% - 64%	Low	0	0
3.	65% - 79%	Fair	6	28.6
4.	80% - 89%	High	8	38.1
5.	90% -100%	Very high	7	33.3
Total			21	100

If it is related to table 4, then the average student learning achievement reached 83.48 in the "high" category, so it can be concluded that student learning achievement after the role-playing model was applied was in the "high" category. And the percentage of learning completeness is shown in the following table.

Table 6. The Frequency Distribution of Learning Completeness

Mastery Level	Score Interval	Category	Frequency	Percentage
70% – 100%	70 – 100	Completed	19	90.50
0% – 69%	0 – 69	Not Completed	2	9.50
Total			21	100

Overall, the data in Table 6 showed that the achievement of classical completeness had exceeded the standard of 85%. Referring to the fulfillment of the indicators according to the data from the observations and the data on the completeness of the learning achievement, it can be concluded that the role-playing model is effectively applied in mathematics learning, especially in arithmetic operations.

5. Discussion

This research was conducted through 3 (three) meetings in the classroom and applied the role-playing model in arithmetic operations. The learning scenario began with preparing the learning facilities and students to participate in learning activities. Next, the main activity was presenting the learning material. Student activities proceeded according to the learning scenario; it followed the stages of the role-playing model. The result showed that the role-playing model is effectively applied in mathematics learning, especially in arithmetic operations.

The role-playing model can make students unconsciously use expressions about the material they are studying because, basically, role-playing is a game by playing students will feel happy and active because playing is the world of students. The role-playing model can make students more responsible and active in their group; students can play while learning without feeling forced to learn, so the role-playing model is one of the appropriate models used at the elementary school level. It was related to Khotimah (2016) that one alternative that allows us to do it in learning by engaging students in an active discussion is the role-playing method.

Joyce and Weil (1996) reinforced that role-playing directs students to explore the problems of human relations in a way played a role in the situation of the problem and then discuss the regulations. That statement was relevant to the student's activities during mathematics learning. Whereas their activities fulfill the role-playing scenario, it was learning while playing and also for students to express feelings, behavior, values, and problem-solving strategies.

The implementation of the role-playing model in mathematics learning can help the students to understand the material and even realize that the learning activities conducted are more than just material. This allows students to avoid bored while studying, making it easier for them to express and construct understanding expressively. The implementation of the role-playing method in learning is related to the constructivist approach as Joyce et al. (1996) said that together, students could explore feelings, attitudes, values, and problem-solving strategies.

Activities and tests of students' mathematics learning achievement after the role-playing model were categorized as good. This result indicated that the implementation of the role-playing model has a positive impact because this model can construct the character of students, become a very effective means to increase creativity, and develop self-confidence. Students had better performance and expressed favorable responses after the introduction of the role-play activity. Role-playing is a beneficial tool for understanding and applying mathematics concepts (Yap, 2019).

The percentage of role-playing learning was 61,11%, categorized as good. This result indicated that the students enjoyed fun learning. The learning process through role-playing allows the students to be creative and has a better impact on student development. Manorom et al. (2006) stated that role-playing has a positive impact on the development of skills and academic knowledge. Furthermore, the test achievement showed that the learning completeness >85% also indicated that the students were able to understand and enjoy the activity presented easily, so the material learned can be applied to complete the mathematics question given because learning activities through the role-playing model was able to give strong and long-lasting messages and impressions in children's memories. In addition, students are also trained to make decisions quickly and express themselves completely and freely.

6. Conclusion

This study aims to determine the effectiveness of the role-playing model in learning mathematics, especially arithmetic operations material. Based on the results of the study, the role-playing model proved to be effective in learning mathematics, especially in arithmetic operations. In addition to being useful in increasing student activities and learning outcomes, role-playing also shapes character and presents new experiences that are very enjoyable for students, as well as raises enthusiasm and an optimistic attitude within themselves. The application of the role-playing model in learning mathematics meets the effectiveness indicators set out in

this study, namely (1) the percentage of learning activities is in the good category of 61.11%, and (2) classical learning completeness is 90.5% exceeding the standard set that is 85%.

This research is only limited to learning mathematics with certain materials, while the role-playing model has a broad scope that can be applied to other learning in schools. This is based on the positive benefits of using the role-playing model; namely, this model shapes the character of students as well as can be a very effective means to hone, build self-confidence, and provide a useful positive influence in terms of the development of skills and academic knowledge. Therefore, other researchers can develop and expand the use of the model in other learning because role-playing contributes to improving the quality of learning in schools and the development of students.

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