

# The Use of Educational Game Media and Its Effect on Student Achievement of 6<sup>th</sup> Grade Elementary School Students in Mathematics Learning

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**Abstract**—This study aims to find out the description of the use of educational game media and its impact on the mathematics learning outcomes of grade VI elementary school students. This study included quasi-experimental research with a pre-test-post-test control group design. This study involved 29 sixth grade elementary school students at Makassar. Determination of sample was done by using simple random sampling technique. Students' mathematics learning outcomes data are obtained by using test of students' learning outcomes in essay forms (pre-test and post-test) given classically to students. The data obtained were analyzed using descriptive statistical analysis techniques. The results of this study indicated that the average value of students' learning outcomes before and after the use of educational game media has increased from 44.14 to 85.00. The test scores of students' learning outcomes were only centered on the medium, low, very low category before the use of educational game media. The average score in the very low category is at 31.92 with a frequency of 13 students, low category is 49.50 with a frequency of 10 students and for the moderate category is 61.66 with a frequency of 6 students. The average value of student's learning outcomes after experiencing the use of educational game media increased with a high category of 81.58 with a frequency of 19 students while for the very high category 91.50 with a frequency of 10 students. This indicates that there was an increase in students of learning outcomes after the use of educational game media in learning mathematics.

**Keywords**—*educational game, learning outcomes*

## I. INTRODUCTION

Education in elementary school is held to develop student's attitude, ability, knowledge and basic skill to prepare them for higher education. Therefore, the quality of education which can facilitate technology-based learning that leads to an active and creative learning process through collaboration between government and teachers is needed. Teachers as educators should provide a number of knowledge to students at school [1]. The teacher as the spearhead of education determines the success of the education process which aims to educate the nation. Thus, teacher's creativity is needed in managing learning well in accordance with student learning characteristics [2].

Teachers as educators must have minimum skills to bring technology into their teachings. They must have at least some

skills in using hardware and software [3]. With these skills, the teacher will easily convey the material to students using technology-based media. One of the subjects taught in elementary school is mathematics which includes aspects of numbers, geometry and data processing [4]. Mastery of mathematics subject from early age is needed to create technology that alleviates human work. This subject is given to equip students to think logically, analytically, systematically, critically, and creatively and equip them ability to work together [5]. To achieve the objectives in learning mathematics, it is necessary to find alternative learning media that is applied to improve the quality of learning. Media is an inseparable part of the teaching and learning process to achieve learning goals [6].

The learning process will run effectively and efficiently if supported by the availability of supporting media. One alternative media that can be used is media in the form of educational game. Educational game is an application for video or interactive game whose main purpose is to provide not only entertainment but also education that supports the quality of learning in the classroom [7]. Furthermore, educational game is identified as a supporter in learning process [8]. Digital education game is identified as enabling collaborative learning that generates new ideas and exchanges information, simplifies problems and solves problems [9].

Consequently, the educational game was chosen as a solution to the existing learning problems because the educational game is both interactive and entertaining. In addition, the learning stages of students in elementary school are still in the playing stage. The use of educational game also helps teachers to prevent inappropriate behavior carried out by students who are not socially acceptable [10]. In this educational game, learning is given through practice or *learning by doing* by involving students directly in the use of media that demands student's activity, as knowledge skill, and behavior can be obtained through direction and guidance from the teacher also through practice (experience) [11]. Therefore, practice and direction from the teacher in the context of mastering the material taught by the teacher through the use of educational media in the process of learning mathematics are needed. This is done considering

that the study of mathematics subject is abstract [12] so that it is difficult to be mastered directly by students without using instructional media.

Thus, mastery or understanding of student towards the content taught will impact on student’s learning outcome. Learning outcome describes student’s ability after they receive learning material in the classroom [13]. In line with this, learning outcome is the acquisition of student learning process in accordance with the purpose of teaching after following the teaching and learning process [14]. Therefore, to maximize students’ learning outcomes, instructional media that can help deliver material easily from the teacher to students is needed [6]. As explained earlier, educational game is chosen in mathematics learning because educational game is instructional media used in providing teaching in the form of games with the aim of stimulating thinking power and increasing concentration through unique and interesting media [15]. This indicates that the educational game aims to support the teaching and learning process with fun and more creative activities that are educational [16].

Based on the explanation above, the educational game is one of the instructional media in which in this media there is an educational communication interaction process that takes place appropriately, effectively, and efficiently so that it can stimulate students' thoughts, feelings, concerns, and interests so that they are expected to contribute in improving the quality of learning which impacts on improving students’ mathematics learning outcomes.

