Designing an Interactive Multimedia Learning Tool for Secondary School History Students in Secondary School

Azlan Abdul Rahman[1*], Syahrini Shawalludin[2], Siti Fairuz Ibrahim[3]

[1]Academy of Language Studies, Universiti Teknologi MARA (Kedah Branch), Malaysia

[2,3]College of Creative Arts, Universiti Teknologi MARA (Kedah branch), Malaysia,

*Corresponding Author

ABSTRACT

It has revolutionized the learning paradigm in Malaysia through the integration of multimedia interactivity. In alignment with the nation's initiative for digital education, instructors are developing online content to enable students to become self-directed learners. A particular project employs augmented reality to transform history education. The "Tokoh-tokoh Pejuang Malaysia" enables students to engage with the biographies of Malaysia's great warrior interactively, accompanied by precise visual references. 71 high school students engaged in this method via an online survey. Students' response indicated that the incorporation of multimedia interactivity, including augmented reality, enhanced their interest in learning about history in a more engaging and dynamic manner. This aligns with the Malaysian Education Blueprint 2013-2025, which priorities globalized online learning for lifelong education. As digital learning strategies expand, traditional textbooks and teaching aids are being supplanted by more interactive methods in the educational landscape. The favourable reaction from students promotes the wider implementation of interactive multimedia in teaching. The transition will result in enhanced quality that aligns with Malaysia's dedication to incorporating innovative technologies into the classroom, hence boosting accessibility and involvement in education.

Keywords — interactive multimedia, history, warrior, augmented reality

INTRODUCTION

Education has promptly adopted a variety of new technologies in response to global technology advancements, which are incorporated into everyday learning contexts. The COVID-19 epidemic has underscored the significance of comprehensive digital learning solutions, as educational institutions globally transitioned to remote and hybrid learning models. The essential approach to addressing growing demands lies in the development and implementation of digital tools. Consequently, it is revealed that interactive multimedia digital learning can substantially boost student engagement and facilitate cognitive development in the acquisition of academic content, considering their diverse learning demands(Pekrun et al., 2018). The interactive utilisation of multimedia in a simulation learning environment improves learning outcomes. The average summary of student results has greatly increased, consistently surpassing the minimum completeness cutoff criteria. This further substantiates the findings about the function of multimedia and digital platforms in optimizing settings that foster an enabling atmosphere for diverse student categories to learn. The research by Jiang, (2022); Patwardhan et al., (2015) show that: i) learning different kinds of knowledge requires varying degrees of interaction; and ii) interactive visualization cannot fully benefit from learning unless it is enhanced with 'Interactivity Enriching Features', such as suitable affordance for manipulating variables, particularly for higher learning outcomes.

Interactive media encompasses diverse forms of media, predominantly digital, wherein the user can affect the experience, including the content they receive. Examples encompass social media sites, online quizzes and polls, various applications, and video games. The incorporation of interactive digital media through technology instruments accommodates various learning styles, hence rendering the educational delivery method more systematic and contemporary(Mayer, 2020). Such methods have been shown to enhance relevance and efficacy

in knowledge delivery, hence improving learning outcomes for students. A new generation of learners is entering higher education as digital natives—innately digitally savvy and inherently adept at utilising technology(Smith et al., 2020). what extent do digital natives demand specifics from the way that education is delivered? An upgrade of academic content delivery via digital means is essential to attract students and reflect a familiar environment(Teräs, 2022). This alignment guarantees that education stays pertinent and adapts to the changing requirements of the pupils.

The examination of history is especially important during periods of swift transformation, as it cultivates a sense of national identity and loyalty among residents (Anderson, 2003). Educational institutions have historically acknowledged the essential role of history in nation-building, providing students with a profound comprehension of the past to inform future decisions and avert the recurrence of historical errors (Weltman, 2013). Traditional methods of teaching history frequently depend on antiquated ways, rendering the topic tedious and monotonous for students. Recent research by (Rahman et al., 2020) underscores the advantages of incorporating Information and Communication Technology (ICT) into history instruction. Their research illustrates that ICT not only augments student participation but also boosts comprehension of historical events and cultivates empathy through interactive learning experiences.

Interactive multimedia and digital learning offer a compelling and attractive resolution to these difficulties. The incorporation of multimedia features and digital tools can enhance history education, making it interactive and immersive, thereby engaging students' interest and promoting deeper understanding.

