Improving Understanding of Mathematics Concepts in Elementary Schools Through Digital Educational Games

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Abstract

There are obstacles for students, especially in elementary schools, in understanding concepts in mathematics lessons which has an impact on the lack of interest of students in learning mathematics which can result in a decrease in students' numeracy and reasoning skills. These obstacles will certainly affect the learning process of students. To be able to overcome these obstacles, a special approach is needed in learning that can encourage students' enthusiasm for learning. Therefore, this study aims to find out that digital educational games are one of the learning media that is suitable for learning mathematics for students in elementary schools. This study uses a literature review research method by collecting and obtaining data through the results of previous studies and then analyzing it. The results obtained in this study are that digital educational games are able to provide an understanding of mathematical concepts to elementary school students effectively and fun.

Keyword: Concept mathematics, Digital Games, Elementary School

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INTRODUCTION

Education is one of the important factors that affect the success of a nation to be able to improve high-quality Human Resources (HR). Therefore, education is used as one of the efforts for every country to be able to prepare its generation to be ready to welcome and be able to compete with developments in this technological age. With the development of the times that have occurred, of course, it also has an impact on the development in the world of education, it can be seen by the developments contained in the learning implementation process which can be seen from the development of learning methods, learning media, and learning outcomes.

The problem that often occurs in the world of education is how the process of implementing teaching and learning activities can be carried out properly. A fun learning for students so that students can easily accept the material given by the teacher and not feel bored or even depressed by the material given by the teacher. In this case, learning media is the most important thing to be able to optimize the process of teaching and learning activities so that they are carried out properly, optimally, and also fun for students.

The elementary school level is one of the most important levels in the world of education because it has a great influence on the success of education that will be taken at the next level. Learning that is carried out ineffectively and efficiently often makes students feel uninterested in following it, which results in the learning outcomes of students who still do not understand the concept of learning taught by teachers, one of which is in subjects that are

often considered difficult for students to be able to understand, namely in mathematics subjects which are often considered less interesting and boring because they only discuss numbers, formulas, drawings, and calculation operations. In fact, mathematics is one of the subjects that supports the development of science and technology so that mathematics has an important role for students now and in the future (Supriyanti, 2020).

In the development of technology in the 21st century in the world of education today, many educational *games* have emerged that are designed as learning media for students to teach basic education such as writing, reading, arithmetic, and drawing. The existence of educational *games* makes the learning system very effective, comfortable, fun and easy to understand because it can be accessed directly to students through games (L. D. Pratama et al., 2019); (U. N. Pratama & Haryanto, 2017).

Digital game-based learning is a method that takes advantage of technological developments through current games, every digital game that is used as a media or learning tool must have cognitive learning elements (Wijaya & Andriyono, 2020; Indarti & Laraswati, 2021; Tangkui & Conch, 2020). Digital educational games were chosen to be used as a medium or learning tool because they are used as one of the alternatives used to be able to improve learning, especially in mathematics subjects so that during the learning process students feel happy so that it will be easy to provide an understanding of the material to be taught.

METHODS

In conducting this research, a research method is used, namely using the *literature review* method, the results of which are obtained through several articles that are analyzed by looking for similarities and then conclusions are drawn. To obtain data sources, this study obtained it through an article available online on Google Scholar which was conducted in December 2022 and the article was published around 2017-2022.

RESULTS & DISCUSSION

Result

Through the sources that have been collected through the analysis of several research journals that discuss the same topic of problems and after drawing an outline as many as three research journals that have been selected have obtained results, namely:

1. The research conducted by Dyah and her friends at SD Negeri 2 Sumberngepoh, Lawang with the research subject of 10 students in grade 2 regarding the material of number division using educational game media called "Gaed Babil", which has a length, namely "Number Division Education Game" through android-based electronic media. In the development of educational game media, observations have been made on the use of learning media, student characteristics, curriculum, basic competencies and indicators, material content and learning objectives. Based on the results of the validation of media experts which contained three aspects, namely the aspect of the type and size of the letters, the aspect of layout, and the aspect of the use of illustrations and colors, a percentage with an average of 95.83% was obtained which was categorized as the game was considered feasible. The results of the validation of material experts and questions that pay attention to three aspects, namely the material aspect, the question aspect and the presentation aspect which obtained a percentage with an average of 95.83% which were categorized as the game was considered feasible. Meanwhile, based on the results of the practicality of educational games regarding the division of numbers through teacher validation, the percentage obtained

95% and in the questionnaire responses from students obtained a percentage with an average of 93.33%, which stated that the educational game of dividing numbers developed was interesting, made it easier to understand the material, and easy to use by students. Moreover. In analyzing the learning outcomes, students obtained a percentage of 0.47% with the criteria for passing the test with a score of 60 which was determined through the average rest obtained from the sum of 10 students and obtained moderate criteria, so that it can be concluded that the use *of games* in mathematics learning can increase the completeness of students' learning outcomes compared to mathematics learning that does not use *games.*

