



Analysis of the Using Digital Educational Game Media in Mathematics Learning to Improve Student Learning Outcomes in Elementary School

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Abstract. Education plays an important role in shaping the future of the younger generation. Education can improve the quality of knowledgeable human resources, as well as personal development and skills needed to achieve success in life. Educational Games are a creative and innovative learning media that can be used in Mathematics learning. This research aims to examine and explore the application of educational games in mathematics learning to improve learning outcomes for elementary school students. The method used in this research is a systematic literature study in accordance with the discussion, namely educational games, mathematics learning, and learning outcomes. Based on the results of a systematic literature study, educational games for learning mathematics can be said to be effective and able to improve student learning outcomes quite well. Apart from that, the use of educational game media can also increase student learning motivation and students can learn more happily. Future research can further examine the influence of digital educational game media on students' numeracy abilities. The results of this research can also be useful for a deeper understanding of learning media that are suitable for improving student learning outcomes.

Keywords: Mathematics Learning, Educational Games, Learning Outcomes, Elementary School.

1 Introduction

Education plays an important role in shaping the future of the younger generation. With education, you can improve the quality of knowledgeable human resources, as well as self-development and the skills needed to achieve success in life. Every individual must be able to adapt to every development they face, such as in the era of rapid technological developments and changes in educational paradigms, which of course have a large impact on the world of education, so that educators in particular must be able to adapt to these changes. However, in reality there are still many educators who have not utilized technology in learning at school, this is due to a lack of understanding by educators in using technology in the learning process, so there are still many educators

conventional methods in the learning process, this will of course affect learning outcomes student.

One conventional method that is still used is the use of learning media which is still limited to teacher books and student books. The use of learning media that is less interactive will affect students' level of understanding, interest in learning and also student learning outcomes. Especially for elementary school students, the problem that often occurs is a lack of understanding of the material being taught and students often feel bored when learning takes place in the classroom. Therefore, it is important to innovate interactive and creative learning media to increase understanding and interest in learning to improve student learning outcomes.

One creative and innovative use of learning media that can be used is through educational games. Educational games are learning media that can combine aspects of entertainment with learning, so that they can increase students' interest and motivation in learning. One of them can be applied to mathematics subjects. Learning mathematics at the elementary school level is an important foundation in forming students' basic understanding of mathematical concepts that they will use throughout their lives. However, many students find it difficult to deal with mathematics material. Educational games are here as a solution to help overcome these problems in an interesting and fun way. The development of games in Indonesia itself is growing rapidly. Because the current rapid development of technology has an influence on the learning process in elementary schools and also influences learning materials and the way the material is delivered in the process of teaching and learning activities [1]. At the educational stage, elementary school children will be more interested in games on Android phones than traditional games. Currently, elementary school students are more likely to be interested in games that are easy to play and contain pictures, animations and text that attract attention. Games play quite an important function as a means of entertainment or education and learning for old, young, men and women, especially children. The games that are popular today are digital-based games. Apart from entertainment functions, games are also often created for education or learning. Learning in the form of games usually includes early childhood learning such as learning to count, read and so on. It has been proven that learning to count using games is more interesting for students compared to using classical media using paper or stationery [2].

The research results [1] state that the educational game introducing flat shapes is suitable for use as a learning medium for fourth grade elementary school students. Because this Android-based educational game is effective and can attract students' attention and is suitable for learning while playing. Terrel and Rendulic in their research stated that the use of games for learning in elementary schools can increase students' internal motivation and learning achievement [3]. The educational games created must be able to stimulate student motivation and make the teaching and learning process more enjoyable. The main goal of educational games is to change negative perceptions of mathematics. Educational games offer a different way of presenting mathematical concepts in a more interesting and easy to understand way. In the context of games, abstract concepts can be illustrated through simulations, visualizations, and direct interactions that can help students understand mathematical material. Educational games

also support problem-based learning. Students are invited to find mathematical solutions to overcome challenges in the game and involve students to be active in learning and help improve students' critical powers. This game can submit on learning management systems [4] [5] [6].

The aim of this research is to examine and explore the application of educational games in mathematics learning to improve learning outcomes for elementary school students. It is hoped that this research will have a positive impact on readers, especially improving the learning outcomes of elementary school students after implementing educational games in mathematics learning.

