The Effectiveness of Digital Game-Based Learning in Elementary Schools: A Literature Review

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Abstract: The development of the digital era demands scientific innovation and learning that is in line with technological developments. One of the innovations in learning that utilizes technology is digital game-based learning. Researchers in various fields and levels of education have researched many digital game-based learning concepts, including at the education level in elementary schools. This study aims to determine the effectiveness of learning using digital games in elementary schools. The method used is systematic literature review with Google Scholar database. Review literature was analyzed based on articles published in the period 2018 to 2022 with search keywords in three stages. The results of the literature search in phase 1 obtained publication data with the search keyword "digital comic-based learning" as many as 33 documents. Data reduction in step 2 by focusing the search on research subjects in the basic school obtained data from as many as 19 documents. The data validation in step 3 by setting the criteria for publicly accessible article documents is obtained 10. In-depth data analysis was carried out on 6 articles that were in accordance with the field of study while 4 articles were not analyzed due to exclusion criteria. Based on the findings of literature studies, learning to use digital games in elementary schools can increase learning interest, enthusiasm for learning, learning motivation, and learning outcomes in various fields of science. The findings can be concluded that digital game-based learning in elementary schools is effective if used for the purpose of increasing student interest, motivation, activity and learning outcomes.

Key Word: Primary school learning, digital games, literature review.

INTRODUCTION

Educational technology is not only considered as equipment or software, but it can also refer to processes that help people understand things more clearly and quickly. The goal of using educational technology is to simplify and use fewer resources, but it can also improve learning outcomes (Purosad et al., 2020). The use of technology in learning will increase

success in achieving learning objectives so as to improve the quality of education. Facilities and infrastructure, teacher quality, and student quality are some of the things that have an impact on the quality of the Indonesian education system (Fajri & Afriansyah, 2019).

Learning media has an important role in improving the quality of education. The use of learning media can help achieve learning objectives and help students understand the material while preventing boredom (Sutarno & Mukhidin, 2015; Firmadani, 2020). Other benefits of integrating media into the educational process include the possibility that they will help instructors produce quality content (Hidayat et al., 2019). Teachers must utilize media-based learning resources so that students can understand the information taught and achieve their goals (Kristianto & Rahayu, 2020). One of the learning media that is currently becoming a trend and starting to be widely applied in learning is game-based learning media which is later known as digital game-based learning.

Digital game-based learning (DGBL) has gained significant attention in recent years as a potential educational tool for primary schools. The increasing use of technology in learning provides space for educators to explore innovative learning that involves students in enhancing their learning experience. Today's technological development, children can easily obtain information and get it quickly and endlessly (Salsabila et al., 2021). Digital game-based learning refers to the use of digital games as a medium for teaching and learning, combining educational content and objectives in a game format. The promised potential of the digital game-based learning concept becomes an opportunity and challenge.

Digital game-based learning has been shown to have positive effects on student motivation and the learning process in a number of studies. For instance, Gee (2003) study found that online gaming has the ability to create an engaging and difficult learning environment that promotes active engagement and problem-solving abilities. Similar research was done by Squire (2005) to demonstrate how DGBL can foster student collaboration and social engagement as well as teamwork and communication abilities.

Additionally, learning results for students can be enhanced by using digital games. Wouters et al. (2013)'s study found that students who participated in digital game-based learning outperformed those who received traditional instruction on the post-test. Digital games' interactive features let students explore and apply ideas in fun and interesting ways, enhancing learning results.

Aside from its academic advantages, digital game-based learning has been found to support the growth of critical thinking abilities. Students that played educational games demonstrated improved levels of problem-solving and analytical thinking abilities, according to a 2012 study by Hwang et al. Digital game-based learning challenges students to think critically and apply what they have learned in real-world situations by giving them a variety of problems and puzzles to solve.

It's necessary to be aware of the drawbacks of digital game-based learning in elementary schools despite its promise and advantages. Concerns concerning the possibility of excessive screen usage and its effects on students' physical and mental health have been highlighted by certain studies. For the successful adoption of digital game-based learning in the classroom, it is also necessary to address issues with game design, curriculum integration, and teacher preparation.

This literature review's main goal is to give readers a thorough grasp of how well digital games are used to teach in elementary schools. The study looks at previous studies to determine the advantages and disadvantages of digital game-based learning and offers suggestions for effective incorporation into the curriculum. In the end, the objective is to teach educators about the potential of DGBL as a useful tool for enhancing learning opportunities in elementary schools and to contribute to continuing discussions regarding the use of technology in education.

