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ELEMENTARY SCHOOL STUDENT'S MATHEMATICAL LITERACY SKILLS: MY TRIP MATH ADVENTURE GAME LEARNING MEDIA

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ABSTRACT

This study's objective is to determine the level of students' mathematical literacy skills before and after using the My Trip Math Adventure game. This research method uses a quantitative approach and employs a quasi-experimental design with a one-group pretest-posttest design. The sample of this study was grade V students of elementary school Inpres 15 Wara. The analysis technique used was descriptive statistical analysis and inferential statistical analysis. The results of the study indicated that there was an increase in students' mathematical literacy skills after the implementation of the My Trip Math Adventure game. The present study is based on the results of data analysis using descriptive statistics for students' mathematical literacy skills before the implementation of the My Trip Math Adventure game. Following the implementation of the My Trip Math Adventure game, 33% of students rated their mathematical literacy skills as high, while 67% rated them as very high. The results of the inferential statistical analysis (paired sample T-test) obtained a significance value of <0.05, which means that there was an increase in students' mathematical literacy skills after the implementation of the My Trip Math Adventure game in elementary school.

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1. INTRODUCTION

Mathematics is an important science in the world of education. Not only do formal schools study mathematics, but everyday life also requires it (Gravemeijer et al., 2017; Mayla et al., 2024). Mathematics lessons need to be taught in elementary schools with strong mastery because they teach basic, creative, critical, logical, and systematic thinking skills for students' life supplies (Nanda & Rani, 2025). Salsabila & Azhar (2022) assert that mathematics fundamentally involves comprehending structures, relationships, and symbols, which subsequently shape reality. This indicates that mathematics is a very important part for students to have because many activities are certainly inseparable from it, such as counting money, measuring food ingredients, making schedules, and so on. Therefore, one of the skills to support this is literacy skills.

According to Bolstad (2023), mathematical literacy skills relate to an individual's ability to directly apply knowledge to everyday real-world problems. Mathematical literacy skills are individuals' abilities to formulate, use, and interpret mathematics in various contexts (Almarashdi & Jarrah, 2023; Çakıroğlu et al., 2023). This skill includes the ability to reason mathematically and use mathematical concepts, procedures, facts, and tools to explain and predict events. Mathematical literacy can make it easier for students to learn more about the role of mathematics in everyday life (Sumirattana et al., 2017; Aritonang & Safitri, 2021).

Mathematical literacy is important for developing logical, creative, and analytical thinking (Sitorus, 2016; Topal & Yenmez, 2024). It aids students in comprehending the significance of mathematics in their daily lives. It enhances their capacity to make rational and logical decisions. In addition, literacy in the context of mathematics is the strength of using mathematical thinking to solve everyday problems and be better prepared to face life's challenges (Ozkale & Ozdemir Erdogan, 2020).

However, some of the challenges faced by students in developing mathematical literacy include difficulty understanding and applying mathematical concepts in the context of real problems (Jannah & Hayati, 2024; Rahma et al., 2024). In addition, there is a contradictory situation, where human capacity is still stagnant or even declining. One indicator that can show these trends is mathematical ability. Based on the Program for International Student Assessment (PISA) report (2023), the numeracy literacy skills of Indonesian students were still relatively low in 2022. Indonesia's reading literacy ranking is 71 out of 81 countries, while its mathematical literacy ranking is 70 out of 81 countries. This condition occurs because most students still consider mathematics to be a difficult and unpleasant subject to learn, so the term "mathematics is a monster" emerged. Until now, mathematics is still considered a scary specter for students (Kamarullah, 2017; Artemenko et al., 2021).

One of the solutions that can be applied to overcome this problem is to use innovative and fun learning media, such as Android-based educational games. Through the adaptation of technology in the learning process, students can learn actively and with high enthusiasm for learning both in and outside the classroom (El-Sabagh, 2021; Sitthiworachart et al., 2022). Educational games are a valid, effective, and practical method for improving student learning outcomes in mathematics (İlhan, 2021; Vankúš, 2021; Yu et al., 2021; Muhtarom et al., 2022). The My Trip Math Adventure game is an Android game that serves as an effective learning medium.