PROBLEM STATEMENT

In Malaysian secondary schools, conventional history teaching methods frequently depend on rote memorisation and antiquated pedagogical techniques, resulting in student disengagement and a superficial comprehension of historical themes. Students' perceptions of interactive language learning activities in enhancing speaking proficiency. The research by Omar et al., (2020), sought to evaluate the efficacy of interactive language learning activities in stimulating learners' speaking abilities. The traditional method does not promote critical thinking, empathy, or a feeling of national identity in pupils, which are vital for their personal and civic growth. A multitude of students regard history as a monotonous discipline, mostly because it emphasises the memorisation of dates and events over comprehending the intricacies and storylines that influence historical occurrences (Saeed, 2020). The problems presented by the COVID-19 pandemic have highlighted the pressing necessity for creative teaching tactics that align with contemporary digital-native learners, as distant education has revealed the shortcomings of conventional instructional methods (Poobalan et al., 2021a)

Notwithstanding considerable progress in educational technology and the Malaysian government's dedication to improving digital learning environments, a substantial gap persists in the successful incorporation of interactive multimedia tools in history instruction (Ministry of Education Malaysia, 2013). Studies demonstrate that interactive digital media can improve student engagement and comprehension by offering dynamic, immersive experiences absent in conventional techniques. According to (Muskhir et al., 2023), in the contemporary digital age, interactive learning media serves as an optimal way to enhance the quality of effective and efficient education. Many educators, however, express scepticism about the effective implementation of new technologies in the classroom, raising questions about educational quality and teachers' adaptability to contemporary educational expectations. Furthermore, the absence of training and professional development opportunities in ICT intensifies this problem, rendering educators inadequately prepared to incorporate innovative pedagogical methods into their instruction (Zhang et al., 2004).

The incorporation of interactive multimedia methods offers a viable resolution to these issues, as it may enhance the teaching and learning of history, making it more engaging, pertinent, and effective. Most educational institutions continue to employ conventional learning media, including textbooks, blackboards, and predominantly the lecture technique. This approach possesses multiple disadvantages. The technology provides enhanced immersive and interactive learning experiences for students(Harjana et al., 2023).Utilising interactive methods like augmented reality (AR) and multimedia presentations, educators can enhance comprehension of historical events, promoting critical thinking and emotional engagement with the content. Moreover, these strategies might correspond with the objectives of the Fourth Industrial Revolution (IR4.0) and the Malaysia

Education Blueprint 2013–2025, which underscore the necessity of preparing students with essential competencies for the digital era. This project seeks to investigate the efficacy of interactive multimedia tactics in improving history education, focussing on student involvement and educational quality within Malaysia's dynamic educational environment.

RESEARCH OBJECTIVES

The primary objective of this research is to examine the impact of interactive digital media on the evolution of history instruction for secondary school students in Malaysia. This research aims to assess the effectiveness of multimedia-centered methodologies, including augmented reality (AR) and various digital tools, in enhancing student engagement, improving understanding of historical events, and cultivating a more robust sense of national identity. The initiative seeks to tackle the obstacles posed by conventional lecture-based teaching approaches, which frequently result in disengagement and superficial memorization devoid of a profound comprehension of historical context.

This research aims to investigate the alignment of Information and Communication Technology (ICT) integration in history education with the overarching objectives of the Fourth Industrial Revolution (IR4.0), emphasizing the capacity of interactive digital media to address the changing learning requirements of digital-native students. This aims to evaluate how these technologies can assist educators in enhancing the overall quality of history teaching and learning, in accordance with the goals of the Malaysia Education Blueprint 2013–2025.

This research examines the significance of teacher professional development and ongoing education in the effective implementation of ICT-driven teaching methodologies. The study will assess the efficacy of these approaches in fostering lifelong learning and digital fluency in students, while also cultivating a profound understanding for the significance of historical information in influencing national identity and future decision-making.

RESEARCH QUESTIONS

This research project aims to investigate various critical enquiries concerning the incorporation of interactive digital media in secondary school history education. The primary objective is to examine the influence of multimedia techniques, including augmented reality (AR), on student engagement and comprehension of historical material. The research initiative will also investigate if these digital methods cultivate a heightened feeling of national identity and historical empathy in pupils, in contrast to conventional teaching techniques. An additional critical inquiry pertains to the efficacy of digital media in augmenting the overall learning experience in history, and its alignment with the objectives of the Malaysia Education Blueprint 2013–2025 and the Fourth Industrial Revolution (IR4.0). The study will examine the obstacles instructors encounter in integrating these technologies into their classrooms and how professional development programs might assist educators in enhancing the quality of history education. Additionally, it aims to evaluate students' opinions of ICT-enhanced history lectures and their contribution to fostering a more profound comprehension of historical events and their significance to current challenges. The initiative will investigate the degree to which digital technologies facilitate the development of lifelong learning abilities, digital fluency, and self-directed learning in history students.