METHOD

Sistematic literature review (SLR) is a category of literature review that gathers and critically examines several studies, research, or articles through a systematic procedure and technique. The main reason for SLR is to offer a thorough summary of the recent and obtainable literature on the recent relevant research question (De La Cruz et al., 2016). However, SLR is a technique of arrangement and unification of result findings that are suitable and accurate standards to resolve a definite problem (Piper, 2013). It is a procedure of developing an obvious question that utilizes rational and logical particular approaches to classifying, picking, and crucially measuring or calculating important investigations, and assembling and examining the data gotten from the findings for the current review. SLR attempts to

categorize, evaluate, classify, and generate realistic support that assembles pre-stipulated suitability measures to remedy and resolve a provided research matter.

A meta-evaluation is a mathematical review of the data available from several sources that aims to look into or address the problem that has been found (Piper, 2013). According to Li et al., (2020), performance SLR is frequently used in studies on learning to examine the effects of and advancements in a certain subject.Consequently, in the current research, a modified PRISMA statement model is applied for the technical procedure to examine, gather, and produce complete related info in the previous research to offer the state of the research. Accordingly, the PRISMA data facilitates the researcher to equip and enhance the coverage of the paper assessment (Khan & Qureshi, 2020) and shape on designated aims of the finding of the research. The example underneath shows the inclusive and inclusion literature at each phase. Figure 1 shows the methodology of our study.

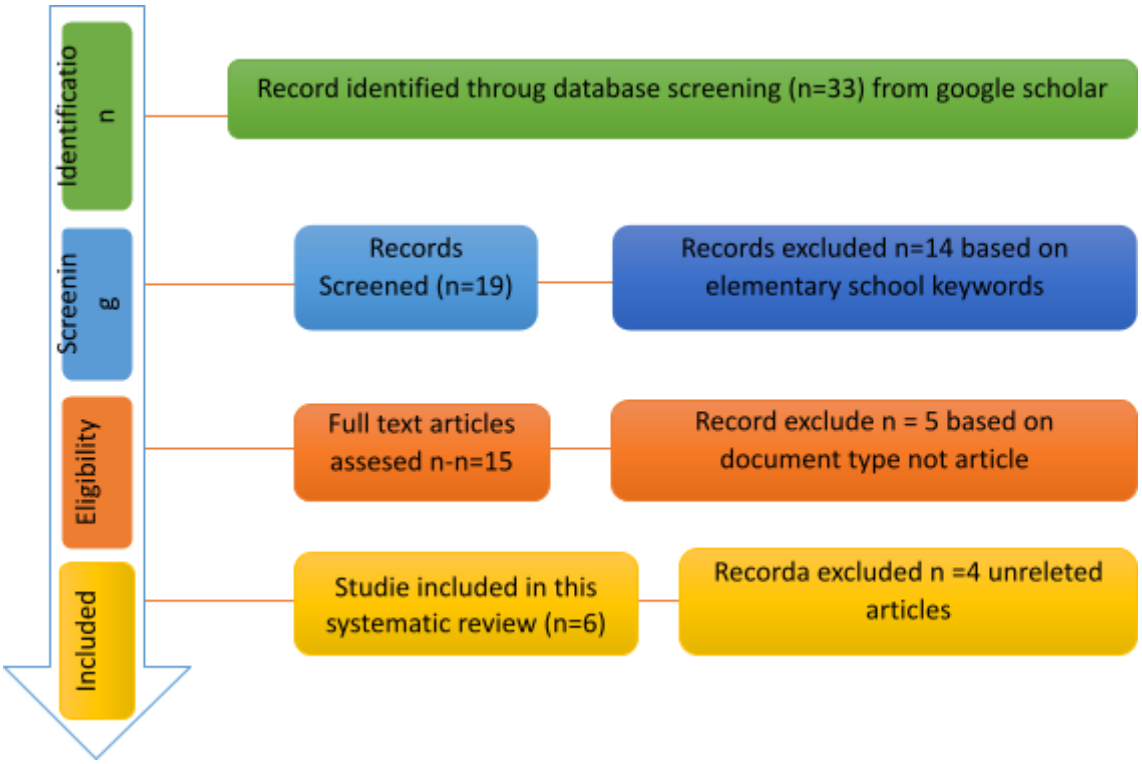

Figure 1 The process of searching for article documents in systematic analysis review

RESULTS AND DISCUSSION

The article search step begins by accessing the google scholar database at the url https://scholar.google.com/. The determination of search keywords was carried out using Indonesian "digital game-based learning" then limited searches with articles published in the

period 2018 to 2022. The article search will be conducted on July 12, 2023. A search with the keyword in question returns 33 results with different types of documents. The display of search results with the keyword "digital game-based learning" is shown in figure 2.