II. METHOD

This study aimed to obtain an overview of the use of educational media game and the impact on students’ mathematics learning outcomes. The researcher chose the design of pre-experimental study because this study only involved one experimental class without the other class as a comparison group (control class). The design of the pre-experimental research used was one-group pre-test-post-test design where the research began with a pre-test before being given treatment and post-tests after being given treatment in the form of the implementation of educational media game.

The research design intended in this study was by using Fraenkel’s and Wallen’s design [17].

O <sub>1</sub>	X	O <sub>2</sub>
Pre-test	Treatment	Post-test

Information:

O<sub>1</sub>= student’s learning outcome before being taught using educational game media (*pre-test*).

X = process of learning mathematics using educational media game.

O<sub>2</sub>= student’s learning outcome after being taught using educational game media (*post-test*).

The study involved 29 Grade VI elementary school students in Gowa district, Makassar as the research samples. Samples were selected using random sampling technique. The instrument used to collect the data of students’

mathematics learning outcomes was an essay-based student learning outcomes test (pre-test and post-test) given classically to students. The data obtained were then analyzed using descriptive statistical analysis technique to see an overview of students’ learning outcomes before and after the use of educational media game in mathematics learning for sixth-grade students.

III. RESULTS AND DISCUSSION

General description of the effect of educational game media on mathematics learning outcomes of elementary school class VI students at Tombolo K., Gowa, Makassar is stated below

A. Scores of Mathematics Learning Outcomes

The description of the pre-test scores obtained by students on the mathematics learning outcomes test could be seen before the learning process with the use of educational game media, while the post-test scores of students could be seen after the learning process with the use of educational media games applied. Furthermore, data related to students’ learning outcomes are presented in the form of frequency distribution where the frequency distribution was expressed in the form of description interval of the pre-test and post-test scores. The statistical distribution of students’ mathematics learning outcomes in detail is presented as follows.

TABLE I. STATISTICAL SCORES DISTRIBUTION OF STUDENTS’ MATHEMATICS LEARNING OUTCOMES

Statistics Scores Category	Pre-test	Post-test
The highest score	65	95
The lowest score	25	75
Average (Mean)	44.14	85.00
Standard deviation	12.892	5.825

If the table is presented in the form of histogram, frequency distribution of pretest and posttest scores of students’ mathematics learning outcomes using educational game media can be described as follows.

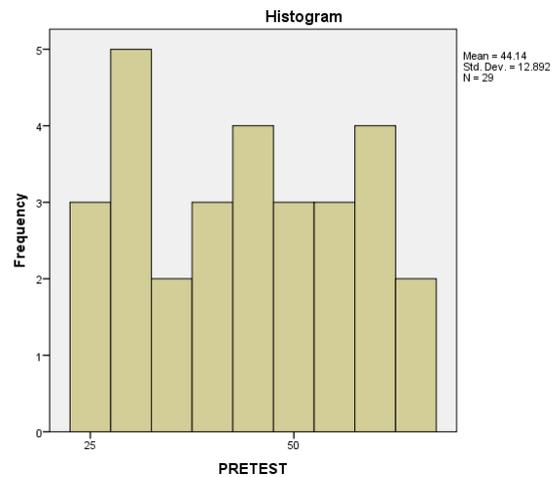


Fig. 1. Frequency distribution of students’ pre-test

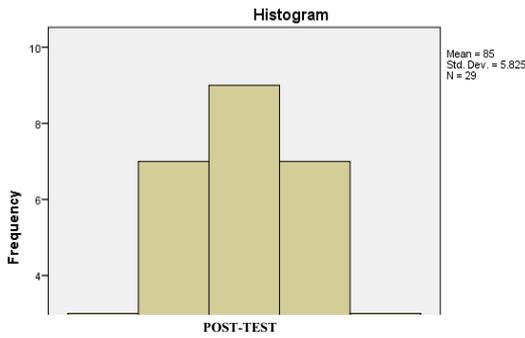


Fig. 2. Frequency distribution of students' post-test

**B. Mathematics Learning Outcomes Category**

Data on students' learning outcomes were further categorized to see the comparison between the category of students' mathematics learning outcomes of pretest and posttest. To determine the category of students' mathematics learning outcomes, the researcher used the guidelines for categorizing the scores of students' pretest and posttest adapted from the guidelines of learning outcomes of Depdikbud in 2009 [18]. In detail, the category guideline of students' pretest and posttest scores is expressed in the form of intervals and described in the Table II.