2. The research with the title "Development of Ghosting Educational Game Media (Go Shopping With Studying) on Rounding and Assessment Materials for Grade IV Elementary School" conducted by Retna and Delia was conducted at SD Islam Al Irsyad, through the results of interviews with teachers and several students in grade IV of SD Islam Al Irsyad, there are still many students who have not been able to follow and understand learning, especially in subjects in the field of mathematics. It was found that there were several students who had gotten quite good grades in answering questions about rounding and interpretation material, but when teachers asked and answered questions directly, there were many students who experienced difficulties and lacked understanding in the concept of the material. In assessing the feasibility of using the validation results from material experts and getting a percentage of 90.9% which is classified as "very feasible" and in the validation results from media experts getting a percentage of 88.2% of the value categorized as "very feasible". Meanwhile, through the assessment of the questionnaire, the teacher received a percentage of 100% which was classified in the category of "very practical") and the results of the student questionnaire received a percentage of 88.6% which was classified in the category of "very practical. In addition, there was an increase in student learning outcomes through the N-Gain test which obtained a percentage of 0.63 which was classified as "moderate". Therefore, the Ghosting educational game is considered very feasible, practical, and efficient to be used in elementary schools, especially grade IV as a learning medium that helps to understand the concept of the material.

3. The research conducted by Iffatu and his colleagues on "Development Of *Math Space Adventure Game* As A Learning Medium On Fractional Material In Elementary Schools" conducted at MIN 2 Kediri by taking the subject of students in class IV A obtained results through product validation that had been studied by media experts obtained a percentage of 85.9% which was categorized as "very feasible", through the results of a questionnaire about practicality by teachers obtained a percentage of 80.9% which was categorized as "very practical", and based on the results of the trial stated that *the Math Space* educational *game* can improve student learning outcomes with a percentage of 32.79% so that the *game* is declared suitable for use by elementary school students because it is proven to help teachers to provide an understanding of learning concepts in mathematics, especially material about fractions.

DISCUSSION

Characteristics of Students in Elementary Schools

Through the results of the analysis of the three research journals, digital educational games in their use become a learning medium using technology on software that can be downloaded via smartphones, with the existence of digital educational games as a learning medium can facilitate the process of learning activities that are liked by students, especially in elementary schools, which of course in the creation and use of digital educational games have

paid attention to and adjust to the characteristics of the development of students in elementary schools according to their level. Generally, students in elementary school are approximately 6 years old or 7 years old until the age of 12 to 13 years which according to an expert in cognitive development, namely Jean Piaget, children are in the stage of concrete operational development, which is the stage where students need concrete objects that are able to be captured by the five senses to be able to help make it easier to provide an understanding. Therefore, at the elementary school level, tools or media are needed in the learning process.

In line with the results of the analysis of the three journals, Sugianto also wrote in his article entitled "Characteristics of Elementary School Children" that elementary school age children are identical to play, happy to move, happy to work in groups, happy to feel and carry out things directly. Therefore, in developing learning activities that can optimize students to learn while playing, moving, learning in the form of groups, an effective and efficient game is needed, and this can be realized through *digital educational* games.

Digital Educational Games in Learning in Elementary Schools

The development of information technology has influenced the creation of a digital-based educational game that presents the game as an object that is not only silent but also visually visible, and can move and sound (audio-visual), even though this digital educational game is a learning game but does not eliminate providing fun in playing it. This is proven through the analysis of the three journals that the existence of educational media games is able to improve the learning process to be much more fun and able to help improve students' understanding, that's because digital educational games are designed with the most attractive appearance possible in order to increase students' desire to participate in learning.

The Use of Digital Educational Games in Mathematics Learning

Mathematics is a science that discusses an idea or idea that is arranged hierarchically and uses deductive reasoning (Soedjadi, 2000). The existence of abstract concepts that are accepted by students in mathematics lessons encourages reinforcement and repetition to be made so that they last a long time in students' memory. By managing mathematics, learning using educational games is an effective and efficient alternative solution in teaching mathematics learning that has been proven through the three journals. In addition, by equipping a picture display that can move, make sounds, and have attractive colors, it can be more memorable and easier to remember in students' memory. The use of digital educational games in mathematics learning also combines different learning styles of students, such as combining visual, auditory, or kinesthetic learning styles

Advantages of Using Digital Educational Games

In the use of each learning method used by teachers, of course, there are several advantages of its use, as well as the use of digital educational games. Some of the advantages of using digital educational games as a learning medium are:

1. Students become more likely to interact and play an active role in learning.

2. It can create a pleasant learning atmosphere for students so that motivation arises in students to participate in learning.

3. Teachers feel helped in providing material in a fun way.

4. Motivate students not to feel afraid in learning math lessons because they are displayed attractively.

5. Providing opportunities for students to be able to control the learning process in accordance with their wishes.

Lack of Use of Digital Educational Games

There are advantages in the learning method using digital educational games, of course, there are also disadvantages in the process of using digital educational games when learning takes place. There are some disadvantages in the use of digital educational games, namely:

1. The time needed is longer because not all students are able to quickly understand the use of *digital educational* games.

2. Teachers must be able to maintain classroom conditions so that they continue to run conducively.

3. There are network constraints that can cause disruption to the learning process

CONCLUSION

Through the results of the analysis of several journals, it was found that there was an increase in understanding of concepts in mathematics subjects using digital educational games, this can be due to the fact that the age of students at the elementary school level is still entering the age of learning while playing with learning media in the form of *games* which is liked by children is proven to be able to attract their attention so as to encourage students' desire to participate in learning carried out with teachers and by using digital educational games in mathematics learning can help students to better understand mathematical concepts as evidenced through research that has been carried out from the three articles that there is an increase in grades after using *games* Digital education as a learning medium compared to before educational games were used as a learning medium.

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