The Effect of Digital Snakes-and-Ladders Media on Learning Activity in Elementary School Social Science Instruction

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ABSTRACT

This study investigates the effect of digital snakes-and-ladders game-based media on students' learning activities in Social Science (IPAS) instruction at the elementary school level. The research was conducted in a fourth-grade class at an Islamic elementary school in Tangerang, Indonesia, involving 19 students as research participants. A quantitative approach with a pre-experimental one-group pretest–posttest design was employed. Students' learning activity data were collected through observation instruments and learning activity tests administered before and after the implementation of the digital snakes-and-ladders media. The data were analyzed using a paired-sample t-test. The results indicate a significant improvement in students' learning activity after using digital snakes-and-ladders media, as reflected in the increase in mean scores from the pretest to the posttest. These findings demonstrate that integrating digital game-based learning media into IPAS instruction can create a more engaging, interactive, and student-centered learning environment. The study provides empirical evidence for the growing body of research on digital game-based learning in elementary education, particularly in enhancing students' learning activities within integrated subject contexts. The results imply that teachers are encouraged to utilize innovative digital learning media to foster active participation and meaningful learning experiences among elementary school students.

Keywords: *digital learning media; digital snakes-and-ladders; learning activity; game-based learning; Social Science instruction; elementary school*

INTRODUCTION

Learning activities are a fundamental component of effective instruction, particularly at the elementary school level, where students' cognitive, social, and emotional development is still forming. Active learning enables students to engage meaningfully with learning materials through observing, questioning, discussing, and reflecting, rather than passively receiving information from teachers (Rusman, 2017). In Social Science instruction at the elementary level, learning activities play a crucial role in helping students understand social norms, cultural values, and community life, which are inherently contextual and experiential (Setiawati et al., 2019).

However, classroom practices in many elementary schools still tend to rely heavily on teacher-centered approaches, such as lectures and textbook-based instruction. Previous studies have reported that conventional methods often limit students' opportunities to actively participate in learning, leading to low engagement, minimal interaction, and reduced motivation (Giwangsa, 2021; Hasan

et al., 2021). As a consequence, students may perceive Social Science as a monotonous subject dominated by abstract concepts and memorization, rather than as a meaningful learning experience connected to their daily lives.

The challenge of low learning activity is further intensified by the rapid development of science and technology in the 21st century. Contemporary education demands that teachers integrate digital technology into instructional practices to foster interactive, student-centered, and meaningful learning environments (Effendi, 2019). Digital technology offers diverse opportunities to present learning content in more engaging formats, stimulate students' curiosity, and encourage active participation through multimedia and interactivity (Bahri et al., 2018). Nevertheless, many teachers still encounter difficulties in designing and implementing digital learning media that align with curricular objectives and students' developmental characteristics, particularly at the elementary school level (Putri & Citra, 2019).

One instructional approach that has gained increasing attention is digital game-based learning. Game-based media combine educational content with elements of play, such as rules, challenges, and rewards, which can enhance students' motivation and engagement (Afandi, 2015). Among various game-based learning tools, the snakes-and-ladders game has been widely recognized as an effective educational medium due to its simplicity, adaptability, and collaborative nature. Traditionally, snakes-and-ladders has been used as a physical board game to reinforce learning concepts through repetition and interaction (Kurniasih, 2018).

With the advancement of digital technology, the traditional snakes-and-ladders game has evolved into a digital format that integrates multimedia elements, interactive features, and instructional content aligned with learning objectives. Digital snakes-and-ladders media allow students to learn through visual representations, immediate feedback, and collaborative gameplay, potentially enhancing both cognitive and behavioral aspects of learning (Novita & Sundari, 2020; Novita et al., 2020). In Social Science instruction, digital snakes-and-ladders can be designed to incorporate contextual questions related to social norms, cultural practices, and everyday social interactions, thereby making learning more concrete and relevant for elementary students.

Although numerous studies have examined the impact of snakes-and-ladders media on learning outcomes and learning motivation, most focus primarily on cognitive achievement or interest in learning (Putri et al., 2022; Irsal, 2021). Research that specifically investigates students' learning activity as a comprehensive construct—including attention, participation, interaction, and engagement—remains limited, particularly in the context of digital snakes-and-ladders media at the elementary school level. Moreover, existing studies often

examine the use of snakes-and-ladders in general subjects, with relatively little emphasis on Social Science instruction in elementary education.

