The Development of Jarimatika Method in Increasing the Speed of Counting Through Android-Based Taktikjar Learning Media

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ABSTRACT

This study aims to improve abstract mathematical numeracy skills for Ranu Prima College students, especially in solving multiplication problems by providing 6-20 formation multiplication methods using students. The Jarimatika method helps students understand multiplication by using their fingers that allow students to learn while doing. This study used a sample of 25 students. The method used is the One Group Pre-test Post-test Experiment. The results showed an increase in the acquisition of the posttest score compared with the pretest with a gain of 0.70 with the Wilcoxon test results obtained $p < \alpha$ (0.012 <0.05). Thus, it can be concluded that the Jarimatika method effectively increases the multiplication ability of 6-20 formations in Ranu Prima College students.

Keywords: Jarimatika Method, Multiplication, Experimental Design.

1. INTRODUCTION

Education is a systematic effort carried out by people who are responsible for influencing students [1]. Mathematics is the science that underlies the universal development of modern technology. It has a significant role in various disciplines and advancing the power of human thought [2-3]. Mathematics education is the subject of providing useful life skills in our daily activities [4]. In 2018, the Program for International Student Assessment (PISA) Indonesia results did not yet show a significant increase. The mathematics learning achievement of Indonesian students is ranked 7th behind out of 73 countries, with an average score of 379 [5].

One of the factors that cause the mathematical ability of Indonesian students to become low is the paradigm of students thinking that mathematics is complicated so that it becomes a subject that is shunned and feared by students [6]. Mastery of mathematics supports learning success; learning includes the basics, especially counting [1].

The ability to count greatly affects the quality of students' mathematics learning. The quality of learning mathematics is caused by teachers still using conventional learning methods like memorizing and remembering the material [7]. Besides the teacher factor, the success of a teaching and learning process is also influenced by the way students learn [8]. Students tend to be busy playing by themselves, chatting with their classmates, disturbing friends focusing on receiving explanations from the teacher, being influenced by gadgets, and many other factors.

The solution from several factors that affect the quality of learning mathematics must be an appropriate and fun method [1]. The use of the right method can improve students' mathematics learning achievement [9]. The level of achievement in learning mathematics has a relationship with the students' ability to count. Students have difficulty in solving problems that have to do with the multiplication of numbers [10]. The ability to count, especially multiplication, is an obligation for students

to master because it greatly affects the quality of students' mathematics learning [11].

The method that can help improve students' understanding of mathematics learning is the Jarimatika method [12]. The Jarimatika method is a method of learning while playing with finger aids [13-14]. The involvement of students in demonstrating the Jarimatika method can make learning more meaningful. They can use their fingers to solve counting problems based on the rules of hand formation and finger completion [12].

The Jarimatika method requires a level of endurance and memory in its completion. Mathematics learning will be more memorable if students seek, work on, and find solutions [15]. The teaching and learning method is in accordance with the slogan "I hear, and I forget, I see, and I remember, I act, and I understand" [16]. Compared to other methods, the Jarimatika method emphasizes planting concepts with a quick count system involving all the five senses to master knowledge thoroughly and deeply, which impacts the retention of the multiplication system in students' memories.

The Jarimatika method was developed through the Taktikjar application because it is considered in accordance with the current development of science and technology [17]. The use of the Tactics Jar application compared to the manual Jarimatika method, the Taktikjar Application emphasizes the cultivation of concepts packaged in an attractive and fun application to be used independently by students both at school and outside of school as a supporter of learning media.

The Taktikjar application is a quick calculation system that can be accessed anytime and anywhere via smartphones. Hence, students can search, work on, and find their solutions to impact the retention of the multiplication system in students' memories. Learning mathematics by using learning media Taktikjar application can provide its own pleasure for students.

1.1. Increasing Students' Counting Speed Using the Jarimatika Method

Mathematics is very important to be taught because it is a support for other sciences. Because of the importance of mathematics, the speed of math in schools needs serious attention. Talking about mathematics is difficult; of course, it cannot be separated from students' displeasure about mathematics subjects [19].

According to the Indonesian Dictionary (KBBI, 2008), speed is the time it takes to cover a certain distance, while according to the Indonesian Dictionary (KBBI, 2008), counting is doing calculations. So, the computational speed is the time used as quickly as possible to do the math for the multiplication of natural numbers. The speed indicator for calculating the multiplication of two digits takes approximately 3 seconds for the problem. So, if the question is given 10 numbers, the fastest 30 seconds is over.

In increasing the counting speed, an appropriate method is needed; one of the methods is Jarimatika. It is a method of counting (multiplication, division, addition, and subtraction) using the fingers [18]. It also trains students to use their left and right brain optimally because students move their fingers while thinking.

1.2. Development of the Jarimatika method into an android-based Taktikjar (finger tinkering)

The Jarimatika method is an easy and fun method to learn. Following the times, we want to develop the Jarimatika method, namely by packaging the method into a Taktikjar application (finger tinkering).

The use of the Taktikjar application, compared to the manual Jarimatika method, Taktikjar Application emphasizes the cultivation of concepts packaged in an attractive and fun application so that they can be used independently by students both at school and outside of school as a supporter of learning media.

Here is an initial view of the Taktikjar application:

Figure 1 Taktikjar Application (Otak Atik Jari).

1.3. Integration of Android-Based Taktikjar to Increase Counting Speed

The ability to count is an attempt to recognize mathematics concerned with the characteristics and

relationships of real numbers and their calculations, especially concerning addition, subtraction, multiplication, and division. In completing the calculation, students are required to solve the problem in a predetermined time. Therefore, we need an appropriate method to achieve these calculations more efficiently and faster. One of the appropriate methods is the Jarimatika method.