In this literature study research, the researcher provides a general overview of the research stages which are presented in the flow chart in figure 1

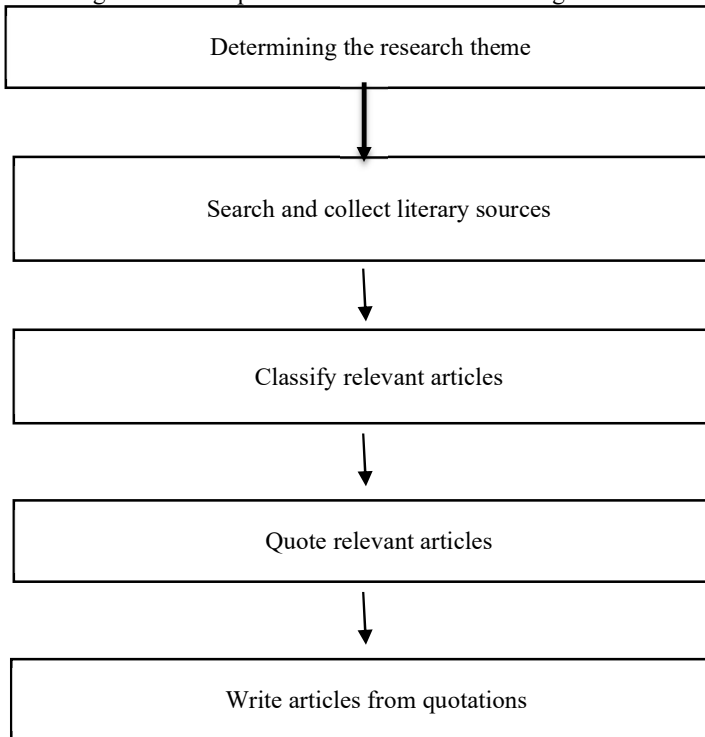


Fig. 1. Research Framework

2 Methods

This method uses descriptive analysis and theoretical references that are relevant to the cases and problems studied. In this research, researchers used journal studies based on a number of empirical articles regarding educational games in mathematics learning to improve student learning outcomes which were studied using a qualitative approach

[7]. The research data used is secondary research data using literature studies, namely in the form of analysis of data sources from national and international journals.

This research procedure includes: 1) determining the research theme, namely the keywords Educational Games, Mathematics Learning, and Learning Outcomes in Elementary Schools; 2) search and collect various literature using Google Scholar with a maximum range of the last 10 years; 3) classify various types of articles that are relevant to the research theme; 4) cite relevant articles; and 5) write articles from quotations by studying content analysis techniques, namely studying content descriptions, message characteristics, and the development of content [8]. In this research, researchers obtained 3 journal articles that were relevant to the research theme.

3 Result and Discussion

Advances in digital technology are interrelated with the world of education and have a positive impact, especially in the field of mathematics, one of which is increasing learning outcomes and the effectiveness of mathematics teaching as well as mathematical approaches to aspects that must be taught and what must be studied can be harmonized with technology. One concrete example of the integration of digital technology with education is the development of educational games as an interactive learning medium. Mathematics educational games are one of the instructional games that combine the concepts of learning and playing into one interactive learning medium [9].

Education is the main pillar for liberation students in a continuous proces so that changes occur towards potential ideal external and internal as unique potentials with their nature (naturenature) respectively [10] According to Dienes, a mathematics teacher of Hungarian, English and French nationality, Mathematics is a structured subject, classifying structures, relationships within structures and classifying relationships within structures. He believes that every mathematical concept can be understood by students if it is presented in a concrete and varied form, because according to observers, mathematics lessons are only of interest to students because they are easy. One of the stages carried out by Dienes is play, children begin to observe patterns and regularities contained in concepts. They will pay attention when there are certain rules to complete the game. Through games, students are invited to start recognizing and thinking about mathematical structures [11].

Educational games are specifically designed and developed to help students learn while playing, so that students continue to learn even while playing. Apart from that, the games played can also help improve students' thinking power, creativity and ability to remember information. In addition, games have a positive effect on learning because they can provide direct experience from the users involved. It is hoped that this game can make students more interested in learning mathematics and invite students to play while also learning. Game-based learning is an effective way to increase children's learning motivation, because in a game there are challenges that must be completed, thus giving rise to a greater sense of curiosity or curiosity about completing a challenge [12].

