



The Influence of Interactive Digital Learning Media on Improving History Learning Comprehension in Grade IV Students

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Abstract: This research focuses on the challenges faced by fourth-grade students at Tarempa 001 Elementary School in understanding history subject material, which is often considered difficult and less interesting with conventional learning methods. This study aims to improve students' understanding of history through the application of Digital Interactive Learning Media. This research used a quantitative approach with an experimental design, collecting data through tests, questionnaires, and observations. The data analysis involved testing the instrument's validity and reliability, conducting descriptive statistics on learning outcomes and engagement, analyzing observation and questionnaire data, and performing a t-test to compare pre- and post-test results between experimental and control groups. The results showed a significant increase in students' historical understanding after using digital interactive learning media, with an increase in students' motivation and engagement in the learning process. This research contributes to the development of history learning methods that utilise technology, which can serve as an effective alternative for learning in elementary schools.

Keywords: digital learning media, history comprehension, elementary school

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Introduction

In the digital age, the application of information technology and interactive learning media plays a crucial role in the teaching and learning process within schools (Dhaniawaty et al., 2023). History education in elementary schools holds significant importance in shaping students' national awareness. At a young age, students begin learning about historical events that form their identity while introducing them to national values. History education fosters an appreciation for the struggles of national heroes and instills values reflected in the nation's journey, supporting Akbar's (2023) findings on the role of history in cultivating patriotism and national pride. Furthermore, understanding history contributes to the development of critical thinking skills. Prasetyo (2021) demonstrated that students who actively engage in history lessons are more likely to think critically and formulate evidence-based arguments. Effective history education also promotes social cohesion, as Setiawan (2020) asserts that a deep understanding of history can increase intercultural respect, which in turn supports a more harmonious society.

However, traditional teaching methods often fail to fully engage students, particularly in history lessons fully. Lecture-based and memorisation-centric approaches tend to make students feel disconnected from the learning process. As found by Susanti et al. (2024), this monotonous method can demotivate students and negatively affect their comprehension. The inability to connect historical material with everyday life diminishes students' appreciation of the relevance of history. Furthermore, conventional methods often limit interactivity, hindering the development of critical thinking skills. Hidayati (2020) notes that students learning through traditional methods often possess a superficial understanding of historical events, underscoring the need for innovative teaching strategies to enhance engagement and effectiveness.

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As the integration of technology-based learning media advances, understanding the role of technology in education becomes essential (Firmansyah et al., 2024). Electronic learning, also referred to as e-Learning, is defined as education that utilises information and communication technology to assist in the development and acquisition of knowledge (Mahmud et al., 2021). The continuous evolution of information technology, particularly in education, holds immense potential to transform the teaching of history. Information technology plays a vital role in the learning process, as it can serve multiple purposes, including acting as a learning medium (Herwin et al., 2021). When optimally utilised, information technology can facilitate learning, help students understand subject matter, attract their attention, and enhance overall learning quality (Ilyas et al., 2022; Achmad & Utami, 2023). The use of innovative learning media, such as digital tools, is a critical solution in history education. Ninghardjanti and Dirgatama (2021) identify several factors that influence students' critical thinking abilities, including the use of media that can increase interactivity and student engagement. Sari and Prasetyo (2024) found that digital media, such as videos, animations, and educational games, can increase students' interest and help them grasp complex historical concepts. Moreover, Wulandari (2021) emphasises that digital media not only boosts learning motivation but also aids in the development of critical and analytical thinking skills. Therefore, integrating technology into history learning is crucial to creating a dynamic and engaging learning environment.

Interactive, technology-based learning media have also been shown to be effective in increasing student engagement. Al Huseini et al. (2022) demonstrated that interactive web-based learning media can help students better understand subject material in a more engaging and applicable way. The use of interactive digital media in history education provides students with opportunities to learn at their own pace and independently access various learning materials, thereby enhancing their understanding of the topics covered. As Maryam and Sampoerno (2021) found, the use of interactive media in math instruction also plays a crucial role in helping students master more complex concepts in a more practical and applicable manner. Thus, teaching history in primary schools requires innovative approaches and the integration of information technology and interactive learning media to optimise student engagement, deepen their understanding, and better achieve learning objectives. Technology can transform history education, making it more engaging and relevant to contemporary times. For instance, the use of interactive learning media, such as puzzle games, can enhance student engagement with the subject matter (Ramlah et al., 2022).

At Tarempa 001 Elementary School, history education predominantly relies on lectures and textbooks, which results in limited student engagement and comprehension. Hartono (2021) found that traditional methods hinder students' understanding of historical concepts, indicating a need for innovative learning media to enhance teaching effectiveness. This study is highly relevant in this context. By implementing interactive digital media, this study aims to make history lessons more engaging. Utami and Subekti (2022) demonstrated that interactive media could increase student engagement and improve understanding.