Marlina, Ririn&Purwadi stated that the speed of counting is one of the most important scourges. Counting speed is seen when students are able to solve problems in counting quickly [19]. The application of the Jarimatika method makes students more active in participating in learning activities. This is very influential on increasing students' multiplication counting speed. This is indicated by the results of the initial test of student speed 33.3%, and the results of the first cycle 48.8%, while the results of the second cycle reached 93.9% [18].

Android-based mathematics learning media is a media that is very suitable in this current technological era, namely by utilizing smartphone technology in learning so that it is in great demand by students because it is packaged in an attractive and easy-to-understand form. This is indicated by the quality of these mathematics learning media products, which received a score of 83.5% by experts. It is feasible and very good for use in learning mathematics [20-22].

Based on the relevant research above, the learning process by integrating the application of Taktikjar (finger tinkering) can facilitate students in learning mathematics, where the material taught will be connected with the concept of Jarimatika (method of counting using fingers) so that students can easily understand it. Thus students' abilities in completing calculations (multiplication, division, addition, and subtraction) can be increased. By integrating the Taktikjar application (finger tinkering), the learning process will be more straightforward because this application can be opened anytime and anywhere. This can help students in increasing the speed of counting.

2. RESEARCH METHODS

In this study, the population was all students of the Ranu Prima College tutoring institution. The sample consisted of all junior high school students of the Ranu Prima College tutoring institution. The research design used is Research and Development (R&D). The research design for teaching and learning media development refers to developing a 4D model, which includes defining, designing, developing, and disseminating proposed by Thiagarajan (1974). The model in this study was modified, namely simplification from four stages into three stages, namely, define (definition), design (design), develop (development). The trial of the project-based blended learning model uses a one-group pretest-posttest design; namely, this trial is carried out by comparing the learning outcomes before and after learning.

One group pretest-posttest design can be described as follows:

Figure 2 One group pretest-posttest pattern design.

Explanation: O1 = test or observation carried out before treatment is given, X = the treatment given to see the effect in the experiment, O2= test or observation carried out after the treatment is given.

In this study, the treatment given was to solve multiplication problems through the Jarimatika method after getting the results from the pretest and the difficulties experienced by students in the multiplication problem. After the treatment, a posttest will be held.

The steps taken in this research are: (1) Conducting preliminary research, namely, implementing a pretest of 20 questions to determine students' abilities. The pre-test has been carried out on grade 7 to grade 9 students who take tutoring at the Ranu Prima College (RPC) Bone Tutoring Institute, (2) Doing treatment, namely carrying out multiplication teaching using the android-based Jarimatika method. The treatment has been carried out for grade 7 to grade 9 students who take tutoring at the Ranu Prima College (RPC) Bone Tutoring Institute, (3) Conducted a posttest of 20 questions to determine the effectiveness of teaching, students' independence and accuracy after the treatment was carried out. The post-test has been carried out on students from grades 7 to 9 who take tutoring at the Ranu Prima College (RPC) Bone Tutoring Institute.

3. RESULTS AND DISCUSSION

Jarimatika conducted at the Ranu Prima College (RPC) Bone tutoring institution focused on solving multiplication problems. After the sample was given

a pre-test, treatment was then given until finally a post-test was given. The pre-test and post-test each consist of 20 multiplication questions. The tests given have the same level. The learning process in the experimental class is through three stages, namely pre-test, treatment, and post-test. The pre-test is used to determine the extent of the students' initial ability to understand mathematical material. Post-test is used to determine the students' understanding after being given treatment or applying the learning model. The value of the experimental class learning outcomes in the study is presented as follows.

Table 1. Students' scores of experimental class

Descriptive Analysis	Experiment	
	Pre-test	Post-test
Maximum score	90	100
Minimum score	50	70
Average	72	90.6
Standard Deviation	10.308	8.32

Based on table 1 above, it can be seen that the maximum score in the pre-test is 90 and the post-test is 100; this means that the highest score in the second stage is adrift with a slight difference. While the lowest score in the early stage (pre-test) is 50, and in the final stage (post-test) is 70. If we look at the average value of the two classes above, it shows that the average value in the early stage (pre-test) is 72 is lower than the average value at the final stage (post t-test), which is 90.6.

3.1. Shapiro Wilk Test

After passing the normality test and homogeneity test, the results showed that the data of the two groups in the study were not normally distributed and homogeneous, so in testing the data of the two groups was recommended to use a non-parametric test, namely the Shapiro Wilk test which was carried out to determine whether there was a difference in the average value of the ability student multiplication.

The experimental group was given learning through the Taktikjar method (finger tinkering). The results of hypothesis testing in this study can be seen in Table 2 below:

Table 2. Students' scores of experimental class

Test	Statistic	db	*P*
Pre-test	0.892	25	0.012
Post-test	0.960	25	0.407

Based on the pre-test and post-test normality analysis using the Shapiro Wilk test, a significance value of 0.012 in the pre-test and 0.407 in the post-test showed that the data were not normally distributed.

3.2. N-Gain Test

The N-Gain test was used to determine students' knowledge before and after applying the Jarimatika method, which was carried out in the experimental class in the Ranu Prima College (RPC) Bone tutoring institution. The gain value indicates that the increase in the average research sample is included in the high category; it is 0.69. This high criteria category is because students have different memories.

4. CONCLUSION

The development of the Jarimatika method into the Taktikjar application is in line with the achievement of numeracy skills in increasing students' counting speed. This Taktikjar application is specifically designed so that students can use their smartphones in learning. In addition, the application is also very suitable during this pandemic, namely using the device as a learning media. These results indicate that developing the Jarimatika method into a Taktikjar learning application positively influences students' counting speed.

ACKNOWLEDGMENT

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