Fun learning can influence student learning outcomes. Learning success is influenced by several factors, one of which is the learning media factor. According to Muthson (2010), in order to increase the effectiveness and efficiency of learning, various creative and innovative learning models need to be developed. Mathematics teaching in schools is too formal [13]. Learning mathematics is not just about remembering the formula of a concept, but rather constructing a concept through a real context [14]. Even though mathematics is not just about remembering the formula of a concept, it is constructing a concept through a real context. This needs to be done so that the learning process does not seem less interesting, monotonous and boring, which will hinder the transfer of knowledge. Therefore, the role of media in the learning process is important because it will make the learning process more varied and less boring [15].

Educational games are proven to increase students' interest in learning so that educational games become a revolutionary step in learning that is fun for students. Games as an educational medium can make students learn while playing. Educational games can also improve concentration and increase interest in learning. Apart from that, there are still several benefits from implementing games as an educational medium, including: increasing student activity, increasing student understanding, and improving student learning outcomes. An educational game must consider various things so that the game can truly educate, increase knowledge and improve students' skills so that it doesn't just waste a lot of useless time. Educational game applications are really needed for elementary school students to make it easier to understand school material. Apart from that, educational games have also been proven to be able to be used as alternative media in learning mathematics. This proves that games as an educational medium can be applied to overcome the problem of mathematics learning difficulties for students [16] [17].

Based on the research procedure, the first step taken was to determine the theme. In determining the theme, the keywords used were educational games, mathematics learning and student learning outcomes. Next, search and collect various articles using Google Scholar with a maximum range of the last 10 years. Then the researcher classified various types of articles that were relevant to the research theme. In classifying articles, researchers selected three articles that were relevant to the research variables. Next, the researcher quoted three articles that were relevant, and in accordance with the research conducted by the researcher. And finally, the researcher wrote an article from the quotation results in accordance with content analysis techniques, namely studying content descriptions, message characteristics, and the development of content.

From the results of the classification of journal articles, the researcher focused on three journals that were relevant to the researcher's research. Because the three journal articles are in accordance with the theme chosen by researchers regarding the use of educational games which can improve learning outcomes in mathematics learning in elementary schools.

Research results from journal articles have been collected regarding the application of educational games that can improve the effectiveness of elementary school students' mathematics learning outcomes. In this research, the researcher chose three journal articles that used the Research and Development method with different topics chosen, namely fractions, mathematics numbers, addition and subtraction. Apart from that, the

educational games used by each article are different, including the math room adventure game, bilomatics game and whizzer game. However, from the analysis results obtained, all three are effectively used to improve student learning outcomes, such as in the mathematics room adventure educational game which showed a result of 32.79% and was said to be suitable for use to improve learning outcomes for fraction material in fourth grade elementary school students. Then the bilomatics game shows a percentage of 80.5% and 85.2% in the mathematical number material which can be used for grade I elementary school students. And the congklak game shows results of 87% and 90%, which is very suitable for use in addition and subtraction material for third grade elementary school students.

In this research, the first thing the researcher did was determine the theme. The theme used by researchers is educational game learning media to improve mathematics learning outcomes. The next step was for the researcher to search for and collect several literature sources via Google Scholar over a period of the last 10 years. From the results of the articles collected by the researcher, the researcher classified the relevant articles and selected three articles to be analyzed. After that, the researcher quoted the relevant articles that had been selected. And finally, the researcher wrote an article from the quotations that had been analyzed.

The results of the analysis from this research state that the use of digital educational game media is considered effective in learning mathematics in elementary schools. Learning from digital task can increase the creativity skills of students [18][19][20]. This is based on the results of an analysis of three research articles regarding the development of digital educational games and their application in elementary schools. Each research article discusses the development of different digital educational game media, but all three show that the use of educational game media can improve student learning outcomes in mathematics lessons in elementary schools. Based on the results of the analysis of this article, it can be said that the use of educational game media in mathematics lessons can be said to be effective and able to improve student learning outcomes quite well. Apart from that, the use of educational game media can also increase student learning motivation and students can learn more happily.

4 Conclusion

Based on the results and discussion presented above, it can be concluded that educational games have a good impact in improving student learning outcomes, especially in mathematics lessons for elementary school students. Educational games are also considered effective in helping to improve student learning outcomes quite well, and can help increase students' learning motivation so that they have a good impact on improving students' critical thinking. Apart from that, educational games also provide a fun experience in the learning process.

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