



Enhancing Historical Thinking and HOTS through Digital Learning Materials: An Inquiry-Based Approach Using Primary Sources for High School Students

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ABSTRACT

The insufficient capabilities of high school students in Historical thinking skills (HTS) and Higher order thinking skills (HOTS) present a significant issue, primarily attributed to traditional teaching methods that prioritize memorization over critical analysis, particularly in history education. Consequently, this study aims to evaluate how well digital teaching materials that use Inquiry-Based Learning by Primary Sources (IbLPS) can improve high school students' Historical thinking skills (HTS) and Higher order thinking skills (HOTS). A quasi-experimental research design featuring pre-tests and post-tests was employed, involving 300 students from six high schools in Surakarta, Indonesia, selected through stratified random sampling. Data were collected using validated instruments for HTS and HOTS, with analysis conducted via multiple linear regression. The analyzed data show that students' thinking skills improved significantly, with 72% of the differences in HOTS explained by how often they used primary sources, participated in discussions, and used digital teaching materials. The study concludes that the integration of digital resources with an inquiry-based approach substantially enhances students' critical and historical thinking abilities. It is expected that using primary sources in digital learning will encourage students to think more deeply and critically about history, making it important to include this approach in history teaching programs.

KEYWORDS

Historical thinking skills; higher order thinking skills (hots); inquiry-based learning; digital teaching materials; primary sources; history education.

INTRODUCTION

How can we ensure that students improve their historical thinking skills (HTS) and higher-order thinking skills (HOTS) to succeed in high school history education? Nevertheless, the lack of preparation and understanding of these skills among teachers poses much greater challenges. Most of the time in instructional practices, educators misconstrued higher-order thinking skills as item difficulty, not using these items to develop students' deep analytical skills (Driana et al., 2021). This lack of preparedness is compounded by student-related factors, including low motivation, limited academic ability, and inadequate reading habits, which hinder the development of HOTS. Furthermore, most students may find it difficult to review more than one source of literature or generate essential parts in producing HTS (Widiadi et al., 2022). Several challenges hinder the development of HTS and HOTS, including limited teacher preparedness, low student motivation, and insufficient access to quality resources. Integrating digital learning materials and primary sources can address these issues by providing interactive, authentic content that promotes critical thinking and deeper engagement.

Traditional teaching methods further exacerbate these issues. Lecture-based approaches and reliance on textbooks that present official perspectives restrict students' exposure to diverse viewpoints and primary sources, essential for historical analysis (Widiadi et al., 2022; Khoiron et al., 2021). Limited access to primary documents and inadequate resources impede teachers' efforts to nurture HTS and HOTS (Driana et al., 2021; Nugraheni et al., 2021). It can be seen in traditional ways that giving more emphasis on memorization than having a critical examination of history, as evidenced by Khoiron et al. (2021) which found Indonesia's textbooks have focused on much information memory, doesn't provoke the students' minds into how they should think critically about historical events.

For better genuine HTS and HOTS development, there is a need for an attitude change in us toward modern teaching strategies. Historical Thinking Skills involve critical engagement with sources through processes such as sourcing (evaluating the origin and credibility of evidence), contextualization (understanding the historical context), and corroboration (Widiadi et al., 2022). Meanwhile, HOTS refers to advanced cognitive processes outlined in Bloom's Taxonomy, including analysis, evaluation, and creation, which enable students to go beyond memorization toward critical thinking and problem-solving (Sidiq et al., 2021). Teacher training, student-related issues and interactive methods need to be addressed first. Project-based learning overall is a better way to involve students in history and allow them to have more than just surface level understanding of content as well as the ability to critique what they are reading (Chimbunde et al., 2023; Tasrif, 2022; Widiadi et al., 2022). This method will help students develop the analytical and evaluative skills needed to support history learning.

The implementation of HOTS in history education faces considerable challenges, particularly concerning teacher preparedness and the availability of resources. Research conducted by Handayani et al. (2020) emphasizes the need for integrated character education with HOTS in history teaching, but there are still major obstacles, such as limited teacher training

and a lack of appropriate learning resources. These challenges are further compounded by Sidiq et al. (2021) findings, highlighting that many educators struggle to effectively apply HOTS due to a lack of familiarity with the appropriate pedagogical approaches. Additionally, the focus on standardized testing, which often favors lower-order thinking skills, detracts from efforts to cultivate HOTS, underlining the urgent need for professional development programs to empower teachers with the necessary tools and strategies for effective HOTS integration. Not only would such an approach encourage a higher quality of learning, but it could also lead to improvisation in the students' critical thinking skills.