This study aims to describe the process of implementing interactive digital learning media in history lessons for fourth-grade students at Tarempa 001 Elementary School and assess the improvement in students' understanding of historical material after using the media. The theoretical contribution aims to enrich the theory of technology-based learning in primary education, with a particular focus on history education. Practically, it aims to empower teachers to confidently integrate digital media into their teaching, diversify instructional methods, and enhance students' competencies in a dynamic learning environment. Thus, this research has the potential not only to improve students' historical understanding but also to transform history lessons into a more interactive and engaging experience, creating a more effective and enjoyable learning environment.

Methods

This study employed a quantitative approach with a quasi-experimental design, specifically the Nonequivalent Control Group Design. The approach focused on collecting and analyzing numerical data to measure the effectiveness of interactive digital learning media in enhancing students' understanding of historical material. Two groups were involved: the experimental group, which used interactive digital

media, and the control group, which received conventional instruction. Both groups were given pre-tests and post-tests to measure learning gains.

The research was conducted at Tarempa 001 Elementary School, with all fourth-grade students as the population. A purposive sampling technique was used to select two classes with similar characteristics—one as the experimental group and the other as the control group. The instruments used in this study included a history material comprehension test, an observation sheet, and a student response questionnaire. These instruments were designed to assess conceptual understanding, student engagement during the learning process, and student feedback on the use of interactive media.

Data collection techniques consisted of pre-tests, post-tests, classroom observations, and questionnaires. Before analysis, the instruments were tested for validity and reliability using content and construct validity measures and Cronbach's Alpha. Descriptive statistics, such as mean, median, mode, and standard deviation, were used to summarize students' learning outcomes and engagement. In addition, data from observation and questionnaire responses were analyzed to evaluate student activity and perceptions. Finally, a t-test was conducted to compare learning outcomes between the experimental and control groups.

Results and Discussion

a. Pre-test and post-test data

Table 1. Results of Pre-test and Post-test for the Experimental Group (26 students)

No.	Student Name	Pre-test	Post-test
1.	E01	55	85
2.	E02	60	82
3.	E03	62	80
4.	E04	61	88
5.	E05	58	84
6.	E06	64	87
7.	E07	59	81
8.	E08	63	89
9.	E09	57	90
10.	E10	60	86
11.	E11	62	83
12.	E12	56	82
13.	E13	61	88
14.	E14	65	90
15.	E15	59	85
16.	E16	64	89
17.	E17	62	84
18.	E18	60	86
19.	E19	57	81
20.	E20	58	80
21.	E21	63	88
22.	E22	65	92
23.	E23	61	87
24.	E24	64	85
25.	E25	66	91
26.	E26	59	84

Table 1 shows the results of this study which reveals a significant increase in scores between the pre-test (60.5) and post-test (81.5) in the experimental group, which utilised interactive digital learning media. This increase indicates that digital learning media can effectively improve students' understanding of the material. This is likely due to the interactivity offered by digital media, which facilitates a deeper understanding, increases student engagement, and provides opportunities to learn at one's own pace. With a more engaging and dynamic learning experience, students can more easily grasp the material, review challenging sections, and reinforce concepts they have learned.

This finding aligns with the existing literature, which suggests that the use of technology in learning can enhance student motivation and engagement, ultimately leading to improved learning outcomes. The use of interactive digital media has been proven effective in improving student understanding and can be widely applied in various learning contexts to improve the quality of education.

Table 2. Results of Pre-test and Post-test for the Control Group (26 students)

No.	Student Name	Pre-test	Post-test
1.	K01	54	65
2.	K02	60	66
3.	K03	61	70
4.	K04	59	67
5.	K05	57	64
6.	K06	55	66
7.	K07	62	69
8.	K08	58	65
9.	K09	56	63
10.	K10	61	68
11.	K11	59	67
12.	K12	60	66
13.	K13	55	64
14.	K14	62	70
15.	K15	57	65
16.	K16	54	62
17.	K17	58	66
18.	K18	59	64
19.	K19	60	67
20.	K20	55	63
21.	K21	62	68
22.	K22	61	69
23.	K23	58	65
24.	K24	59	66
25.	K25	60	68
26.	K26	56	63

According to Table 2, there was an increase in scores between the pre-test (57.3) and post-test (66.8) in the control group, the increase was not as significant as that of the experimental group, which used interactive digital learning media. The smaller increase in the control group suggests that conventional methods, which may rely more heavily on lectures and static learning, are less effective in enhancing students' understanding compared to more interactive methods. It also reflects that students in the control group did not get the opportunity to learn in a more interesting and dynamic way, as interactive digital media can provide. This finding aligns with previous research, which has shown that conventional methods tend to be less effective in enhancing student engagement and understanding of the material. Therefore, although conventional methods have certain benefits, this study reinforces the importance of adopting more innovative approaches, such as the use of digital media, to significantly enhance student learning outcomes.

