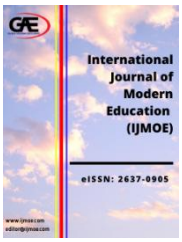
International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume: 8 Issue: 31 (September 2026) PP. 64-77



INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
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EFFECTIVENESS OF INTERACTIVE MULTIMEDIA LEARNING IN PROMOTING HIGHER-ORDER THINKING SKILLS PRACTICES AMONG PRIMARY SCHOOL PUPILS

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Article Info:

Article history:
Received date: 15.07.2026
Revised date: 30.07.2026
Accepted date: 18.08.2026
Published date: 03.09.2026

To cite this document:

Guntala, J. M., Lee, B. N., & Antin, A. (2026). Effectiveness Of Interactive Multimedia Learning in Promoting Higher-Order Thinking Skills Practices Among Primary School Pupils. *International Journal of Modern Education, 8*(31), 64-77.

Abstract:

The digital transformation of education has intensified the need to integrate Information and Communication Technology (ICT) into teaching and learning to enhance students' Higher-Order Thinking Skills (HOTS). But the teaching methods of history in primary schools are still limited by using traditional teaching methods, low technology facilities, and less use of interactive learning materials, which are still not adequate to facilitate the development of students' HOTS. This study was designed to find out the effectiveness of interactive multimedia learning to improve the HOTS practices of primary school students in History. The study used quasi-experimental research design with 30 primary school students in Tambunan district, Sabah who were divided into treatment group and control group. The data gathered was done by using a HOTS practices questionnaire given in pre-test and post-test and analysed by descriptive statistics and inferential statistics through independent samples t-test using SPSS version 23. The results suggested that there was a significant difference between the HOTS practices of the treatment group (interactive multimedia learning) and the control group (conventional) after the intervention, with the interactive multimedia treatment group having significantly higher HOTS practices than the conventional control group. On the other hand, there was no significant difference between genders, which means interactive multimedia learning is equally effective for male and female students. The findings indicate that interactive multimedia learning is a valid pedagogical approach in enhancing the practices of HOTS which

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EISSN: 2637-0905
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can provide more active, interactive and student-centered learning experiences. This study helps to enhance technology-enhanced teaching in History and empowers the implementation of the Malaysia Education Blueprint (MEB) 2026–2035 to support the process of digital transformation and the progression of HOTS Skills in primary education.

DOI: 10.35631/IJMOE.831004

Keyword:

Higher-Order Thinking Skills, History Education, Interactive Multimedia Learning, Primary School, Quasi-Experimental

Introduction

The Malaysia Education Blueprint (2013-2025) is being further developed through the implementation of the Malaysia Education Blueprint (MEB) 2026-2035. The MEB 2026–2035 focuses on nurturing human capital that is competitive at the international level by incorporating the 21st century skills, educational digitalisation, Artificial Intelligence (AI), student-centred learning and Higher-Order Thinking Skills (HOTS) (Ministry of Education Malaysia [MOE], 2026). This is alligned with the goals of the Primary School Standard Curriculum (KSSR) that embeds History in the primary school curriculum as an important subject to develop historical thinking, national identity, patriotism and citizenship among students in grades one through six (MOE, 2017). Consequently, the teaching of History should no longer be based on the students' memorisation of facts, but should have a component of inquiry, problem-solving and critical thinking.

Digital technology is a crucial tool in improving learning and teaching. The use of interactive multimedia, digital applications, augmented reality, educational games and Artificial Intelligence (AI) has been revealed positively influence students' motivation, engagement, conceptual understanding, and higher-order thinking in History learning (Burgos-Videla et al., 2025; Darnawati et al., 2025; Jayamaha, 2024; Tirado-Olivares et al., 2024). The Cognitive Theory of Multimedia Learning (CTML) by Mayer (2021) states that the most effective way to learn from multimedia is to present information in both visual and verbal modalities, and for the learner to create a meaningful representation in his/her mind. Similarly, the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) is a theoritical base for HOTS as it focuses on the cognitive processes of applying, analysing, evaluating and creating which are essential in effective History learning.