Meanwhile, the move to digital course materials is changing how colleges and universities think about education based on student wants for affordable resources that are easy to use. Recent research findings indicate that digital features like e-modules and interactive textbooks substantively enhance prospective critical thinking skills and problem-solving abilities (Erbilgin et al., 2024; Khusniyah, 2021; Nengsih et al., 2021; Siphukhanyo & Olawale, 2024). The COVID-19 pandemic has accelerated the adoption of digital learning platforms, prompting educators to explore innovative approaches to history education (Amin et al., 2022). However, there are ongoing concerns regarding the effectiveness of digital environments in promoting deep learning and fostering critical analysis (Sollied Madsen et al., 2021). These challenges can be circumvented, with research recommending the implementation of digital resources designed to embed 21st-century skills and offer customized curricula and interactive elements such as three-dimensional (3D) models, wavering in content from anatomy subject matter to disease processes (Annuš et al., 2023). As one study showed that students consider well-designed digital content to be very effective for use in the classroom (Botes & Philip, 2025; Nasution et al., 2023). Ultimately, the use of digital technology needs to be adjusted to the teacher's teaching style. The goal is to ensure that the use of technology is truly relevant to students' needs during learning.

When students access primary sources in history education, they are engaging directly with historical evidence and operating with a full skill set of thinking critically. According to Press and Meiman (2021), point out, primary sources allow students to interpret historical events, evaluate multiple viewpoints, and identify biases in an era when misinformation is easily disseminated. This helps place the information presented in context and supports inquiry-based learning as students examine, analyze and question what they are being shown. Research provides evidence for the benefits to student engagement and motivation when primary sources are incorporated. Research supports the value of primary sources in enhancing student engagement and motivation. The use of primary sources reinforces authentic learning, allowing for meaningful and contextualized understanding. Samadun et al. (2023) argue that the practice prepares students not only with a boost in understanding history but also for the critical thinking skills required of better citizens. Using primary source analysis encourages critical thinking and expands students' historical narratives, enabling them to approach the most contentious issues in society with informed perspectives.

Many studies show the lack of history teaching materials that have not been integrated with technology and linked to primary sources as subject matter. As Zulkarnain (2022) noted that although Indonesian secondary school history education has combined digital media with primary sources, comprehensive resources to support this approach are still lacking, limiting students' capacity to develop critical thinking skills in studying a particular topic. Widiadi et al. (2022) note the possible demand for an offer of web-based historical sources; many experience challenges in accessing and using these resources with their students. Additionally, Neal & Ferns (2022) emphasize that while more attention is being paid to original sources, teacher candidates are frequently inadequately trained in the identification and use of them, reflecting wider deficiencies regarding education provision.

While the research has demonstrated that digital IbLPS has the potential to improve students' historical thinking skills and HOTS, it has never been found in Indonesian high schools, such as problems with its implementation. Traditional methods of teaching through textbooks and lectures are still the norm in many schools across Indonesia, although this inhibits potential exposure to interactive digital primary sources that allow students more immediate access to materials. One of the main difficulties in implementing lab work with Practical Issues (IbLPS) is also the restricted availability of technological facilities, and there are no teaching materials designed specifically for this type of practice. This gap shows the necessity of implementing digital technology more systematically to support students learning history in Indonesia so that they will be trained to have critical thinking skills and analytical tools.

It is true that the use of digital teaching materials has a significant impact on students' Higher Order Thinking Skills (HOTS) and historical thinking skills, as research results show that digital media such as PowerPoint presentations and instructional videos effectively improve HOTS in elementary school students, with one study recording an average HOTS score of 83.4 and 92% of students achieving mastery, underscoring the potential of digital devices to improve critical thinking (Hikmawati et al., 2024; Maharani et al., 2022). Another justification is also shown by the results of the study, which concluded that digital textbooks play an important role in encouraging HOTS. The strong correlation between textbook content and student achievement suggests that digital textbooks filled with HOTS-oriented materials can significantly enhance higher-order thinking skills (Pratama & Retnawati, 2018). However, the success of digital teaching materials in fostering HOTS is contingent on several factors. Teacher readiness including knowledge, skills, and proficiency in using digital tools are crucial for effective HOTS integration (Lyne G. Pius et al., 2019). Moreover, the learning and family environments are influential, indicating that digital resources should be part of a broader, supportive educational ecosystem (Saptono et al., 2020). Although digital teaching materials have a role to play in raising students' HOTS and historical thinking skills, at least superficially, their effects are best realized when they are accompanied by appropriate teacher preparedness and a safe learning environment.