The My Trip Math Adventure game is an Android-based Indonesian adventure game that can be accessed anywhere and anytime, designed to make the process of learning mathematics more interesting and interactive for students (Sakinah et al., 2024). This game contains the concept of an Indonesian adventure, educational and attractive, packaged with applications that are relevant to today's era. In addition, "My Trip My Adventure" can be a learning medium, especially if converted into an educational game or integrated with an adventure-based learning method. The event program, featuring travel and nature exploration content, can enhance students' comprehension of diverse subjects, particularly in mathematics education.

Interactive media based on Android games can promote the application of beneficial learning (Ramli et al., 2024). Text, animation, video, and graphics are all viable forms of presentation for this type of educational material. Playing educational games significantly improves students' reading and math skills. Research shows that incorporating technology into primary school curricula is a great way to boost students mathematical literacy (Trigueros et al., 2014; Coffland & Xie, 2015; Novita & Herman, 2021). There have been several attempts to create educational games that can help students learn mathematics while also improving their reading, writing, and arithmetic abilities. Unfortunately, there isn't an adventure-themed educational game that showcases the archipelago's many distinct locales. While showcasing the stunning scenery of several archipelago regions, this game introduces players to the idea of learning mathematics. Students can study different parts of the archipelago while simultaneously acquiring mathematical skills. Therefore, the author assumes that the implementation of game-based learning media can assist mathematics subject teachers in strengthening the mathematical literacy skills of elementary school students.

2. METHOD

The method used by researchers is a quantitative approach with an experimental design. Where quantitative research is a type of research that produces findings that can be achieved using statistical procedures or other methods of qualification (measurement). The quasi-experimental design seeks to gather information that approximates what could be learned from real experiments in situations where it's not possible to control or change all important factors. The research design used is the One Group Pretest-Posttest Design. This design employs a single group of subjects. First, measurements are taken (pretest), then treatment is given; specifically, by applying the My Trip Math adventure game for a specified duration, and then measurements are taken a second time (posttest). The following is the experimental design in this study presented in Figure 1.

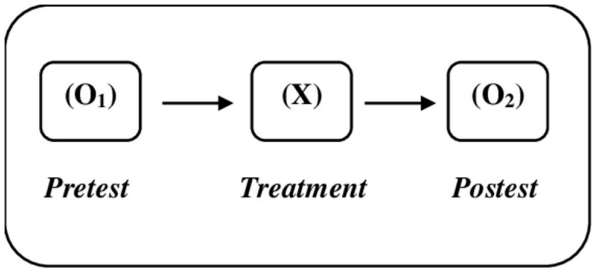

Figure 1. One Group Pretest-Posttest Design

The population in this study was all students of elementary school Inpres 15 Wara, Palu City, Central Sulawesi, in the 2023/2024 academic year, consisting of 6 classes. The sample that became the subject of this study was class V, with 15 students selected as the research class. The instrument used in this study was a mathematical literacy ability test. We will administer the test through multiple-choice questions and essays.

The test consists of a pre-test and post-test, which are conducted to determine the increase in students' numeracy and literacy abilities using the trip math adventure. There are two types of statistics used for data analysis in this study, namely descriptive statistics and inferential statistics. The prerequisite test in this study is the normality test and then hypothesis testing. Hypothesis testing using the paired sample t-test aims to determine whether or not there is a significant increase between students' mathematical literacy ability scores achieved before and after the implementation of the My Trip Math Adventure game as a learning medium.

3. RESULTS AND DISCUSSION

Results

Description of Mathematical Literacy Skills of Students Who Learn Using the My Trip Math Adventure Game

Building upon the results of the research that has been conducted at elementary school Inpres 15 Wara. The scores of the mathematical literacy ability test given to students before and after the implementation of learning using the game "My Trip Math Adventure" in class V elementary school, Inpres 15 Wara, were processed using SPSS V.25. The following are the results of the pretest and posttest presented in Table 1.

Table 1. Descriptive Statistical Values of Pretest and Posttest Results

Statistics	Grade V grades	
	Pretest	***Posttest***
Number of samples	15	15
Lowest value	45	75
Highest value	93	99
Mean value	71	88

Before implementing learning games, an initial test (pretest) was conducted with the lowest score obtained being 45, the highest score being 93, and the average score being 71. After implementing learning using games, a final test (post-test) was conducted with the lowest score obtained being 75, the highest being 99, and the average score being 88. The results of the pretest and posttest in class V showed an increase in mathematical literacy skills. The average pretest score was 71, while the average posttest score was 88. The following are the frequencies and percentages of the results of the pretest and posttest of students presented in Table 2 and figure 2.