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In spite of these efforts, the use of digital technology in History classes is not uniform. The previous studies have revealed that teachers still employ traditional teacher-centered approaches because of the lack of infrastructure, digital skills, time, and lack of multimedia teaching materials (Costa et al., 2024; Ishak & Ahmad, 2025; MOE, 2026). These barriers restrict opportunities for students to have meaningful and student-centered learning experiences to develop HOTS. Moreover, although interactive multimedia learning has the potential to facilitate the learning process as well as the results of students in the classroom, there is limited empirical evidence concerning the effectiveness of interactive multimedia learning in fostering the HOTS practices of primary school students in History, particularly in the context of Malaysia. So, the effectiveness of interactive multimedia learning in increasing students' HOTS practices in the History sucject in level III of primary school was evaluated. The multimedia developed combines information and digital literacy elements to foster active learning by exploring information, visualising concepts in history, and engaging in interactive learning activities.

The results will provide empirical evidence for technology-based History instruction and the Malaysia Education Blueprint (MEB) 2026-2035 to enhance digital education and the progression of implementation higher order thinking skills. The present study focuses to examine the effectiveness of interactive multimedia learning in promoting HOTS practices among primary school pupils. Specifically, the study sought to determine whether there were statistically significant differences in HOTS practices between the control and treatment groups in the pre-test and post-test, as well as whether there was a statistically significant difference in HOTS practices between male and female pupils within the treatment group in the post-test. Accordingly, the following null hypotheses were tested: H_{01}: There is no statistically significant difference in HOTS practices between the control group and the treatment group in the pre-test. H_{02}: There is no statistically significant difference in HOTS practices between the control group and the treatment group in the post-test. H_{03}: There is no statistically significant difference in HOTS practices between male and female pupils within the treatment group in the post-test.

Literature Review

The digital transformation of education outlined in the MEB 2026–2035 highlights the importance of integrating digital technologies to improve teaching and learning while developing students with digital literacy, HOTS and 21st-century competencies (MOE, 2026). In keeping with these goals, interactive multimedia learning has emerged as a key pedagogical innovation that encourages student-centred learning by combining text, graphics, audio, video, animation and interactive elements in meaningful learning contexts. Interactive multimedia offers opportunities for students to explore abstract historical concepts through visualisation, simulation and authentic historical sources in History education. This instructional method is in line with Mayer's (2021) CTML that states that impactful learning takes place when learners actively process information delivered in integrated visual and verbal formats. Likewise, Cognitive Load Theory states that good multimedia teaching will lower extraneous cognitive load and enhance the efficiency of working memory, which will help to construct knowledge deeply (Sweller et al., 2019). Furthermore, the implementation of HOTS in History education is conceptually grounded in the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001), which emphasises the cognitive processes of applying, analysing, evaluating, and creating as essential competencies for meaningful learning.

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The positive educational effects of interactive multimedia have been reported consistently in recent studies, in various learning contexts. Jayamaha (2024) showed that the use of mixed reality board games could make primary school students more enthusiastic in learning History and Darnawati et al. (2025) showed that history-based digital games could make students more understanding of the concept of history through enjoyable and interactive learning. Similarly, Tirado-Olivares et al. (2024) found that digital technologies with learning analytics enhanced students' interpretation of historical evidence and historical thinking through formative assessment. In addition to the improvement of engagement and achievement, interactive multimedia can also be used to promote constructivist learning by allowing students to construct their own knowledge. Regarding HOTS, Burgos-Videla et al. (2025) demonstrated that adopting historical inquiry using digital technologies had a significant impact on improving students' critical thinking and historical reasoning, while Costa et al. (2024) indicated that the use of pedagogical strategies that included multimedia content led to an increase in participation in historical inquiry and problem-solving activities. The results of these investigations suggest that interactive multimedia is not only able to improve academic achievement but also to develop higher-order cognitive processes needed to achieve meaningful learning in History.