SIGNIFICANCE OF RESEARCH

A prevalent method of historical study among students entails rote memorization of information, frequently devoid of comprehensive understanding of the historical context, which often leads to the perception of history as a monotonous topic. The eleventh edition of the Malaysian Education Blueprint underscores the necessity of studying history in classrooms to cultivate gratitude and appreciation among students (Ministry of Education Malaysia, 2013). By comprehending substantial historical losses, such as those inflicted by the COVID-19 epidemic, students may cultivate a greater appreciation for the significance of formal education. The government's implementation of home-based learning during the pandemic highlighted the necessity of fostering a desire for learning, even in adverse conditions (Poobalan et al., 2021).

To guarantee the success of the Fourth Industrial Revolution (IR4.0), educators must enhance educational quality by integrating ICT from 2013 to 2025. The efficacy of education relies not alone on the curriculum but also on the calibre of instruction. Consequently, educators require ongoing professional development and incentive to improve their competencies and understanding to achieve curriculum objectives (Rahman et al., 2020). Integrating interactive digital media as a contemporary method for teaching history is essential in the current digital learning landscape, in accordance with IR4.0 standards. Employing a multimedia-centric methodology enables educators to enhance students' national identity and their engagement with historical material.

(Marco Ferreira et al., 2024) the emergence of the digital revolution compels educators to adopt new educational paradigms and integrate digital solutions into their instructional tactics. Undoubtedly, the COVID-19 pandemic has expedited this necessity, compelling educators to innovate and deliver optimal learning experiences. Interactive digital media, aligned with the requirements of IR4.0, is applicable across diverse disciplines due to its practicality and significance.

TECHNOLOGY ADVANCES THE PERSPECTIVE OF INTERACTIVE LEARNING

Technology significantly transforms conventional teaching techniques by creating dynamic, interactive learning environments. The incorporation of multimedia interactivity and augmented reality (AR) into the Malaysian educational framework exemplifies this transition effectively. The "Tokoh-tokoh Pejuang Malaysia" initiative enables students to interact with historical material via augmented reality, hence improving engagement and facilitating a more visual and participatory understanding of intricate topics. Research substantiates this methodology, indicating that multimedia technologies enhance student engagement and retention by providing more enriched and immersive learning experiences(Akçayır et al., 2017).

Moreover, technology promotes self-directed learning by enabling students to investigate topics at their own pace, in accordance with the objectives of the Malaysian Education Blueprint 2013-2025, which highlights lifelong learning and globalized online education (Ministry of Education Malaysia, 2013). By multimedia and augmented reality, students evolve from passive users of information to active participants, thereby fostering enhanced comprehension and engagement with the material (Yang et al., 2014). This also enhances accessibility, as technology facilitates personalized learning experiences, guaranteeing that students with diverse learning requirements and styles can benefit from customized instructional resources.

UTILISING AUGMENTED REALITY (AR) TO ENGAGE USERS

Augmented reality (AR) is an emerging technology with several potential applications in multiple professional and academic domains. The primary attraction of this product resides in the fusion of its real and digital components. Augmented reality is often employed for visualization, resulting in a more passive user experience(Lilligreen at al., 2023). Augmented reality is employed in educational settings to improve learning outcomes by providing varied visuals. The literature review revealed a body of studies indicating improved academic achievement, increased student engagement, motivation, and satisfaction in educational environments that utilize AR technologies(Saltan et al., 2016). In contrast to traditional textbooks, augmented reality (AR) can engage audiences by simulating real-time occurrences. Augmented reality is particularly advantageous in disciplines like history, where students may lack sufficient excitement for the material. Augmented Reality (AR) is an innovative method that can captivate kids in historical studies and attract them as potential learners.

