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Basic Arithmetic Learning through Math Online Games for Elementary School Students during the Pandemic

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ABSTRACTS

The purpose of this study is whether online math games can be one of the basic arithmetic lessons during the online learning process during the Covid-19 Pandemic. To support the research, we use an experimental research method, which is to try out a lesson using an online math game application to 10 4th grade elementary school students for 2 days. While the approach used in this study is quantitative. The results show that there are still many students who are not fluent in working on basic arithmetic problems before playing math online games. So that learning through online math games is very helpful for students in improving their numeracy skills. This is because as long as students play the game, students can continue to hone their numeracy skills. Thus, the student who gets a final score of more than 70 at the time of the post-test increase to 50% compared to the time of the pre-test which is only 40%. Therefore, it is clear that online math games can be a method of learning basic arithmetic to improve students' numeracy and literacy levels.

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1. INTRODUCTION

The Covid-19 pandemic, which has not yet ended, has resulted in the implementation of teaching and learning activities that are still carried out online. Although the vaccination process has spread widely in the world, including Indonesia, there are still not many elementary school students who can get the vaccine because the type of vaccine that is suitable for the age of children in elementary school is still not widely spread. This causes the teaching and learning process to still be carried out online because if it is carried out offline, it is worried that the transmission of the virus can occur (Abdillah *et al*., 2020; Ganesha *et al*., 2021).

The online teaching and learning process cannot be separated from the use of the internet and smartphones as supporting tools, because through smartphones the learning process can be carried out. But in reality, the use of smartphones is more often used for other than the learning process, one of which is playing online games. This situation can cause students, including elementary school students to be lazy to learn and cause a decrease in the level of student understanding, including a decrease in understanding a subject (Anggraeni & Wihardja, 2020; Shudiq *et al*., 2021).

The most frequently encountered subject is mathematics. One of the materials is basic arithmetic, which includes addition, subtraction, multiplication, and division that children should master to solve arithmetic problems related to mathematics subjects easily and practically (Abdillah *et al*., 2020; Susdarwono, 2020). However, not all online games can have a negative impact. Online games can also have a positive impact on learning. This of course applies to math-based online games, one of which is arithmetic online games (Prastius, 2020; Van der Maas & Nyamsuren, 2017).

Quite a lot of research related to online math games has been carried out before. The results of the research show that simple arithmetic applications for elementary school children based on augmented reality (AR) can be used (Joefrie & Lamasitudju, 2017). Other research has developed an android-based educational game design on mathematical logic material (Pramuditya *et al*., 2018). Some studies have studied in depth the use of math game android applications in improving students' mathematical calculation skills (Hakim & Sari, 2019). Other studies have explored motivation and increased student involvement in playing math video games which are a source for student learning (Barreto *et al*., 2017).

Other research results have developed mobile math games to improve the elementary arithmetic abilities of elementary school students (Hardian, 2019). Other research has also succeeded in developing learning basic arithmetic educational games for Ibtida'iah madrasah children (Shudiq *et al*., 2021). However, in this study, the author will use the online games that have been provided. There are so many online games that can be found easily in the play store application on smartphones, one of which is an online game called “Math games: arithmetic, times tables, mental math”.

Based on the above background, the purpose of this research is to show whether online math games can be one of the basic arithmetic learnings during the online learning process during the Covid-19 Pandemic. In addition, to determine the effectiveness of online math games in improving elementary arithmetic skills of elementary school students.

2. THEORETICAL FRAMEWORK

2.1. Arithmetic

Arithmetic is one of the branches of mathematics that deals with numbers, relations between numbers, and observations of numbers to solve a problem. While basic arithmetic

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is a fundamental part of arithmetic itself which refers to numbers, measurements, and computing with 4 basic operations, namely multiplication, division, addition, and subtraction. (Hidayat, 2020).

2.2. Math online games

Math online games are one of the many types of educational games or commonly called Edugames. Edugame itself is a type of game with educational content, namely video games with context and content designed to place players in a learning process situation. Edugame aims to create an interesting learning experience to achieve learning objectives by using the principle of "games" and a punishment or reward system that functions as an assessment method (Abdillah *et al*., 2020; Hardian, 2019).

From the Edugame concept, online math games can be interpreted as online games with content and context that have been designed to place players in situations of the mathematics learning process, which aims to create an interesting mathematics learning experience so that it can achieve learning objectives (Barreto *et al*., 2017).

3. METHODS

This study uses an experimental research method, namely testing learning using an online math game application. While the approach used in this study is a quantitative approach, to see quantitatively how the learning outcomes in students' ability to count or to be precise in doing arithmetic problems using online math games.

This quantitative approach is carried out by filling out 10 arithmetic questions as shown in **Table 1**, using google form as a research instrument. Questions in the form of google forms are distributed to students via WhatsApp groups to see how far students can work on basic arithmetic problems. The correct answer is worth 1, while the wrong answer is worth 0. The total correct score is 100 (if students answer all the questions correctly, then the maximum score is 100). The equation 1 to calculate the score is:

$$\frac{n \times 100}{10} = St \qquad (1)$$

where n is the value for the correct answer and St is the final grade of the student.

After the pre-test, students will be instructed to download and play an online math game called “Math games: arithmetic, times tables, mental maths” for two days. After the experiment is completed, students will be asked to work on post-test questions to see if there is an increase in students' basic arithmetic abilities after carrying out learning online math games.