Despite its educational benefits, the implementation of interactive multimedia in History classrooms continues to face several challenges. Some of the key obstacles to effective implementation identified in previous studies are the lack of digital infrastructure, inequitable access to technology, teacher digital competence, and limited time for creating quality multimedia resources (Costa et al., 2024; MOE, 2026). The digital divide between urban and rural schools also has an impact on the extent to which technology can be used in the teaching of History. The challenges indicate that successful execution requires not only access to the technology as well as teacher readiness, institutional support, and pedagogical innovation policies. While there are many studies on the role of interactive multimedia on students' motivation, engagement and level of academic achievement, empirical studies on how interactive multimedia can improve HOTS practices in primary History education are still limited, especially in the Malaysian context. Furthermore, few studies have focused on HOTS within the scope of application, analysis and evaluation as suggested in the Revised Bloom's Taxonomy. Hence, this research purpose is to fill this gap, through examining the effectiveness of interactive multimedia learning in improving the HOTS practices of primary school students in History. The findings are expected to contribute to more innovative History teaching practices, strengthen the integration of digital technologies into primary classrooms, and provide empirical evidence supporting the implementation of the MEB 2026–2035.

Research Methodology

This research applied a quasi-experimental design with a treatment group and a control group in order to find out the effectiveness of interactive multimedia learning in facilitating the HOTS practices of primary school students for History subject. Since random assignment was not possible in the school environment, intact classes were used to maintain the authenticity of the existing learning environment (Campbell & Stanley, 1963; Creswell & Creswell, 2023). The participants in this study consisted of 30 primary school students who were selected using purposive sampling technique and divided into two classes, one treatment (n = 15) and one control (n = 15). Intact classes were chosen because of the lack of feasibility of random assignment in the school environment. Quasi-experimental studies in the classroom are usually

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conducted in intact classes due to practical and administrative reasons, but GPower 3.1 (Faul et al., 2009) indicates that medium effects require larger sample sizes. The large treatment effect observed indicated that the sample size available was adequate to demonstrate the the statistical difference between the two groups. To examine gender differences, a balanced subsample comprising seven male and seven female pupils from the treatment group was analysed. An equal number of participants from each gender was used to facilitate a balanced comparison and to minimise the influence of unequal group sizes on the interpretation of the findings. The balanced subsample was only used for the gender analysis and had no impact on the main intervention analysis between the treatment and control groups. The treatment group was taught with interactive multimedia learning while the control group was taught with the conventional teacher-centred learning. The intervention was conducted for 10 weeks starting with a pre-test and ending with a post-test to assess the changes in students' HOTS practices. Ethical approval was sought from the school administration, participants were briefed of the study and participants received information regarding voluntarily with their parents' consent and participants' confidentiality was respected throughout the study (British Educational Research Association [BERA], 2024; Creswell & Creswell, 2023).

The data were collected using an adapted HOTS Practices Questionnaire developed by Shakila Dahalan (2020), based on the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) and the HOTS Skills Guidelines published by the Ministry of Education Malaysia (2018). The questionnaire with five-point Likert scale was used to measure the three dimensions of HOTS, which are application, analysis and evaluation. The content validity was assessed by two persons who are expert in History Education and Educational Technology, and the reliability was assessed by a pilot study using Cronbach's alpha with values of more than .70 considered as acceptable internal consistency (Hair et al., 2022; Taber, 2018). The data were analysed using IBM SPSS Statistics Version 23. Descriptive statistics, including the mean (M) and standard deviation (SD), were used to describe students' HOTS practices, while an independent-samples t-test was conducted to examine whether there was a statistically significant difference between the treatment and control groups. The assumptions of normality and homogeneity of variance were evaluated before conducting inferential analyses to determine the appropriateness of using parametric analyses (Field, 2024). Mean scores were interpreted based on the classification of Jamil Ahmad (2002) and the statistical significance was set at $p < .05$.

Table 1: Components of the Questionnaire Instrument

No.	Section	Construct	Items	Total Items
1	A	Demographic Information	A1, A2	2
2	B	HOTS – Application	B1.1–B1.7	7
3		HOTS – Analysis	B2.1–B2.5	5
4		HOTS – Evaluation	B3.1–B3.5	5

Source: Adapted from the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001), the Higher-Order Thinking Skills Guidelines (MOE, 2018), and Shakila Dahalan (2020).