This study addresses this research gap by examining the effect of digital snakes-and-ladders game-based media on fourth-grade students' learning activity in Social Science instruction. The novelty of this research lies in its specific focus on learning activity as the elementary outcome variable, rather than solely on academic achievement or motivation. In addition, the study emphasizes the integration of digital game-based media within Social Science instruction at the elementary level, a context that has received limited empirical attention. By employing a quantitative pre-experimental design, this study seeks to provide empirical evidence on how digital snakes-and-ladders media can enhance students' active participation and engagement in Social Science instruction.

The findings of this study are expected to contribute both theoretically and practically. Theoretically, the study enriches the literature on digital game-based learning by highlighting its role in fostering learning activity in elementary Social Science education. In practice, the results may serve as a reference for teachers and schools in designing innovative, technology-integrated learning media that promote active, meaningful learning experiences for elementary school students.

METHODS

This study employed a quantitative approach using a pre-experimental one-group pretest–posttest design to examine the effect of digital snakes-and-ladders game-based media on students' learning activity in Social Science instruction (Sugiyono, 2019). The design involved measuring students' learning activity before and after the implementation of the digital learning media.

The research was conducted at an Islamic elementary school in Tangerang, Indonesia, during the second semester of the 2024/2025 academic year. The participants consisted of 19 fourth-grade students selected using a saturated sampling technique, in which all members of the population were included due to the small class size (Suriani et al., 2023).

The independent variable was the use of digital snakes-and-ladders game-based media, while the dependent variable was students' learning activity. Learning activity was defined as students' observable engagement during instruction, including attention, participation, interaction, and involvement in learning tasks (Widodo & Widayanti, 2014).

Data were collected using learning activity tests and structured observation instruments administered as pretests and posttests. The intervention involved integrating digital snakes-and-ladders media into Social Science instruction through

collaborative gameplay and contextual questions aligned with the learning objectives.

Data analysis used descriptive statistics and a paired-samples t-test to examine differences between pretest and posttest scores. Before hypothesis testing, a normality test was performed to ensure the suitability of parametric analysis. All statistical analyses were conducted using SPSS software at the 0.05 significance level.

RESULTS AND DISCUSSION

Descriptive Statistics of Students' Learning Activity

Students' learning activity was measured before and after the implementation of a digital snakes-and-ladders game-based media using a pretest-posttest design. Descriptive statistical analysis was conducted to identify changes in students' learning activity levels.

Table 1. Descriptive Statistics of Learning Activity Scores

Statistic	Pretest	Posttest
N	19	19
Minimum Score	60	80
Maximum Score	75	100
Mean	68.42	90.53
Standard Deviation	5.02	6.21

Table 1 shows a clear increase in students' learning activity scores after using digital snakes-and-ladders media. The mean score increased from 68.42 in the pretest to 90.53 in the posttest, indicating a substantial improvement in students' engagement and participation during Social Science instruction.

Normality Test

Before conducting inferential analysis, a normality test was performed to ensure the data met the assumptions of parametric testing. The Shapiro–Wilk test was used due to the small sample size.

Table 2. Normality Test Results (Shapiro–Wilk)

Data Set	Sig. Value
Pretest	> 0.05
Posttest	> 0.05

The results indicate that both the pretest and posttest data were normally distributed, as the p-values were greater than 0.05. Therefore, parametric statistical analysis using a paired-sample t-test was deemed appropriate.

Paired-Sample t-Test Results

A paired-sample t-test was conducted to determine whether there was a statistically significant difference between students' learning activity scores before and after the implementation of the digital snakes-and-ladders media.

Table 3. Paired-Sample t-Test Results

Comparison	Mean Difference	Sig. (p-value)
Pretest–Posttest	22.11	< 0.05

The paired-sample t-test results show a significant difference between pretest and posttest learning activity scores ($p < 0.05$). This finding indicates that the use of digital snakes-and-ladders game-based media had a statistically significant effect on improving students' learning activity in Social Science instruction.

The findings of this study demonstrate that the use of digital snakes-and-ladders game-based media significantly improved fourth-grade students' learning activity in Social Science instruction. The increase in posttest scores indicates that students became more actively involved in the learning process after the integration of the digital game-based media. This result suggests that digital snakes-and-ladders media effectively transformed the learning environment from a teacher-centered approach to a more interactive, student-centered experience.