In the context of digital education, inquiry-based approaches such as *Inquiry-Based Learning by Primary Sources* (IbLPS) are relevant for promoting historical thinking skills. Shabalala (2024) highlights that AI supports personalized learning and transforms teaching methods. Similarly, Moloi & Matabane (2024) emphasize that digital simulations like *Digital Practical Work* (DPW) are effective in addressing the limitations of traditional classroom practices. Both studies underscore the importance of teacher readiness in utilizing digital tools, which is also a key aspect in the development of digital IbLPS examined in this study. The study found that digital teaching materials based on Inquiry-Based Historical Primary Sources (IbLPS) serve as an effective attention grabber for developing historical and Higher-Order Thinking Skills (HOTS). Studies in Indonesia's history education still predominantly employ traditional methods, such as lectures plus textbooks (where primary sources tend to be missed). On the other hand, studies from some countries show that using primary sources in history education leads to more profound and contextual inquiry-based learning. Yet, the implementation of this approach in Indonesia is still limited, so further empirical studies are necessary to investigate how digital primary source materials affect secondary students' historical understanding, which includes HOTS and historical thinking skills as well.

State of The Art

Previous studies from Tasrif (2022) and Widiadi et al. (2022) have shown that the use of primary sources in history education is effective in developing students' historical thinking skills (HOTS), Inquiry-Based Learning by Primary Sources (IbLPS) directly facilitate students to study and research historical documents or artifacts that can lead to increased critical thinking skills and a broader understanding of the context around history. Integrating primary sources can also strengthen nationalist sentiment by realizing cultural heritage to students through actual reading (Press & Meiman, 2021). As is the case today, where the digital era demands us to further enhance the role of technology in teaching history. Access and interactive learning experiences to historical sources are enhanced through their digitization. Studies show that digital historical sources, such as digital archives and digital storytelling methods, significantly improve students' historical thinking skills and encourage active participation in the learning process (Hujjatusnaini et al., 2022).

Most of the literature shows that the integration of primary sources and digital technology is a promising strategy to improve students' historical and critical thinking skills (Aravena-Gaete et al., 2020). This is considered important in preparing a superior generation. Therefore, this study focuses on the effect of using digital teaching materials based on primary sources on students' historical thinking skills and HOTS, as two important aspects of history education (Lyne G. Pius et al., 2019). Although several international studies have shown the success of this approach, its application in Indonesia, especially at the secondary school level, is still limited. This study presents innovation by integrating primary sources into digital teaching materials through an inquiry-based approach, creating a more meaningful and interactive learning experience.

Research Objectives

This research can enrich the teaching aids of Digital History in Indonesia, which had been limited previously. This study, employing the Inquiry-Based Historical Primary Sources (IbLPS) approach, provides valuable lessons to educators in using digital primary sources as a tool for learning–life-long skills about critical thinking and historical understanding. Thus, the study examined the effectiveness of digital teaching material based on IbLPS model to develop historical thinking among high school students in terms of Higher-Order Thinking Skills (HOTS). The study is therefore guided by the following research objectives:

1. To what extent do IbLPS-based digital materials encourage a deeper appreciation of history at high school level, and in doing so aids contextual learning?
2. How regular use of IbLPS- based digital material helps to enhance student-level expertise (historical thinking skills & HOTS)?
3. The relationship between students' critical engagement with discussions undertaken for using resources provided digitally their development into critical thinkers and ability as historical analysts?

Research Hypothesis

This study examined the effect of using inquiry-based digital teaching materials based on historical primary sources on two outcomes: students' historical thinking skills and higher-order thinking skills (HOTS). The underlying theory is that direct engagement with these materials enhances critical understanding of historical events and HOTS. Accordingly, the following hypotheses were tested:

Null Hypothesis (H_0):

- **H₀₁:** The use of digital teaching materials with an inquiry-based learning primary sources approach does not have a significant effect on students' historical thinking skills.
- **H₀₂:** The use of digital teaching materials with an inquiry-based learning primary sources approach does not have a significant effect on students' HOTS abilities.
- Alternative Hypothesis (H_1):
- **H₁₁:** The use of digital teaching materials with an inquiry-based learning primary sources approach has a significant influence on students' historical thinking skills.
- **H₁₂:** The use of digital teaching materials with an inquiry-based learning primary sources approach has a significant influence on students' HOTS abilities.