Pilot Study

Prior to the main study, the questionnaire underwent content validity and reliability assessments to ensure its suitability for quantitative research. The HOTS Practices Questionnaire was modified from Shakila Dahalan (2020) which was based on the Revised Bloom's Taxonomy

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(Anderson & Krathwohl, 2001) and the HOTS Guidelines proposed by the Ministry of Education Malaysia (2018). The instrument was modified and validated by two History Education and Educational Technology experts regarding content relevance, language clarity, construct accuracy, and construct consistency with the study objectives. Content validity is recommended to be accomplished by experts prior to quantitative data collection (Creswell & Creswell, 2023; Hair et al., 2022).

After that, 15 primary school students in one of the primary schools in Tambunan, Sabah were involved during this pilot test. This number of samples meets the minimum of 15 samples for pilot testing recommended by Fink (2009). The instrument was tested for its internal consistency, item suitability, and the language clarity and students' understanding of the questionnaire in the pilot study. Cronbach's alpha was used to assess the internal consistency reliability of the application construct, analysis, and evaluation with the results of 0.952, 0.911, and 0.941 respectively. All values were above the recommended value of 0.70 (Hair et al., 2022; Taber, 2018) which means that the internal consistency was excellent. These results were similar to the findings of the content validation study, and the instrument was found to have satisfactory content validity and high reliability, so there was no need to make significant changes to the instrument in the main study.

Study Findings

Demographic Profile

The study involved 30 primary school students from a school under the Tambunan District Education Office, Sabah. There were equal numbers in both the treatment group (n = 15, 50.0%) and the control group (n = 15, 50.0%). The gender distribution of the sample was 46.7% male and 53.3% female. The gender distribution was relatively balanced, with more females than males, but adequate for comparing the effectiveness of the intervention across the study groups.

Result 1: Differences in HOTS Practices Between the Control and Treatment Groups in the Pre-test

Table 2: Mean and Standard Deviation of HOTS Practices in History by Group (Pre-test)

HOTS Practices	Group	N	Mean	Standard Deviation
Application	Control Group	15	3.666	0.340
	Treatment Group	15	3.761	0.348
Analysis	Control Group	15	3.773	0.594
	Treatment Group	15	3.986	0.255
Evaluation	Control Group	15	3.653	0.410
	Treatment Group	15	3.973	0.465

As shown in Table 2, the mean and standard deviation scores of students' HOTS practice at pre-test for the control group and treatment group. In all three areas of the HOTS (application, analysis, evaluation), both groups had similar mean scores. The treatment group recorded

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slightly higher mean scores than the control group for application (M = 3.761, SD = 0.348 vs. M = 3.666, SD = 0.340), analysis (M = 3.986, SD = 0.255 vs. M = 3.773, SD = 0.594), and evaluation (M = 3.973, SD = 0.465 vs. M = 3.653, SD = 0.410). The findings indicate that there were no statistically significant differences in HOTS practices between the control and treatment groups prior to the intervention.

Table 3: Independent Samples *t* Test Results for HOTS Practices in History Between the Control and Treatment Groups (Pre-test)

Levene's Test for Equality of Variances			**Independent Samples *t*-Test**			
Assumption	**F**	**Sig.**	***t***	**df**	**Sig. (2-tailed)**	**Mean Difference**
Equal variances assumed	0.854	0.363	−1.906	28	0.067	−0.209
Equal variances not assumed	—	—	−1.906	25.862	0.068	−0.209

The assumption of homogeneity of variance was met, as Levene's test was not statistically significant, $F = 0.854$, $p = .363$. (Table 3). The independent-samples t-test also revealed no statistically significant difference between the practices of HOTS in the pre-test of both groups t(28) = −1.906, p = .067, mean difference = −0.209. The effect size was small (Cohen's d = 0.28) indicating that the difference between the two groups was only a small practical difference. So, the null hypothesis (H_{01}) was not rejected, showing that both groups were statistically similar at baseline before the implementation of the interactive multimedia intervention.