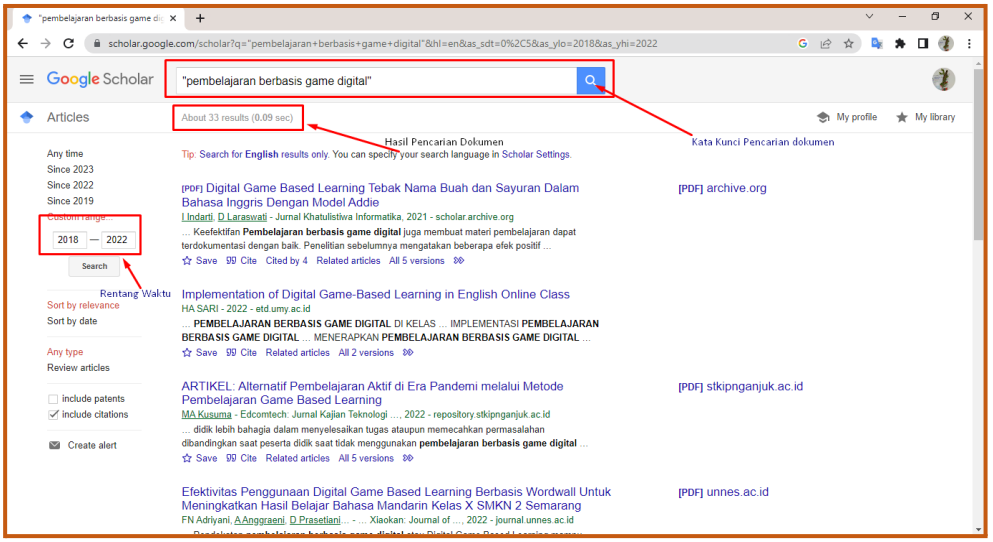

Figure 2. Stage 1 search process with digital game-based learning keywords

The search in stage 1 showed the results of 33 documents with various types of files. To obtain articles that are in accordance with the research objectives, a stage 2 search was carried out by adding the keyword "elementary school" by adding the insert of the word "and" in both keywords. The results of the phase 2 search crucified a research study, namely digital game-based learning in elementary schools. A stage 2 search on the Google Scholat database returns 19 results. The detailed view of the stage 2 search is presented in figure 3 as follows.

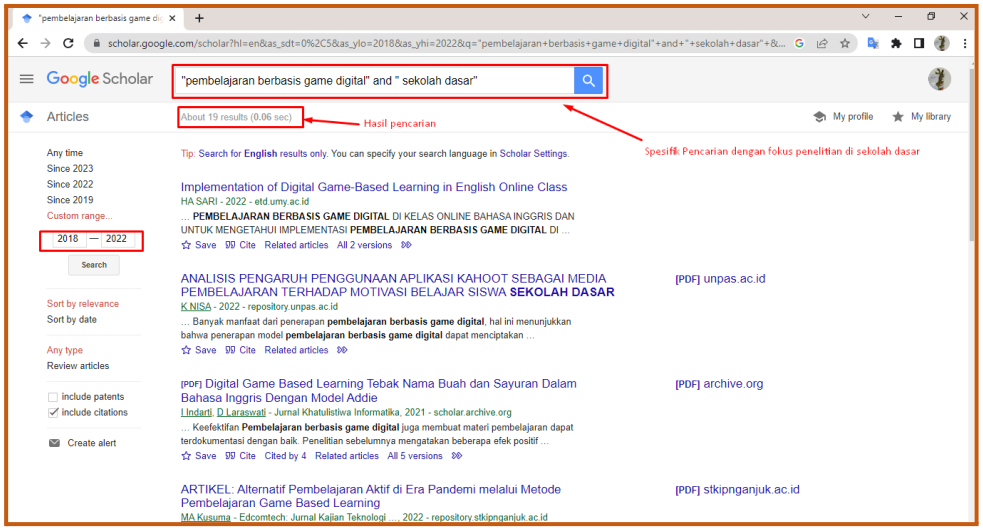

Figure 3. Stage 2 search process with digital game-based learning keywords and elementary school

Stage 3 of data collection is by downloading documents from 19 stage 2 article search results. Stage 3 data search is carried out by selecting documents in the form of journal articles. Other non-search documents such as proceedings articles, books or HTML pages are ignored. The search in stage 3 obtained documents as many as 10 journal articles. 10 journal articles that were successfully downloaded were then carried out a systematic review analysis. Of the 10 existing articles, there are 4 articles outside the topic of discussion due to several things including 1) the article does not discuss the specific subject of research so that it cannot be included in the analysis of digital game-based learning in elementary schools. 2) The article does not discuss learning in elementary school in depth, but only mentions a little related to learning in elementary school. 3) The article does not provide clear hasis so that the results of research on its effectiveness in digital game-based learning in elementary schools are unknown. The results of the systematic analysis of the review are presented in table 1 below.