DESIGN DEVELOPMENT

CREATING AND DEVELOPING INTERACTIVE MULTIMEDIA DESIGN: *"TOKOH-TOKOH PEJUANG MALAYSIA"*

Chapter 7 of the Form 2 history textbook, titled "*Perjuangan Rakyat Tempatan Mengembalikan Kedaulatan Bangsa"* (Local People's Struggle to Restore National Sovereignty), serves as the foundation for the interactive multimedia design project *"Tokoh-Tokoh Pejuang Malaysia"* (Prominent Figures of Malaysia's Freedom Fighters). Instructional designers frequently employ the 5E educational model as their standard methodology to attain superior visual information and user engagement in digital learning. The 5E educational paradigm seeks

to facilitate the acquisition of scientific information through discovery and active student engagement in learning contexts(Zorluoğlu et al., 2022). This strategy, originally developed by Rodger Bybee, is applicable to project-based learning (PjBL), problem-based learning (PBL), and universal design for learning (UDL).

The interactive multimedia design aims to serve as a novel instructional resource for history classes, emphasizing Malaysian soldiers and delivering information visually. It can function as an alternative instructional resource for educators or as a means of autonomous learning for students. The design incorporates an active learning methodology within a multimedia environment, featuring interactive trivia questions that utilized digital technology(Leão et al., 2023). The platform and system designs incorporate interactive elements such as the author's profile, a historical overview, trivia questions, and developer information. The instructional materials consist of multimedia files that include text, graphics, interactive animations, navigation features, and audio.

Adobe Illustrator is utilized for programming interactive graphic design, while Adobe Animate serves as tools for creating animations and facilitating website navigation in interactive multimedia design. Fig.1 illustrates the interface for the interactive multimedia prototype. Fig. 2 illustrates the functionality of Artvive, an open-source platform for augmented reality. The interactive multimedia design employs vibrant colours and textured materials to effectively create an appealing visual experience for adolescents while conveying historical information. Figure 1 illustrates the interface of "Tokoh-Tokoh Pejuang Malaysia," whilst Table 1 offers more documentation.

Fig. 1 The proposed interface design for the interactive multimedia project: *" Tokoh-Tokoh Pejuang Malaysia"*

Table 1. 5E Instructional Model for the interactive multimedia design

STAGE	PURPOSE
Engage	Facilitate the integration of existing knowledge in the classroom with interactive multimedia design through visually appealing formats to enhance learner engagement. Execution of material that engages with the information presented in an appealing manner.
Explore	Students will receive the authentic educational material from the textbook. · The content pertains to concepts of 2D animations and augmented reality style. · Process: Facts presented visually with navigational elements for interactionFundamentals: static imagery, illustrations

Explain	Users engage with specific navigation inside the UI across pages to enhance user experiences.
Extend	Trivia questions were utilised to elicit responses based on the knowledge and visuals derived from the presented information.
Evaluate	· Evaluate efficiency: A survey will be administered following the learner's engagement with the multimedia design interaction. · Evaluate Knowledge: Utilise a questionnaire and trivia questions for interaction through interactive multimedia design.

Sources: https://nasaeclips.arc.nasa.gov/teachertoolbox/the5e

Fig. 2 Transitioning from interface information to an interface including augmented reality

FINDINGS

The survey utilized Google Forms, and descriptive statistics were employed to examine the data and generate coefficients. The statistical analysis summarized the data gathered for the multimedia interactive study and assessed the variability in the survey results. This section assesses the usability, content, interaction, character design, and reliability of the multimedia interactive form interface based on the study's findings.

In Fig. 3, the demographic section of the questionnaire indicates that females constituted 70.6% of the total respondents, and males comprised 29.4%.
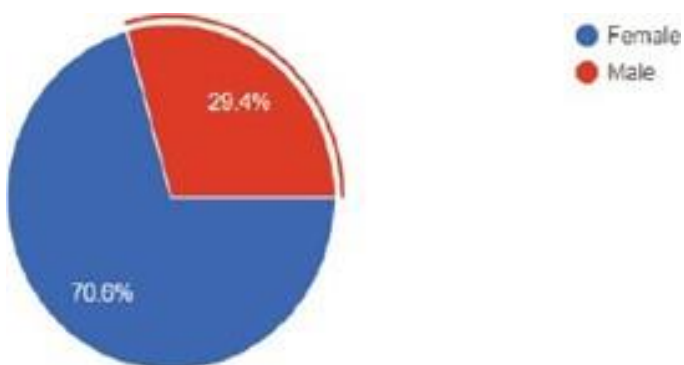