Table 2. Frequency and percentage of the results of the pretest and posttest

Range	Category	***Pretest***		***Posttest***	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
0-20	Very low	0	0	0	**0**
21-40	Low	0	0	0	**0**
41-60	Currently	5	33	0	**0**
61-80	Tall	5	33	5	**33**
81-100	Very high	5	33	10	**67**
Total		**15**	**100**	**15**	**100**

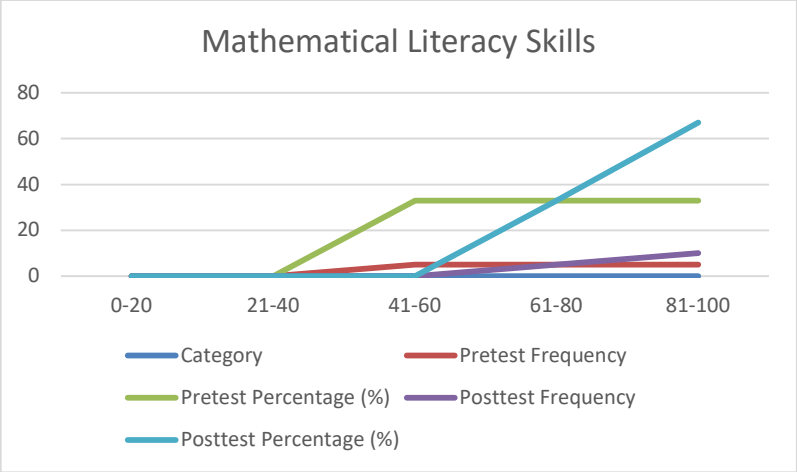

Figure 2. Frequency and Percentage of Mathematical Literacy Skills of Students

The results in Table 2 and figure 2 above show that the level of student mastery of the material in the pretest and posttest is as follows:

a. In the pretest there were no students in the very low and low categories, 5 students (33%) were in the medium category, which means that only 33% of students were able to use formulas and carry out simple procedures, 5 students (33%) were in the high category, which means that there were 33% of students who were able to use relevant information from the questions, 5 students (33%) were in the very high category, which means that there were 33% of students who were able to use relevant information from the questions, use formulas, and carry out simple procedures to answer questions.

b. In the post-test, there were 0% of students in the very low, low, and medium categories. 5 students (33%) were in the high category, which means that only 33% of students were able to use relevant information from the questions; 10 students (67%) were in the very high category, which means that there were 67% of students who were able to use relevant information from the questions, use formulas, and carry out simple procedures to answer questions.

Differences in Mathematical Literacy Skills Before and After Implementing the My Trip Math Adventure Game

In this section, an inferential statistical analysis is carried out to determine whether there is a significant difference in the application of the My Trip Math Adventure learning game on students' mathematical literacy skills or not.

a. Normality Test

The normality test aims to state whether the data on mathematical literacy ability scores for the subject of integer operations for grade V from the population is normally distributed. The normality test for the data in this study used SPSS version 25 statistics. The normality test yielded a significant value of 0.549 for the pretest and 0.180 for the posttest. Given that the results obtained are greater than 0.05, we can conclude that the data follows a normal distribution.

b. Hypothesis Testing

The hypothesis test using the paired sample t-test aims to determine whether there is a significant increase between students' mathematical literacy ability scores achieved before and after the implementation of the My Trip Math Adventure game as a learning medium. Therefore, we formulate the statistical hypothesis in the following way:

Null Hypothesis (H0): If t-count < t_table and Sig-count > α (0.05), then there is no significant difference between the mathematical literacy skills of grade V students at elementary school Inpres 15 Wara, before and after the implementation of the math adventure game called "My Trip."

Alternative Hypothesis (H1): If the t-count < t_table and Sig-count < α (0.05), then there is a significant difference between the mathematical literacy skills of grade V students at elementary school Inpres 15 Wara, before and after the implementation of the math adventure game "My Trip."