The game's interactive nature can explain the improvement in students' learning activity. Game-based learning encourages students to actively participate through turn-taking, problem-solving, and immediate responses to learning tasks. These elements align with constructivist learning theory, which emphasizes that knowledge is constructed through active engagement and social interaction (Rusman, 2017). In this study, students were not merely passive recipients of information but were required to think, respond, and collaborate during gameplay, leading to higher levels of attention and participation.

Furthermore, the use of digital media provided visual and interactive stimuli that enhanced students' motivation and focus. Previous research has shown that digital learning media can increase students' interest and engagement by presenting learning content in visually appealing and dynamic formats (Hasan et al., 2021; Bahri et al., 2018). The digital snakes-and-ladders media used in this study incorporated contextual Social Science questions, helping students connect abstract concepts such as social norms and cultural practices to real-life situations. This contextualization is essential in Social Science instruction, where understanding is closely related to students' everyday experiences (Setiawati et al., 2019).

The findings of this study are consistent with earlier research reporting the positive effects of snakes-and-ladders media on learning outcomes and motivation.

For example, Novita and Sundari (2020) found that digital snakes-and-ladders games improved students' learning outcomes by increasing engagement and motivation. Similarly, Afandi (2015) reported that snakes-and-ladders media enhanced students' interest and participation during learning activities. However, unlike previous studies that primarily focused on cognitive achievement or learning interest, this study specifically examined learning activity as a multidimensional construct encompassing attention, interaction, and participation. This focus represents a key contribution of the present research.

Another important aspect of the findings is the role of collaborative learning during gameplay. The digital snakes-and-ladders activity required students to work in groups, discuss possible answers, and make joint decisions. Such collaboration fosters social interaction and communication skills, which are integral components of Social Science education. This result aligns with Widodo and Widayanti (2014), who emphasized that learning activity increases when students are provided with opportunities for interaction and cooperative learning.

Despite the positive findings, several limitations should be acknowledged. The use of a pre-experimental design without a control group limits the ability to attribute improvements solely to the intervention. Additionally, the relatively small sample size restricts the generalizability of the findings. Future studies are encouraged to employ quasi-experimental or experimental designs with larger samples and control groups to further the effectiveness of digital snakes-and-ladders media in Social Science instruction.

Overall, the discussion highlights that digital snakes-and-ladders game-based media is an effective instructional tool for enhancing learning activity in elementary Social Science classrooms. By integrating digital technology and game-based learning principles, teachers can create engaging learning environments that promote active participation and meaningful learning experiences.

CONCLUSION

This study concludes that the implementation of digital snakes-and-ladders game-based media has a significant positive effect on fourth-grade students' learning activity in Social Science instruction. The findings indicate that integrating digital game-based learning into classroom instruction can effectively enhance students' attention, participation, interaction, and overall engagement during the learning process. The improvement in learning activity demonstrates that digital snakes-and-ladders media provides an interactive and student-centered learning environment that supports active learning at the elementary school level.

Theoretical Implications

From a theoretical perspective, this study contributes to the body of knowledge on digital game-based learning by emphasizing learning activity as a central outcome variable in elementary education. While previous studies have largely focused on cognitive achievement or learning motivation, the present research highlights the importance of behavioral and participatory aspects of learning, particularly in Social Science (IPAS) instruction. The findings support constructivist learning theory, which posits that meaningful learning occurs through active engagement and social interaction. By demonstrating how digital snakes-and-ladders media facilitates these processes, this study extends theoretical discussions on the role of digital games in fostering active learning environments in elementary classrooms.

Practical Implications

In practice, the results of this study suggest that elementary school teachers are encouraged to integrate digital game-based learning media, such as digital snakes-and-ladders, into Social Science instruction to promote students' learning. The use of simple and adaptable digital games can help teachers create more engaging lessons without requiring complex technological resources. Schools and educational stakeholders may also consider providing professional development programs to support teachers in designing and implementing digital learning media that align with curriculum objectives. Furthermore, the findings indicate that digital snakes-and-ladders media can serve as an alternative instructional strategy to reduce student passivity and enhance classroom interaction in elementary education.

Limitations and Future Research

Despite its positive findings, this study has several limitations, including the use of a pre-experimental design without a control group and a relatively small sample size. Future research is recommended to employ experimental or quasi-experimental designs with larger and more diverse samples to strengthen the generalizability of the results. Further studies may also explore the long-term effects of digital snakes-and-ladders media on students' learning activity and examine its impact on other learning outcomes, such as critical thinking skills and social competence.

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