Table 1. Results of literature analysis review of journal articles related to the topic of digital game-based learning in elementary schools

NO	**Research Title**	**Field of Study**	**Research Results**
1	Analysis of Student Learning Activity Using Quizizz Media during a Pandemic (Rahmawati et al., 2021)	Evaluate learning in elementary schools using Media Quizizz	The use of quizizz in learning can increase student learning activity in elementary school
2	Development of Evaluation Tools Using Quizizz Application In Mathematics (Yudha & Dwiprabowo, 2022)	Development of evaluation tools for mathematics learning in elementary schools	Learning math in elementary school using Quizizz's online test-based evaluation tool increased interest in student learning by 84.67%
3	Digital Game Based Learning Guess the Name of Fruits and Vegetables in English with Addie Model (Indarti & Laraswati, 2021)	English language learning	Learning to use fruit guessing games in English in elementary schools can be enthusiastic and also interactivity of students

4.	Analyzing the Effectiveness of Quizizz Media as a Learning Evaluation Tool During Distance Learning (Lumban Gaol et al., 2021)	Learning evaluation in elementary school based on quiz games	Learning evaluation using test questions in the form of game quizzes provides a new experience for students. Students feel more interested when doing game quiz-based questions compared to printed form questions.
	Penerapan HOTs In Mathematics Game Learning Media with DGBL Method (Wijaya & Andriyono, 2020)	Higher order thinking skills in mathematics learning	Digital game-based learning developed with game output products is able to increase students' interest and understanding of mathematical material.
	The Effect of Using Wordwall-Based Educational Games in Mathematics Learning on Learning Motivation (Nisa & Susanto, 2022)	Student motivation in mathematics learning	The use of wordwall media in mathematics learning is proven to improve learning outcomes and student activeness in mathematics learning

Based on the results of the analysis of 6 articles that have been conducted, some of the findings in this study include:

1. Research conducted related to the use of digital game-based learning in the last 5 years (2018 – 2022) in elementary schools has not been widely conducted by researchers.
2. Digital game-based learning can improve several aspects including an increase in student motivation, an increase in student learning activities, an increase in student learning interest and an increase in student learning outcomes.
3. Digital game-based learning can be integrated in various subjects in elementary school and is not limited to 1 specific subject.
4. Digital game-based learning in elementary schools still needs to be developed again seeing the potential that exists and there is still little research that develops learning materials in the form of digital games.

Digital game-based learning is still rarely applied at the elementary school level. This can be seen from the search results on the google scholar data base. From the findings of 33 search results with digital game-based learning keywords, there are only 6 articles that discuss specifically in elementary schools. This data shows that 18% of research on digital game-based learning in elementary schools. While the other 27 search results did not discuss digital game-based learning in elementary schools. Of the 6 articles from the literature review, 2 articles are in the form of development (Indarti & Laraswati, 2021; Wijaya & Andriyono, 2020). Research by Wijaya & Andriyono (2020) developing math learning games for understanding math concepts. Hasil penelitian yang dilakukan oleh Wijaya & Andriyono (2020) shows that mathematics learning games can increase students' understanding of concepts in mathematics learning and are also able to attract students' interest.

Research conducted by Indarti & Laraswati (2021) Developing a digital game to help elementary school students remember the names of fruits and vegetables in English has been shown to increase student interactivity and also attract students' attention. Another study related to the use of digital games in elementary schools using the online tool Quizizz (Lumban Gaol et al., 2021; Rahmawati et al., 2021; Yudha & Dwiprabowo, 2022) Able to create a pleasant learning atmosphere. Other research by utilizing existing digital games as done Nisa & Susanto (2022) shows the results that the use of Wordwall digital games in mathematics learning in elementary schools can increase student activeness and learning outcomes. Dari 6 artikel yang telah dilakukan analisis literature review semuanya menunjukan dampak yang positif terhadap pembelajaran. This needs to be a special concern in developing the direction of elementary school learning in the future.

CONCLUSION

Based on research that has been conducted by several researchers related to the use of digital games in elementary schools overall, the use of digital games is effective when applied in learning. The effectiveness of using digital games in learning can be seen from several aspects that can be improved such as interest, motivation, and also student learning outcomes. However, it is still rare for digital games to be developed for elementary school learning. There is still a need for a more in-depth review of the existing problems so that not many researchers have developed digital games for learning in elementary schools. Therefore,

further studies need to be carried out related to the problems and difficulties of digital game development for further research.

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