The testing technique used is the Paired Sample T-test with a significance level of α = 0.05. Based on the calculation results of the Statistical Package for Social Science (SPSS), a significant value of 0.000 is obtained, leading to the conclusion that H_0 is rejected and H_1 is accepted since the significance value (sig) is less than α (0.000 < 0.05). So, there is a significant difference between the mathematical literacy skills of fifth-grade elementary school Inpres 15 students before and after implementing the My Trip adventure game for math.

Discussion

This study aims to determine the level of mathematical literacy skills of fifth-grade students at elementary school Inpres 15 Wara before and after using the game My Trip Math Adventure. The results of the study indicate that learning using the game My Trip Math Adventure successfully improves student learning outcomes. The initial test (pretest) administered before applying game-based learning showed an average score of 71, with a range of 45–93. We administered a posttest after implementing game-based learning. The scores ranged from 75 to 99, with an average of 88. In the pretest, we didn't see any students in the very low or low categories; instead, we saw 5 students (or 33% of the total) in the medium category, which means that 33% of students could use formulas and simple procedures; 5 students (or 33% of the total) in the high category, which means that 33% of students could use relevant information from the questions; and 5 students (or 33% of the total) in the very high category, which means that 33% of the total could use relevant information from the questions, formulas, and simple procedures to answer questions.

In addition, not a single kid scored in the top three on the posttest, which indicates that all students were highly proficient. In the high category, 5 students (33% of the total) demonstrated an ability to use the questions' relevant information; in the very high category, 10 students (67% of the total) demonstrated an ability to use the questions' relevant information, apply formulas, and carry out simple procedures to answer the

questions. The paired sample t-test, with a significance threshold of $\alpha = 0.05$, is the method employed for testing. We can conclude that H1 is accepted, and H0 is rejected since the sig value is less than α ($0.000 < 0.05$) as shown by the SPSS calculation results. The fifth graders at elementary school Inpres 15 Wara, Palu City, had drastically different mathematical literacy levels before and after playing the math adventure game called "My Trip."

The results of this study are supported by several research results, which state that My Trip, My Adventure can improve students' learning outcomes in general (Papadimitriou & Virvou, 2016; Kartika et al., 2020). My trip, my adventure, is one of the solutions offered in the development of simulation and game-based learning models adopted from the Monopoly game. As is known, simulation learning is a learning model that imitates something real, its surroundings, or processes. This learning model is designed for students who experience various social processes and realities and to test their reactions, as well as to obtain the concept of decision-making skills, which have the advantage of being able to help students understand important factors in real life, what to have, and how to have to be able to carry out life (tasks, jobs) in the real environment (Rachman & Fahdiansyah, 2019). The simulation learning model helps students play roles, make decisions, and understand consequences.

The results of this study also indicate that the integration of technology in learning can improve students' mathematical literacy skills. Through education, humans can broaden their horizons and gain knowledge. Technology has developed very rapidly; some discoveries can make it easier for people to get information about daily work, especially in learning (Anshari et al., 2017; Haleem et al., 2022). Cell phones, once just for communication, are now used for work, entertainment, and children's education. To improve student skills, educators must try to master technology, information, and media and utilize them in classroom learning (Ertmer et al., 2012; Serrano et al., 2019). Interactive learning media can be used as a learning tool to improve students' mathematical literacy skills, one of which is an educational game using the game My Trip My Adventure. Therefore, the results of this study are reference materials for curriculum development in mathematics learning using technology.

4. CONCLUSION

Building upon the research results obtained, it can be concluded that through the implementation of the My Trip Math Adventure game, it can strengthen the mathematical literacy skills in the material of integer operations of grade V students of elementary school Inpres 15 Wara, Palu City. The increase in mathematical literacy skills can be seen in the average score of students before the implementation of the My Trip math adventure game (pretest), which is 71, while after the implementation of the My Trip math adventure game, the average score of students (posttest) has increased to 88. In addition, the paired sample t-test results, with a significance level of $\alpha = 0.05$, showed a significant value of 0.000, leading to the conclusion that H0 is rejected and H1 is accepted. This result means that there is a significant difference between the mathematical literacy skills of grade V students of

elementary school Inpres 15 before and after the implementation of the My Trip Math Adventure game.

As a suggestion, the results of this study can be used and used as a reference for educators or teachers in managing classes by utilizing Android-based technology. In addition, further research suggests the development of interactive media based on technology.

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