Result 2: Comparison of HOTS Practices Between the Control and Treatment Groups in the Post-test

Table 4: Mean and Standard Deviation of HOTS Practices by Group (Post-test)

Group	**N**	**Mean**	**Standard Deviation**	**Interpretation**
Control Group	15	3.680	0.148	Moderate
Treatment Group	15	4.340	0.252	High

Table 4 presents the overall post-test results for students' HOTS practices. The mean score of the treatment group (M = 4.340, SD = 0.252) was markedly higher than the control group (M = 3.680, SD = 0.148) suggesting that the treatment group had a high level of HOTS practices, while the control group had a moderate level. As can be seen in Table 5, the treatment group showed a consistent improvement over the control group in all three dimensions of HOTS. Higher mean scores were recorded for application (M = 4.314, SD = 0.281 vs. M = 3.695, SD = 0.208), analysis (M = 4.346, SD = 0.277 vs. M = 3.666, SD = 0.234), and evaluation (M = 4.360, SD = 0.331 vs. M = 3.680, SD = 0.224), indicating that students who received the interactive multimedia intervention demonstrated stronger HOTS practices than those who received conventional instruction.

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Table 5: Mean and Standard Deviation of HOTS Practices by Group (Post-test)

HOTS Practices	Group	N	Mean	Standard Deviation	Interpretation
Application	Control Group	15	3.695	0.208	Moderate
	Treatment Group	15	4.314	0.281	High
Analysis	Control Group	15	3.666	0.234	Moderate
	Treatment Group	15	4.346	0.277	High
Evaluation	Control Group	15	3.680	0.224	Moderate
	Treatment Group	15	4.360	0.331	High

Table 6: Independent Samples *t* Test Results for HOTS Practices by Group (Post-test)

Levene's Test for Equality of Variances			Independent Samples *t*-Test			
Assumption	**F**	**Sig.**	***t***	**df**	**Sig. (2-tailed)**	**Mean Difference**
Equal variances assumed	6.290	0.018	−8.718	28	< .001	−0.659
Equal variances not assumed	—	—	−8.718	22.663	< .001	−0.659

The results of Levene's test (Table 6) were statistically significant, $F = 6.290$, $p = .018$, indicating that the assumption of homogeneity of variance was violated. Therefore, the results under the *Equal Variances Not Assumed* condition were interpreted. The difference between the treatment and control groups was significant for HOTS practices, with the treatment group having a higher mean score ($t(22.663) = -8.718$, $p < .001$, $d = -0.659$). The intervention also resulted in a very large effect size (Cohen's $d = 3.19$), indicating that interactive multimedia learning has a very practical effect on students' HOTS practice. Thus, the null hypothesis (H_{02}) was rejected, and it was concluded that interactive multimedia learning has a significant effect on the students' HOTS practices in the History field compared to conventional learning.

Result 3: Differences in HOTS Practices Within the Treatment Group Based on Gender

Table 7: Mean and Standard Deviation of HOTS Practices by Gender in the Treatment Group (Post-test)

Gender	N	Mean	Standard Deviation	Interpretation
Male	7	4.342	0.277	High
Female	7	4.350	0.271	High

Table 7 presents the mean scores and standard deviations of HOTS practices for male and female pupils pupils in the treatment group after the interactive multimedia learning intervention. A balanced subsample of 14 pupils from the treatment group (7 boys and 7 girls) was analysed for the gender analysis. This subsample was used to enable comparison between the genders.Both male pupils (*M = 4.342, SD = 0.277*) and female pupils (*M = 4.350, SD =*

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0.271) demonstrated similarly high levels of HOTS practices. A small difference was observed between the mean scores of the female and male pupils, with the female pupil showing a higher mean score.

Table 8: Independent Samples *t* Test Results for HOTS Practices by Gender in the Treatment Group (Post-test)

Levene's Test for Equality of Variances			**Independent Samples *t*-Test**			
Assumption	**F**	**Sig.**	***t***	**df**	**Sig. (2-tailed)**	**Mean Difference**
Equal variances assumed	0.005	0.946	−0.055	13	0.957	−0.0774
Equal variances not assumed	—	—	−0.054	12.653	0.957	−0.0774

The assumption of homogeneity of variance was satisfied as there was no significant difference $F(1, 13) = 0.005$, $p = .946$, between the two groups. Thus, the results of Equal Variances Assumed were interpreted. The results of the independent-samples *t* test displayed no significant difference between the male and female pupils in the treatment group in terms of HOTS practices, $t(13) = -0.055$, $p = .957$, with a mean difference of −0.008. There were a small effect size (Cohen's $d = 0.03$) and the real difference in practices of HOTS between male and female pupils was very small after the intervention. Thus, the null hypothesis (H_{03}) was not rejected. The results indicate that interactive multimedia learning is as effective as improving HOTS practices of male and female students.