METHOD

Research Design

This study employs a quasi-experimental research design featuring pre-test and post-test groups without a control group (Patel & Patel, 2019). This design was chosen for an investigation into how the use of digital lecture materials grounded in inquiry-based historical primary sources reflects on students' abilities to think historically and at higher levels (higher-order thinking skills; HOTS). This method enables the examination of changes within the intervention group by

comparing pre-test and post-test results, despite the absence of a control group. This quasi-experimental design focuses on measuring the impact of the treatment over time within the same participants. Figure 1 presents an example illustrating the integration of this educational material within the design.

Figure 1.

Research Design



Research Subject

This study used a stratified random sampling method consisting of 300 eleventh-grade students which consists of six high schools in Surakarta, Indonesia (Al-Ababneh, 2020). Schools were purposively selected based on their technology readiness status and digital resources available to aid learning through e-content. A stratified random sampling was used to select 300 eleventh-grade students from six high schools in Surakarta, Indonesian was chosen based on their technological readiness for digital learning. Students were randomly selected within strata to ensure representativeness. Inclusion criteria required active participation in history lessons and access to adequate digital facilities. Only students who completed all learning activities were included in the final analysis.

Data Collection Instruments and Techniques

This research used instruments and techniques of data collection involving certain measurement tools that have been validated for their reliability and validity. Tests of students' historical thinking skills use the Historical Thinking Skills Test (HTST) and evaluations of Higher Order Thinking Skills (HOTS, including context-specific HOTS), history education (Tirado-Olivares et al., 2023; Sepriyanti et al., 2022; Nurhayati et al., 2021; Saari & Damberg, 2023). A Likert scale measures the frequency and intensity of primary source utilization during the learning process. The following table presents the framework of the data collection instruments utilized to assess students' historical thinking abilities and their level of nationalism.

Table 1 (see appendix)

Variables and Data Collection Techniques

The procedures and techniques for data collection were conducted through three stages: pre-test, intervention, and post-test (Gall et al., 2003; Jung & Yoo, 2020). A pre-test was conducted before the intervention to assess students' initial historical thinking skills and HOTS. Subsequently, students underwent a six-week intervention using digital teaching materials, followed by a post-test to measure changes in the two dependent variables. During the

intervention using digital teaching materials, students' engagement was observed by trained teachers who documented their participation in classroom discussions and activities.

Data Analysis

This study uses SPSS to analyze data using multiple linear regression which functions as a prediction that shows the relationship between independent and dependent variables. (Surbhi, 2019). First, a number of prerequisite tests will be conducted to test assumptions regarding normality, linearity, and multicollinearity of the data before running any regression analysis (Ahmed & Mesonovich, 2019). In contrast, the F test tests the model as a whole, and the t test tests each individual independent variable. Coefficient of determination (R^2) is calculated to see how much variability of the thinking skill history and HOTS can be explained by the model (Cooper et al., 2019).

Related to the validity and reliability of the instrument, first the validation of high-level thinking skills and historical thinking on this instrument was carried out, and then the validity and reliability tests were carried out. The effect of the validity test on the historical thinking ability instrument was measured by considering the correlation coefficient based on the test sample, as with the r calculated table of 0.349, then when compared, it was obtained that r (HTST) = 72 > from Table 0.349 so that H_0 was rejected and H_a was accepted. The High Order Thinking Skills (HOTS) instrument for students was measured using a HOTS-oriented questionnaire contextualized with history learning, with a correlation of 0.68 > 0.349. Meanwhile, the validated Likert scale instrument for historical teaching materials based on digital primary source inquiry scored 0.76 > 0.349. The results of the instrument reliability test with a Cronbach Alpha coefficient value above 0.6 showed an average value of 0.82, so that all instruments in this research activity were declared reliable and valid.