Fig. 3 Demographic Data of Questionnaire Respondents

The mobile phone was the most favoured device among the technologies identified in the survey. Of the 124 responders, it was a favoured choice. In the ongoing epidemic, computers are considered more reliable for enhancing students' understanding of the subjects instructed by teachers. Computers were recognized as the second most often employed device. Owing to the elevated expense of personal computers, smartphones are regarded as a more cost-effective technological option for numerous families, as illustrated in Fig.4 below.
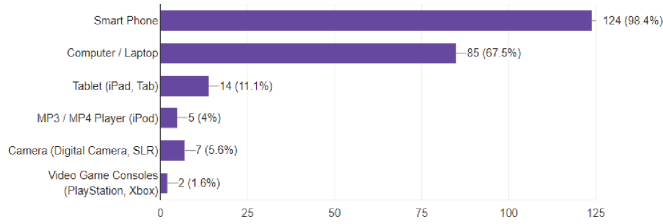
Fig. 4 Device predominantly utilized by respondents

Fig. 5 below delineates eight causes contributing to the diminished interest in history. The respondent may offer several answers for this section. 38.9% of respondents indicated that they did not regard the study of history as essential, but the second largest cohort cited challenges in retaining historical information. Consequently, there is a 32.5% disinterest in the study of history. The under-representation of history in the educational curriculum received the lowest response percentage, comprising less than 10.3%.
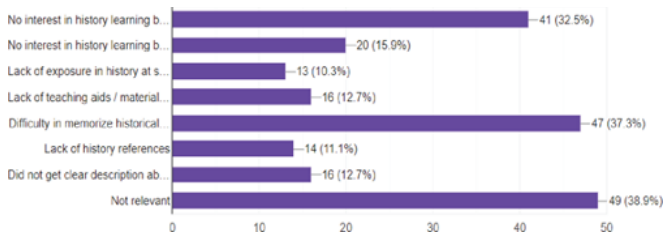

Fig. 5 Determinants of Disinterest in the Subject of History

As a result of the epidemic, 86.5% of participants indicated that their history instructor mostly employed the textbook as the main instructional technique. The handout provided by the instructor received a score of 58.7%, ranking second, as illustrated in Fig. 6.
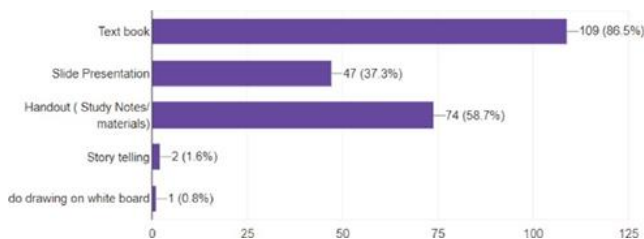

Fig.6 Instructional Approaches for the History Discipline

The benefits and viability of incorporating multimedia interactive teachings into the classroom are also the main topics of this study. When using a Likert scale to evaluate attitudes, 34.5% of respondents agreed and 32.5% strongly agreed that history might be taught using unappealing digital media design.
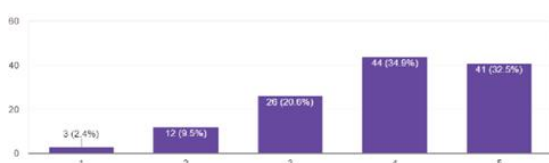

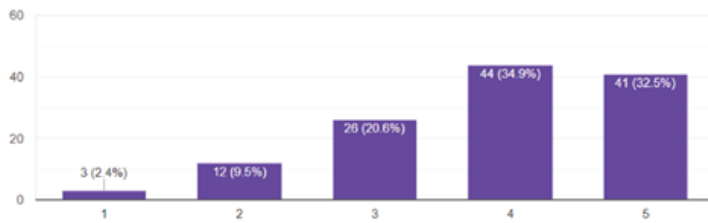Fig.7 Assessment of Respondent Attitudes

Fig. 8 Perception of interactive digital media design as an instructional approach

A character design derived from a real image serves as an engaging medium to assess the respondent's interest in history, which is one of the elements the study employs to evaluate user experience regarding the multimedia interactive interface and content. The findings indicate that 44.4% strongly agree and 28.6% agree that the character design motivates people to persist in studying history through the multimedia interactive project.

In Fig. 9 below, it was depicted.