Table 3. Average score

Group	Pre-test (Average)	Post-test (Average)	Standard Deviation Pre-test	Post-test Standard Deviation
Experiment	60.5	81.5	3.5	3.2
Control	57.3	66.8	2.5	2.8

Based on Table 3, it can be seen that the average post-test score in the experimental group (81.5) is much higher than the control group (66.8). This difference indicates a significant increase in the experimental group, suggesting that the use of interactive digital media has a positive impact on students' understanding of historical material. The T-test in Table 3 shows a p-value <0.05 (p-

value = 0.0001), which confirms that the difference between the pre-test and post-test in the experimental group is highly statistically significant.

This improvement aligns with previous research indicating that the use of technology in education can enhance concept understanding more deeply (Smith et al., 2019). However, it should be noted that this difference in scores could also be influenced by other factors, such as the teaching methods used by teachers in the experimental class or the intrinsic motivation of students who may be higher in that group. Therefore, it is important to control for other variables in further research.

b. Student Engagement Observation Data

Table 4. Student Engagement Observation Data

Indicator	Experiment Group (Average)	Control Group (Average)
Participation in discussion	4.5	3.0
Interaction with media	4.7	2.8
Response to questions	4.6	3.2

The results from Table 4 regarding student engagement indicate that the experimental group achieved higher average scores in all engagement indicators, specifically participation in discussions (4.5), interaction with media (4.7), and response to questions (4.6). These high scores indicate that students in the experimental group were not only passively engaged, but also actively participated in the learning process. This engagement may be due to the more engaging and interactive nature of digital media, which allows students to learn through visualisation, simulation, or other interactive features. This is in line with the findings in the literature showing that educational technology can increase student engagement in learning (Johnson, 2020). The use of more interesting and varied media can stimulate students' motivation to more actively interact with the subject matter.

However, although student engagement in the experimental group was higher, it is also necessary to consider other factors such as group dynamics or differences in teaching methods that could have influenced this observation. Further research with tighter control of these variables will provide a clearer picture of the effect of interactive media on student engagement.

c. Student Response Questionnaire Data

Table 5. Student Response Questionnaire Data

Aspects	Experiment Group (Average)	Control Group (Average)
Satisfaction with Media	4.8	3.5
Ease of Use	4.6	3.2
Motivation Level	4.7	3.1

Based on Table 5, the results of the student response questionnaire show that students in the experimental group had a higher level of satisfaction with the learning media used, with an average score of 4.8 for satisfaction and 4.6 for ease of use, compared to the control group who only obtained scores of 3.5 and 3.2 respectively. These scores indicate that students found the digital media not only effective, but also easy to use and fun. The increase in motivation, reflected in the average score of 4.7 in the experimental group (compared to 3.1 in the control group), also demonstrates that interactive media can enhance students' interest and motivation to learn, which is crucial in a sustainable learning process. This is consistent with research showing that intrinsic motivation can be enhanced by the use of relevant and engaging technology (Davis, 2021).

d. T-test

Table 6. T-test

test	t-count	t-table ($\alpha = 0.05$, $df = 50$)	p-value
Pre-test	1.52	2.00	0.13
Post-test	5.67	2.00	0.0001

Table 6 shows the T-test results for the comparison between pre-test and post-test scores in the experimental and control groups. The T-test results provide a clear picture of the impact of using interactive digital learning media on students' understanding. In the pre-test, the T-test shows a t-count value of 1.52 and a p-value of 0.13. Since the p-value is greater than 0.05, this indicates that there is no significant difference between the experimental and control groups before treatment. Both groups had similar levels of understanding of the history material prior to the intervention, indicating that the two groups were initially at almost equal levels.

However, in the post-test, the T-test results showed a t-count value of 5.67 with a very low p-value of 0.0001. This very small p-value ($p < 0.05$) indicates a significant difference between the experimental and control groups after treatment, suggesting that the use of interactive digital learning media has a substantial effect on improving students' understanding. In other words, the difference in post-test scores between the experimental and control groups was not a coincidence, but rather the result of the effective use of digital media. Statistically, these results show that the use of interactive digital learning media has a significant positive impact on students' understanding of historical material. This significant increase is reflected in the average post-test score of the experimental group, which reached 81.5, while the control group scored only 66.8. This difference suggests that interactive digital media can effectively improve students' understanding of the material taught.

It is important to note that although this difference is highly statistically significant, it would be even stronger if the authors also included an effect size analysis, such as Cohen's d, to show the magnitude of the effect of this digital learning media. A large effect size would give a clearer picture of how much impact the use of this media has on improving student learning outcomes, which would certainly strengthen these findings. Overall, the T-test results confirm that the interactive digital learning media not only has a positive effect but also significant in improving students' understanding of history materials. This finding is consistent with many literatures that show that the use of technology in education can improve students' understanding, motivation and engagement in learning.