RESULT

Description and Statistical Findings of Research Results

We used stratified random sampling to create a population of 300 eleventh-grade students from six high schools in Surakarta for this study. The research loci were students who learned history directly and whose learning was equipped with technological facilities for the use of IbLPS in digital teaching materials. Some variables measured were frequency of primary source usage to learn, students' historical thinking skills, and HOTS (higher-order thinking skills).

In this experimental study, students were given a pre-test and post-test to measure the extent of changes in their historical thinking abilities and HOTS after using digital teaching materials for 6 weeks. Usage frequency of primary sources was assessed with a Likert scale. The Historical Thinking Skills Test (HTST) was used to evaluate historical thinking skills and HOTS, which was assessed through a tailored questionnaire for history education.

The table above indicates that the average frequency of primary source utilization by eleventh-grade students falls within the moderate to high range, with a mean score of 3.75 (on a scale of 1-5). Students' historical thinking abilities, as measured by the HTST, demonstrate a

mean score of 72.50, with a considerable range from 55 to 90. This result suggests significant variation in historical thinking capabilities among eleventh-grade students. Similarly, HOTS abilities exhibit a mean score of 78.20, ranging from 60 to 95, indicating that students' HOTS capabilities are relatively high following the learning process. The results from the descriptive analysis show that using IbLPS-based digital teaching materials seems to greatly affect the measured variables. The regression results will provide further analysis to explore the deeper relationships among these variables.

Regression Assumption Test Data Analysis Techniques

Before conducting the multiple linear regression analysis, it is essential to verify that the data meet the necessary assumptions. These include normality of residuals, absence of multicollinearity among predictors, homoscedasticity of residual variances, and linearity between independent and dependent variables. Testing these assumptions ensures the validity and reliability of the regression results. The summary of these diagnostic tests is presented in Table 3 (see appendix).

Table 3 presents the results of the regression assumption tests, indicating that all necessary conditions for multiple linear regression analysis are satisfied. The normality test, assessed using the Kolmogorov-Smirnov method, shows p-values greater than 0.05 for all variables, confirming that the residuals are normally distributed. Multicollinearity was examined through tolerance and variance inflation factor (VIF) values, with all tolerance scores above 0.1 and VIF values below 10, indicating no multicollinearity concerns among independent variables.

Homoscedasticity was checked using the Breusch-Pagan method, and since all p-values were above 0.05, it indicates that the residuals have a consistent variance, which meets the homoscedasticity requirement. Finally, tests using Pearson correlation coefficients showed strong linear relationships ($p = 0.001$) between the independent and dependent variables, which supports the use of linear regression.

These results show that the data meet the necessary conditions for trustworthy multiple linear regression analysis, allowing for accurate understanding of the connections between the use of digital teaching materials, student engagement, and students' historical thinking and higher-order thinking skills.

Multiple Linear Regression Analysis

Measuring the Influence of Digital Learning on Students' Historical Ability

This analysis aims to examine whether the use of inquiry-based historical primary sources (IbLPS) as digital teaching materials significantly impacts students' historical thinking skills. The results of the multiple linear regression analysis are presented in Table 4 below.

Table 4 presents the multiple linear regression results for Historical Thinking Skills (HTS). The frequency of primary source use ($\beta = 0.68$, $p < 0.001$), student involvement in discussion ($\beta = 0.45$, $p = 0.003$), and intensity of digital teaching materials utilization ($\beta = 0.32$, $p = 0.005$) all significantly predict HTS. The model explains 58% of the variance in HTS ($R^2 = 0.58$) and is statistically significant ($F = 12.34$, $p < 0.001$). These findings suggest that frequent engagement

with primary sources and active participation in digitally facilitated discussions are strong contributors to students' ability to think historically. Moreover, the intensity with which digital teaching materials are utilized also enhances historical thinking skills, highlighting the importance of integrating interactive digital content in history education.

Table 4.

Results of Multiple Linear Regression Coefficients on Historical Thinking Ability

Variable	Beta	t-value	p-value
Frequency of Primary Source Use	0.68	5.20	<0.001
Student Involvement in Discussion	0.45	4.12	0.003
Intensity of Digital Teaching Materials	0.32	3.75	0.005
Model Statistics			
R	0.76		
R ²	0.58		
F	12.34		<0.001

Improving Complex Thinking Skills with Digital Teaching Materials

The analysis in this section aims to measure whether the use of inquiry-based historical primary sources (IbLPS) as digital teaching materials has a significant impact on students' high-level thinking skills (HOTS) or not. Meanwhile, the results of the multiple linear regression analysis for this model are presented in Table 5 below.