Discussion

Differences in HOTS Practices Between the Control and Treatment Groups in the Pre-test

The analysis revealed no statistically significant difference between the treatment and control groups in their pre-test scores, which indicated that both groups were equal before the treatment was implemented. This finding validates the principle of baseline equivalence that is crucial in quasi-experimental designs to ensure that any differences found after the interventions are due to the interventions and not to pre-existing differences between the groups (Creswell & Creswell, 2023). Furthermore, the non-significant result of the Levene's test reinforced the assumption of homogeneity of variance, which enhanced the internal validity and reliability of this study (Field, 2024). The differences between the mean scores for the three dimensions of HOTS (application, analysis, and evaluation) in the treatment group were not statistically significant.

The Cohen's *d* analysis also showed small effect sizes, which further supported that both groups started the study with similar HOTS practices (Cohen, 1988). The results are supported by Campbell and Stanley (1963) and Fraenkel et al. (2023) who emphasizes the importance of pre-test equivalence for making causal inferences in quasi-experimental designs. In terms of the Cognitive Theory of Multimedia Learning, this methodological equivalence gives a valid ground for judging the effectiveness of interactive multimedia learning (Mayer, 2021).

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Therefore, the interactive multimedia intervention is likely to have caused any significant improvement seen in the post-test as opposed to any pre-existing differences between the groups.

Comparison of HOTS Practices Between the Control and Treatment Groups in the Post-test

The findings showed a statistically significant difference in HOTS practices between the treatment and control groups following the intervention, with the treatment group achieving significantly higher mean scores across the three HOTS dimensions of application, analysis, and evaluation. The result of the research explains that interactive multimedia learning could improve students' HOTS practices in the field of History. The result confirms Mayer's (2021) CTML that emphasises engaging learning by integrating visual and verbal information, which enabling learners to construct deeper understanding. The use of text, graphics, animation and interactive features allowed students to gain deeper understanding of the historical content, while reinforcing their knowledge, understanding and application skills, analysing historical evidence and forming critical judgements. The findings, therefore, can be used to support the MEB 2026-2035 which focuses on the integration of digital technology to facilitate 21st Century learning and higher order thinking (MOE, 2026).

The present findings corroborate previous research demonstrating the educational benefits of interactive multimedia in History education. Darnawati et al. (2025) found that history-based digital games had a positive effect on students' conceptual understanding and critical thinking, which were achieved by using exploratory learning, while Jayamaha (2024) stated that mixed reality board games had a positive influence on students' motivation, engagement, and ability to connect historical knowledge with real situations. Likewise, Tirado-Olivares et al. (2024) demonstrated that the use of digital technologies that supported by learning analytics in formative assessment increased the interpretation of historical evidence and historical thinking among students. The significant post-test result ($t(22.663) = -8.718$, $p < .001$) adds to the positive results of the intervention. Pedagogically, interactive multimedia learning helps to move from from teacher-centred pedagogies to student-centred, inquiry-based learning approaches, where students will become more critical, analytical and reflective learners. The results indicated that the more interactive multimedia is integrated into the History learning process, the more effective it is in developing HOTS, and it can facilitate the successful implementation of the MEB 2026-2035.

Differences in HOTS Practices Within the Treatment Group Based on Gender

The results concluded that no significant differences in HOTS practices were observed practices between male and female pupils after the interactive multimedia learning intervention. No statistically significant difference was found between the two groups on the mean score on the post-test and the effect size (Cohen's $d = 0.03$) was negligible, which indicates that there was little practical difference between the effect of gender on pupils' HOTS practices. The result of this study suggests that interactive multimedia learning is equally effective in improving HOTS for male and female students.