Table 1. Basic arithmetic questions tested on 4th-grade elementary school students.

No.	Question	Score
1.	$167 + 18 \times 2 = \cdots$	
2.	$133 \div 6 = \cdots$	
3.	$745 \times 4 = \cdots$	
4.	$145 - 27 \times 3 = \cdots$	
5.	$275 \div 5 = \cdots$	
6.	$120 - 5 \div 5 = \cdots$	
7.	$452 - 325 + 14 = \cdots$	
8.	$18 + 10 + 18 + 20 = \cdots$	
9.	$121 - 15 - 6 = \cdots$	
10.	$18 \times 3 - 16 + 4 = \cdots$	
Total		

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4. RESULTS AND DISCUSSION

4.1. Demographics

The population in this study were 4th-grade elementary school students, while the sample taken was 10 4th grade elementary school students based on the results of interviews with their homeroom teachers, these students were less able to follow online classroom learning to the fullest, including one when mathematics learning. Of the 10 students, 7 were male students and 3 were female students.

The research process begins with making the same pre-test and post-test questions in the form of a google form. The problem consists of ten basic arithmetic problems which include addition, subtraction, multiplication, and division (**Table 1**). The question is in the form of multiple-choice with four choices of answers and only 1 of the 4 choices has the correct answer.

After students complete the pre-test questions, students will be instructed to download and play an online game called "Math games: arithmetic, times tables, mental maths" as a means of learning basic arithmetic material for two days. This game was released on September 15, 2015, by the company Standy Software. The research of students to play math online games is also inseparable from the help of parents in guiding their children at home to play useful online games. Two days after the students played the online math game, the students were asked to work on the post-test questions given by us.

4.2. Data analysis

Table 2 shows the results of students' pre-test and post-test scores in working on arithmetic problems after playing online math games as a learning process. Students who get a final score of more than 70 at the time of the pre-test are 40%. Then after the students studied independently through online math games for 2 days, the students who got a final score of more than 70 at the post-test were 50%. This is in line with the research conducted by (Abdillah *et al*., 2020). However, not all students experienced an increase in working on these arithmetic problems. Some students experience a decline in grades. The comparison of pre-test and post-test scores can be seen more clearly in **Figure 1**.

We can see from **Figure 1**, that there are 5 students whose final grades go up, 3 students whose grades go down, and 2 students whose grades don't go up or down after playing online math games. We can also see that there are no students whose grades increase significantly.

Many factors affect whether or not there is an increase in student grades. These factors include:

(i) The research time span is quite short, which is only 2 days. This little time causes not all students can quickly apply knowledge from the online math games they have played because not all students can apply knowledge quickly.

(ii) Not all students already have their smartphones or gadgets. Most of the students still use their parents' smartphones, so that during the learning process with online math games students cannot play it optimally because the intensity of students using their parents' smartphones is not high.

(iii) Economic factors. Economic factors are very influential in the learning process through this online math game. Not all students come from affluent circles. Some parents are very busy meeting the needs of the family so that the child at home is not often accompanied when learning through online math games takes place. The lack of internet quota availability also has an effect, because poor families will use the internet sparingly or only when learning in class takes place, so they will not often play math online games outside of learning hours (Ganesha *et al*., 2021).

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Table 2. The final results of the basic arithmetic pre-test and post-test questions.

Student	Pre-test Score	Post-test Score
A	40	50
B	100	90
C	70	90
D	100	100
E	50	40
F	70	70
G	50	70
H	70	60
I	90	100
J	80	90

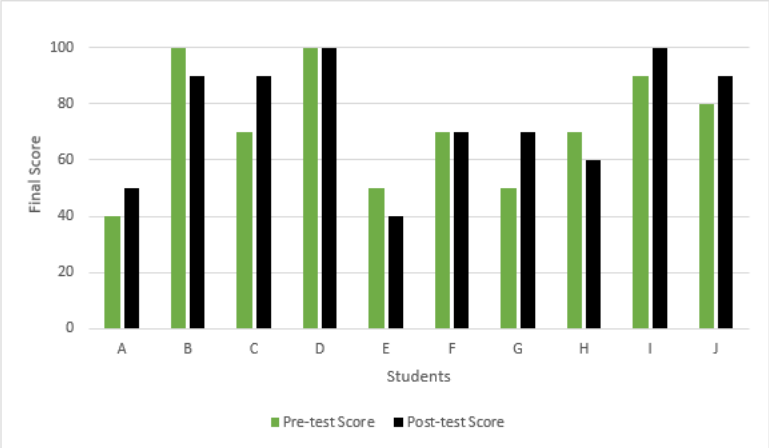

Figure 1. Comparison graph of the final pre-test and post-test scores for basic arithmetic.

5. CONCLUSION

This study concludes that online math games can be used as one of the basic arithmetic learning processes for elementary school students during the pandemic because students who have scores above 70 increase from 40% to 50%. Although the increase was not significant because the research time could be said to be short and not all students could understand learning quickly, learning basic arithmetic through online math games was still quite effective for improving students' basic arithmetic skills. Therefore, students must play this online math game continuously or prolonged, so that students can understand more and more quickly in working on basic arithmetic problems. So, it is clear that online math games can be a method of learning basic arithmetic to improve students' numeracy and literacy levels.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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