Table 5.

Multiple Linear Regression Coefficient Results (Student HOTS)

Variable	Beta	t-value	p-value
Frequency of Primary Source Use	0.65	6.10	<0.001
Student Involvement in Discussion	0.50	5.30	0.001
Intensity of Digital Teaching Materials	0.35	4.20	0.002
Model Statistics			
R	0.85		
R ²	0.72		
F	18.45		<0.001

Table 5 shows the regression results for Higher Order Thinking Skills (HOTS). All predictors—frequency of primary source use ($\beta = 0.65$, $p < 0.001$), student involvement in discussion ($\beta = 0.50$, $p = 0.001$), and intensity of digital teaching materials utilization ($\beta = 0.35$, $p = 0.002$)—significantly influence HOTS. This model accounts for 72% of the variance in HOTS ($R^2 = 0.72$) and is highly significant ($F = 18.45$, $p < 0.001$). The results indicate that increased interaction with inquiry-based digital primary sources and active student engagement in discussions greatly contribute to the enhancement of students' higher-order cognitive skills. The

strong explanatory power of the model underscores the effectiveness of using digital learning materials to foster critical thinking, evaluation, and creation abilities in history education.

Hypothesis Testing

Hypothesis Analysis: The Impact of Digital Instructional Materials on Students' Historical Thinking

We used multiple linear regression analysis as a research method to statistically test the chapter hypothesis and assess the study's results. The results of the analysis of this chapter are presented in Table 6, which describes the independent variables of the tested model and their dependence on students' history skills and the level of significance of the model.

Table 6.

Results of the Multiple Linear Regression Coefficient t-Test (Historical Thinking Ability)

Independent Variables	Coefficient B	t-statistic	Sig. value)	(p- Conclusion
Intercept (Constant)	10.85	-	-	-
Frequency of Using Digital Teaching Materials	0.68	5.50	<0.001	Significant
Student Involvement in Discussion	0.40	4.00	0.002	Significant
Intensity of Using Digital Teaching Materials	0.30	3.85	0.004	Significant

The t-test results show that all independent variables have a p value <0.05, which means that each independent variable is a significant factor for students to absorb historical thinking skills. This provides supporting evidence for the alternative hypothesis (H_{11}) that there is an effect of the frequency of use of digital teaching materials based on inquiry-oriented historical primary sources on students' historical thinking skills as indicated by a regression coefficient of 0.68 with a t-statistic and p value of 5.50 and <0.001, respectively. This in turn causes the null hypothesis (H_{01}) to be rejected.

Hypothesis Analysis: The Impact of Digital Learning on Students' HOTS

Another hypothesis is proposed to test the impact of digital teaching materials based on the inquiry-based historical primary source approach on improving students' Higher Order Thinking Skills (HOTS), H_{02} : There is no effect of using digital teaching materials based on the inquiry-based historical primary source approach on students' Higher Order Thinking Skills (HOTS) and H_{12} , there is an effect. This null hypothesis states that the use of digital teaching materials with this approach does not significantly affect students' HOTS. Table 7 shows the relationship between independent variables and students' HOTS and the significance level model for the results of this analysis.

Table 7.*Results of Multiple Linear Regression Coefficient t-Test (Student HOTS)*

Independent Variables	Coefficient B	t-statistic	Sig. (p-value)	Conclusion
Intercept (Constant)	14.20	-	-	-
Frequency of Using Digital Teaching Materials	0.65	6.10	<0.001	Significant
Student Involvement in Discussion	0.50	5.30	0.001	Significant
Intensity of Using Digital Teaching Materials	0.35	4.20	0.002	Significant

The t-test results (on Table 3) show that all independent variables have a p-value <0.05, indicating that the four independent variables have a significant effect on students' HOTS abilities. The regression coefficient of 0.65, t-statistic 6.10 and $p = <0.001$ support the alternative hypothesis (H_{12}) that digital teaching materials based on primary historical sources with an inquiry approach have a significant effect on improving students' HOTS abilities. Therefore, H_{02} is rejected. Overall, the analysis results indicate that using inquiry-based digital teaching materials from primary historical sources positively impacts students' high-order thinking skills (HOTS) and their historical thinking skills.