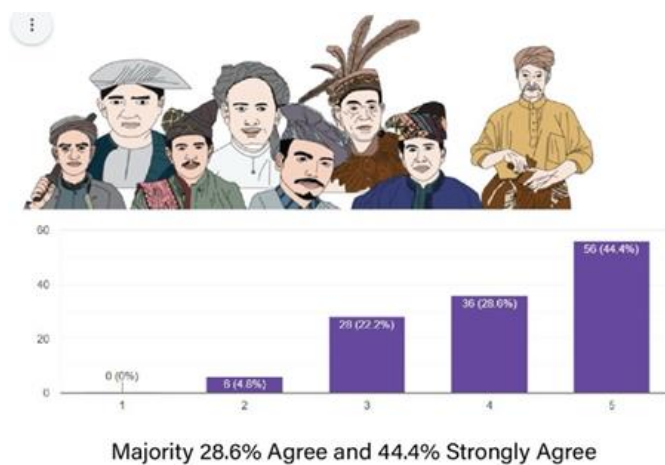Majority 28.6% Agree and 44.4% Strongly Agree

Fig. 9 illustrates the acceptance of the produced character design.

The research reveals that 53.2% of respondents strongly concur that the interface is appropriate for their age and that the content is more comprehensible than that found in a textbook. Their interest in the topic has increased due to the implementation of augmented reality to showcase animations of each soldier.

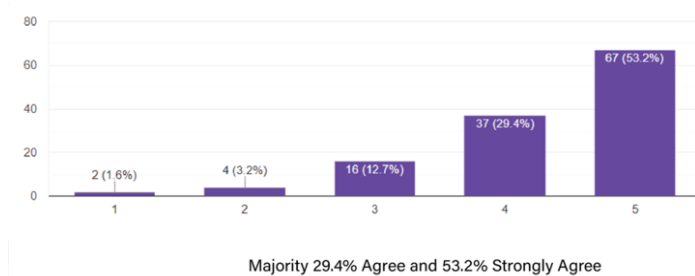Majority 29.4% Agree and 53.2% Strongly Agree

Fig. 10 Acceptable interface

The incorporation of novel technology and innovations into daily educational practices has been propelled by global technological advancements. The COVID-19 epidemic has underscored the vital importance of developing and implementing digital learning solutions to ensure continuous education despite restrictions on in-person instruction. Interactive multimedia and digital learning have emerged as essential elements, creating optimal educational settings that foster deep understanding and cater to the diverse needs of learners. Research demonstrates that the effective progression of interactive multimedia, particularly in simulation-based education and digital communication, has significantly improved educational outcomes.

Technology-driven technologies, including interactive digital media, accommodate various learning styles and enhance the importance and efficacy of knowledge distribution. In the digital age, it is essential to modernize

the dissemination of academic content to meet the expectations of students who are familiar with immediate connectivity and advanced technology. History education has a vital role in shaping a nation's identity and guiding future decisions. Conventional teaching methods are often regarded as outdated and ineffective. Research indicates the advantages of utilizing information and communication technology (ICT) to engage students in historical studies, improve understanding, and foster empathy. The incorporation of multimedia elements and digital tools can transform history education into an engaging and immersive experience, capturing students' attention and fostering a deeper comprehension.

CONCLUSION

The research presented here offers substantial insights into how interactive multimedia methods can markedly improve student comprehension and academic achievement. Interactive digital tools enhance comprehension by delivering knowledge in a more engaging and accessible manner, significantly impacting both educators and learners in academic environments (Mayer et al, 2021). The use of multimedia in education not only corresponds with students' preferences in the contemporary digital landscape but also addresses their interests, hence enhancing the relevance and efficacy of learning (Prensky, 2010). Implementing contemporary approaches enables instructors to enhance engagement and motivation, essential for advancing academic performance (Reina Dodorp, 2016).

Moreover, the advantages of interactive multimedia design transcend historical teaching and can be utilized across other academic disciplines. The visual and interactive elements of these methods are especially beneficial, as they enhance students' comprehension and retention of intricate concepts. Studies indicate that incorporating multimedia components, such movies, animations, and interactive simulations, enhances the comprehension of complex concepts, hence promoting a more effective learning experience Clark et al.,2016. This not only conserves time but also facilitates the coverage of a wider array of content, while ensuring that students uphold elevated levels of comprehension and retention. Research by (Jewitt, 2017) a synthesis of critical reflections, commentaries, and cautionary tales from a variety of perspectives, looking at the issues facing education and considering whether traditional teaching methods have outlived their usefulness given the emerging nature of massive open online courses (MOOCs). The research underscores the considerable potential of interactive multimedia to revolutionize the educational landscape, providing a more dynamic, student-centric methodology that improves both the quality and breadth of instruction. As the educational landscape evolves, these tools signify a pivotal advancement in enhancing instructional efficacy and student performance across diverse disciplines (Laurillard, 2013)

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