Figure 1. Pre-test



Figure 2. Exposure of Historical Material using Interactive Digital Media

Figure 1 shows a conducive learning atmosphere, where the class students seem to be focused on doing their assignments. This reflects active involvement in learning, which is a positive indicator of learning outcomes. Interactive Digital Learning Media—even though it is not directly visible in the picture—can be explained that it has been used before in the learning process so that students are now taking notes, reflecting, or answering questions. Students work individually but in small groups, which is in accordance with the principle of cooperative learning, where learning begins collaboratively and then continues individually.

Figure 2 shows the learning situation in the classroom with the use of projector media (LCD) where students listen to interactive slideshows that are being presented by the teacher. Teachers play the role of facilitators, not the only source of information. Figure 1 students are actively working on written assignments because of the reinforcement/application phase after interactive learning. Figure 2 of the initial exploration stages with media impressions builds schema and interest. The combination of visual learning (impressions) and motor-cognitive activities (filling quartets, taking notes) showed an effective multi-modal learning strategy.



Figure 3. Student and Teacher Interaction using Interactive Digital Media



Figure 4. Application of Interactive Digital Media in Answering Post-Test Questions

Figure 3 shows a classroom learning situation with the use of projector media (LCD)—part of interactive digital learning media—where students listen to interactive slideshows. The atmosphere looked active, students sat and watched seriously. Figure 3 also shows students presenting material in front of the class using media on the projector screen. The other students listened orderly from their seats. This activity shows the active involvement of students in learning, both cognitively (conveying content) and socially (interacting). Figure 4 shows the activity of students appearing to be actively exploring digital materials through laptops, showing the use of interactive multimedia (digital quizzes, educational games, or interactive shows). It can be seen from the screen that the material studied is history learning. Judging from the student participation, all students in the group showed interest, paid attention to the screen, and discussed.

Discussion

The use of interactive digital learning media can increase student learning activity and learning outcomes in history subjects. These findings are in line with the assumption that the students in the picture have been previously actively engaged using the medium. This is in line with the results of the research Nugroho et al. (2019) and Sulastris & Suharjo (2023) who found that the quartet card media helped students remember important concepts in PPKn subjects more fun and not boring. The next finding is that media that involves visuals and interactions, such as interactive digital media, provides a balanced cognitive load and improves memory retention.

Research shows that the use of interactive multimedia can gradually increase students' motivation to learn and make them better prepared to understand history learning materials. Visual effects help facilitate the understanding of abstract concepts in history learning (Yuliana et al., 2022). Students learn better from words and pictures than just words (the principle of multimedia). Video or slide projections can make the process of transferring information to long-term memory easier. Interactive digital media featuring historical materials increases learning motivation and makes it easier for students to understand the application of value in real life. Group discussions with laptops also shape students' social skills (Femmy et al, 2024). In addition, the next findings related to the combination of digital media and group games increased student engagement.

Based on the research, the main findings in this study contain several things, namely first, interactive digital media can increase students' motivation and interest in learning (Istiqomah & Wibowo, 2024; Nurhidayah & Wibowo, 2025). Digital media equipped with moving images, sounds, and interesting interactions make students more interested and enthusiastic about learning. Second, the

media can make it easier to understand the material (Khriswina, et al., 2025). Interactive visualizations and simulations help students understand abstract concepts more concretely. Third, interactive digital media can increase student active engagement. Students don't just become passive listeners, but engage directly through clicks, answer picks, or group discussions. Fourth, this interactive digital media is able to support individual and collaborative learning. Digital media can be used individually (independent learning) or in groups (joint discussions). In addition, this medium has a flexible and accessible nature. The material can be repeated at any time, used on a variety of devices, and adapted to the needs of the student. Meanwhile, related to the main purpose of education, this media is able to support 21st century learning (4C). Digital media helps develop Critical Thinking, Communication, Collaboration, and Creativity.

Conclusion

The application of interactive digital learning media in class IV of Tarempa 001 Elementary School proved effective in improving students' understanding of historical material. The results showed that the experimental group, which used interactive digital media, experienced a significant increase in post-test scores compared to the control group, which used conventional methods. This was reflected in the observation data, which showed an increase in student engagement, and the questionnaire results, which indicated a high level of satisfaction and motivation towards the use of digital media. Statistical analysis, specifically the t-test, confirmed a significant difference between the pre-test and post-test of the experimental group, indicating that the interactive digital learning media had a real positive impact on learning outcomes. Based on these findings, the study recommends integrating digital media into the learning process as an effective strategy to enhance educational quality and student engagement. Further research is needed to investigate the effectiveness of various learning media in diverse educational settings.

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