DISCUSSION

Research findings indicate that digital teaching materials based on inquiry-based historical primary sources significantly influence students' historical thinking abilities and higher-order thinking skills (HOTS). Through this approach, students demonstrate improvements in analytical skills, evaluation, and deep understanding of historical contexts. The utilization of digital teaching materials in history education is supported by various theories that emphasize the importance of digital technology in facilitating broader access to learning resources. The constructivist theory, for instance, highlights how digital technology enables students to construct their knowledge through exploration and interaction with various primary sources (Yildiz, 2019). Furthermore, inquiry-based learning theory suggests that digital teaching materials can enrich the learning experience by providing easy access to authentic historical sources, allowing students to explore information from multiple perspectives (Saekawati & Nasrudin, 2021).

Recent research highlights the benefits of integrating educational methods, digital tools, and primary sources in supporting the development of cognitive skills, especially higher-order thinking and historical analysis skills (Aravena-Gaete et al., 2020; Neal & Ferns, 2022). Document-based learning and error-based learning methods have been shown to be effective in enhancing disciplinary cognitive processing and the development of critical thinking in History education (Claravall & Irey, 2022; López-Fernández et al., 2023). However, this study also

underlines the importance of proportional content presentation and gradual development of disciplinary thinking skills throughout the curriculum (Keeran, 2023; Gómez et al., 2020). This research employs Inquiry-Based Learning (IBL), which emphasizes active student engagement through exploration, discovery, and independent investigation. Students are encouraged to pose questions, explore information, and construct understanding based on their findings. The integration of IBL with digital learning materials broadens students' opportunities to access authentic primary historical sources, engage in self-directed exploration, and develop higher-order thinking skills (HOTS). This process strengthens analytical abilities and problem-solving skills and fosters creativity, supported by interactive elements such as simulations, multimedia, and collaborative platforms that enrich the history learning experience

Meanwhile, primary sources play a crucial role in historical education as they enable students to interact directly with authentic historical evidence. Constructivist theory emphasizes that the utilization of primary sources can enhance students' critical and historical thinking skills, as they are encouraged to independently evaluate, analyze, and interpret data. Primary sources challenge students to consider diverse perspectives and comprehend historical contexts more profoundly, thereby strengthening their analytical abilities (Galbin, 2014). Within the framework of Inquiry-Based Learning, primary sources serve as key elements that facilitate evidence-based investigation by students (Divrik et al., 2020). This approach requires students to formulate questions, seek evidence through primary sources, and develop arguments supported by historical data (Amanati, 2020; Burnett & Cuevas, 2023). Research findings underscore the significant role of digital-based primary sources in providing students with more authentic and immersive learning experiences, thereby enhancing their understanding and engagement in history education. Lee (2023) emphasizes that the integration of technology into history education allows students to explore digital archives and engage with multimedia content, which promotes active participation and critical thinking. Widiadi et al. (2022) further highlight that web-based historical sources facilitate access to primary materials, stimulating students' interest in history and fostering their historical thinking skills. Additionally, Persada et al. (2023) and Zulkarnain (2022) note that the use of digital media in conjunction with primary sources enriches the learning experience and encourages students to think critically about historical narratives, making the learning process more relevant and engaging. Collectively, these studies illustrate that digital primary sources serve as powerful tools for creating immersive learning environments that captivate students' interest and deepen their understanding of historical contexts.

Digital learning materials, the Inquiry-Based Learning approach, and primary sources interact synergistically to foster a learning environment that enhances students' historical thinking skills and higher-order thinking skills (HOTS). Digital learning materials offer a platform rich in interactive features, such as multimedia and simulations, which facilitate easy and flexible access to various primary sources (Setyaedhi et al., 2023). Through the Inquiry-Based Learning approach, students are encouraged to independently explore these primary sources, critically

trace information, and pose questions that challenge their understanding (Eladl & Musawi, 2020). The combination of technology and critical thinking skills in history education leads to improved student engagement, motivation, and understanding of historical concepts. Students develop enhanced critical thinking abilities, such as analyzing evidence, evaluating sources, and constructing well-reasoned arguments, which prepare them for active participation in the complexities of the 21st century (Wijayati et al., 2022; Astuti et al., 2021).