TABLE II. CATEGORY GUIDELINES OF PRE-TEST AND POST-TEST SCORES

Scores Interval	Category
85 – 100	Very high
65 – 84	High
55 – 64	Moderate
35 – 54	Low
0 – 34	Very low

Based on the data of the students' pre-test and post-test, frequency distribution data related to the utilization of educational game media was obtained and shown in Table III below.

TABLE III. FREQUENCY DISTRIBUTION OF STUDENTS' PRETEST AND POSTTEST SCORES

Scores Interval	Category	Pre-test		Post-test	
		Frequency	(%)	Frequency	(%)
85 – 100	Very high	0	0	10	34.48
65 – 84	High	0	0	19	65.51
55 – 64	Moderate	6	20.68	0	0
35 – 54	Low	10	34.48	0	0
0 – 34	Very low	13	44.82	0	0

Based on the results of the research described in Table I and Table III, it can be explained that the mean score of students' mathematics learning outcomes before and after the use of educational game media has increased from 44.14 to 85.00. Before the use of educational game media in learning, the mathematics learning outcomes test scores of 29 students were only concentrated in three categories namely moderate, low, very low. Furthermore, the mean score of students' learning outcomes in very low category was 31.92 with the frequency of 13 students. Meanwhile, the mean score of the low category of students' learning outcomes was 49.50 with the frequency of 10 students. For the moderate category, the

mean score of the learning outcome was 61.66 with the frequency of 6 students.

Different things happened after the use of educational game media in mathematics learning was that the mean score of students' learning outcomes had increased in which the students' learning outcomes were in high and very high categories. The mean score of students' learning outcomes that were in the high category was 81.58 with the frequency of 19 students while the mean score of students' learning outcomes for the very high category was 91.50 with the frequency of 10 students.

To see the score category in general, the scores of students' mathematics learning outcomes were converted into the score category based on Permendikbud no. 81 A in 2013 [19]. This categorization described the competence of students' knowledge which was divided into four categories namely very good, good, sufficient and less good. In detail, Table IV describes the competence categorization of students' knowledge.

TABLE IV. STUDENTS' KNOWLEDGE COMPETENCE CATEGORY

Final Value Conversion		Post-test	Information
Scale 0-100	Scale 1-4		
86-100	4	A	Very good
81-85	3.66	A-	Very good
76-80	3.33	B +	Good
71-75	3	B	Good
66-70	2.66	B -	Good
61-65	2.33	C +	Sufficient
56-60	2	C	Sufficient
51-55	1.66	C-	Sufficient
46-50	1.33	D +	Less good
0-45	1	D	Less good

Based on the Table IV, if it refers to the mean scores of students' mathematics learning outcomes, pretest activity obtained 31.92, 49.50, and 61.66. Those were in less and sufficient categories. Thus, it can be explained that the competence of student knowledge or students scores in pretest activity tended to be in less category, while the mean scores of student learning outcomes in posttest activities obtained were 81.58 and 91.50 in which the scores were in very good category for classification in terms of measuring student knowledge competence. As a result, the mean score of students in posttest activity tended to be in very high category. This indicates that mathematics learning activity using educational game media can improve student learning outcomes in which the mean scores of student learning outcomes were in high and very high categories. Furthermore, the competency category of student knowledge after learning using educational game media was at a very high level.

This is in line with the results of research conducted by Basher and El Din [20] which stated that the use of educational games in learning can improve student learning outcomes. The same thing was expressed by Cheng and Chung [21] that the use of educational game media has an impact on improving student learning outcomes. As well as the results of research from Cheng, Mia, Tsai and Chang [22] that educational game media has a positive impact on student learning outcomes. In addition, the use of educational games

makes it easier for students to understand material related to material that is difficult to understand because this educational game media can increase students' interest or demand and concentration when receiving teaching material in the classroom. This is supported by the results of research by Cheng and Annetta [23] which stated that by using educational games, students are more actively doing several learning strategies to help student learning activities to be more efficient when interacting in the learning process. In line with the results of this research, Selvi and Cosan [24] stated that educational games can increase student interest in learning which impacts on improving student learning outcomes.

#### IV. CONCLUSION

The results of this study illustrate that the educational game media in mathematics learning has a significant influence on students' mathematics learning outcomes. The use of educational game media can improve the competence of students' knowledge in understanding teaching materials presented by teachers in the classroom. Therefore, teachers can choose educational game media as one of the alternative learning media used in the learning process of mathematics to improve students' mathematics learning outcomes. However, the teacher must still pay attention to time management in the learning process in the classroom considering that this media will seize part of the learning time from the allocations previously provided. In addition, the teacher must be able to control and supervise students to be more effective and efficient in using time when using educational game media in mathematics learning.

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