This finding is alligned with Mayer's (2021) CTML, which proposes that meaningful learning happens when learners process information through integrated verbal and visual channels. Through the interactive multimedia in the study, all the pupils had the same opportunities to

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learn the concepts of history, analyze information and solve problems by engaging learning activities. Thus, the effectiveness of the intervention was not due to gender but rather to the instructional design. The results are also corroborated by earlier studies. Darnawati et al. (2025) found that digital history games had a positive effect on pupils' conceptual understanding and encouraged active participation of both males and females. Likewise, Jayamaha (2024) concluded that the application of multimedia in the history learning process could improve the level of students' engagement and historical understanding, and that there was no difference in the level of learning between male as well as female students. The findings of these studies suggest that, when properly designed, a multimedia learning environment is useful for all learners, as it promotes active learning and higher order thinking.

Overall, the results indicate that interactive multimedia learning is an instructional way that is inclusive and able to promote HOTS in primary school students. It is effective across gender and can therefore be confidently used in mixed-gender classrooms to support equitable learning opportunities and meaningful History learning.

Practical Implications and Future Research

The findings demonstrate that interactive multimedia learning effectively enhances students' HOTS in History Education, particularly in the dimensions of application, analysis, and evaluation. The findings are consistent with Mayer's (2021) CTML that states meaningful learning is achieved when visual, verbal, and interactive elements are integrated. Lack of gender differences also indicate that interactive multimedia is a pedagogy approach that is inclusive for various learners. Hence, History teachers are encouraged to use interactive multimedia in teaching to enhance the development of HOTS as per the aspiration of the MEB 2026-2035 (Ministry of Education Malaysia, 2026). Larger and more diverse samples, longer intervention periods and mixed methods designs are recommended for future studies to enhance generalisability of findings. More research is also needed on how interactive multimedia can affect historical thinking, digital literacy, learning motivation and academic achievement, as well as the potential impact of emerging technologies, particularly Artificial Intelligence (AI) on teaching and learning, gamification, Augmented Reality (AR) and learning analytics on History learning which are more adaptive and personalised (OECD, 2023; Sung et al., 2024).

Conclusion

This study achieved its objectives by demonstrating that interactive multimedia learning significantly enhances primary school students' HOTS in History. The results showed that there were no statistically significant gender differences, and that students in the treatment group demonstrated more HOTS practices than students in the conventional instruction group, suggesting its effectiveness and inclusiveness. The results are consistent with Mayer's (2021) CTML, which emphasizes the importance of combining interactive components, auditory and visuals to facilitate meaningful learning. Overall, the evidence of this study offers empirical evidence for the use of interactive multimedia to enhance the development of HOTS and further the digital transformation agenda in the MEB 2026–2035.

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IJMOE
EISSN: 2637-0905
Volume: 8 Issue: 31 (September 2026) PP. 64-77

Acknowledgements: The authors acknowledge the use of reputable academic literature and online scholarly databases in developing the theoretical foundation and contextual background of this study. Artificial intelligence tools were used solely to improve language quality and manuscript organization. The study design, data collection, intervention implementation, statistical analysis, interpretation of the findings and manuscript preparation were conducted independently by the authors. The authors affirm that all research procedures were carried out in accordance with academic integrity, ethical research standards, and principles of intellectual property.

Funding Statement: No funding.

Conflict of Interest Statement: The authors declare that there are no conflicts of interest regarding the publication of this manuscript. All authors have made substantial contributions to the study and have reviewed and approved the final version of the manuscript for submission to the International Journal of Modern Education (IJMOE).

Ethics Statement: This study was conducted in accordance with established ethical principles for research involving human participants. Ethical approval was obtained from the relevant institutional ethics committee before the commencement of the study. Informed consent was obtained from all participants prior to their participation.

Author Contribution Statement: All authors contributed to the study design, data analysis, manuscript preparation, manuscript revision, and final approval of the manuscript. Each author shares responsibility for the accuracy and integrity of the work. All authors have read and approved the final version of the manuscript prior to submission.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume: 8 Issue: 31 (September 2026) PP. 64-77

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International Journal of Modern Education
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Volume: 8 Issue: 31 (September 2026) PP. 64-77
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