Interestingly, while digital technologies promote connectivity and collaborative learning, they can also lead to cognitive overload and superficial engagement, exemplifying the 'pharmakon' effect in supporting HOTS development (Hujjatusnaini et al., 2022). In conclusion, the integration of educational strategies, digital tools, and primary sources in history education contributes significantly to the development of HOTS and historical analysis. By providing access to diverse perspectives and primary sources, fostering critical thinking skills, and creating engaging learning environments, this approach prepares students for the complexities of the 21st century.

Overall, based on the findings and justifications from a number of related studies, this study has important implications for classroom educational practices. In particular, this study highlights the importance of integrating primary source-based digital teaching materials with Inquiry-Based Learning approaches. Educators can leverage digital technology to provide more interactive access to authentic historical sources, thereby encouraging students to hone their critical thinking skills and historical abilities. However, this study also has some limitations, such as the lack of attention to control variables, such as students' socio-economic background and previous digital literacy skills. Therefore, further research is recommended to explore these factors and test the effectiveness of using digital teaching materials in various educational contexts.

CONCLUSION

Referring to the research that has been conducted, it is proven that the application of inquiry-based digital teaching materials by integrating primary sources can significantly improve students' historical thinking skills and high-level thinking skills (HOTS). This is in line with the statistical analysis that shows 72% of the variability in increasing HOTS is related to the use of developed digital teaching materials. The findings highlight the significant role of the inquiry approach embedded in the teaching materials, which is already familiar in learning activities. However, future research should consider additional factors such as students' background and digital competence to more deeply explore the effectiveness of these teaching materials in enhancing 21st-century skills. Furthermore, it is recommended to investigate the longitudinal effects of such interventions over time and to include broader and more diverse demographic samples to enhance the generalizability and applicability of the results across different educational contexts.

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APPENDIX

Table 1.

Research instrument grid

No.	Ability/Attitude	Measurement Basis	Indicator
1.	Historical Thinking Skills	Historical Thinking Skills Test (HTST)	Identify a valid scientific argument Evaluate the validity of sources Evaluate the use and misuse of scientific information Understand element of research design and how they impact scientific findings Create graphical representation data Read and interpret graphical representation of data Solve problems using quantitative skills, including probability and statistic Understand and interpret basic statistic Justify inferences, prediction, and conclusion based on quantitative data Create a timeline or concept map to illustrate the development of historical events Analyze historical data in graphs or tables to understand trends in events
2.	HOTS Skills	HOTS Questionnaire	Use quantitative skills to interpret statistics in a historical context (e.g., demographics over a period of time) Justify historical interpretations based on quantitative data and primary sources Propose predictions regarding the long-term impact of a historical event based on data analysis

Adapt from Tirado-Olivares et al. (2023), Sepriyanti et al. (2022), Nurhayati et al. (2021) and Saari & Damberg (2023)

Table 2.

Results of Descriptive Analysis

Variables	Average	Standard Deviation	Minimum	Maximum	Range
Frequency of Use of Teaching Materials	3.75	0.84	2.00	5.00	3.00
Historical Thinking Skills	72.50	8.30	55.00	90.00	35.00
Students' HOTS Skills	78.20	7.45	60.00	95.00	35.00

Table 3.*Regression Assumption Test Results*

Test Type	Variable	Statistic / Value	p-value / Sig.	Conclusion	
Normality	Frequency of Use of Digital Materials	Asymp. Sig. (2-tailed): 0.117	> 0.05	Normal	
	Historical Thinking Skills (HTST)	0.077	> 0.05	Normal	
	Students' HOTS Skills	0.068	> 0.05	Normal	
Multicollinearity	Frequency of Use of Digital Materials	Tolerance: 0.385, VIF: 1.216	-	No Multicollinearity	
	Historical Thinking Skills (HTST)	Tolerance: 0.529, VIF: 1.216	-	No Multicollinearity	
	Students' HOTS Skills	Tolerance: 0.447, VIF: 1.216	-	No Multicollinearity	
Homoscedasticity	Frequency of Use of Digital Materials	Chi-Square: 1.92	0.160	Homoscedasticity Achieved	
	Historical Thinking Skills (HTST)	Chi-Square: 2.05	0.140	Homoscedasticity Achieved	
	Students' HOTS Skills	Chi-Square: 1.85	0.174	Homoscedasticity Achieved	
Linearity	Frequency of Use & HOTS Ability	Pearson Correlation: 0.62	0.001	Significant Relationship	Linear
	Historical Thinking & HOTS Ability	Pearson Correlation: 0.68	0.001	Significant Relationship	Linear