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Immersive Islamic History Learning: Analyzing Holographic Technology Acceptance and the Potential of Artificial Intelligence (AI) Integration Among the Digital Generation

Pembelajaran Sejarah Islam Imersif: Menganalisis Penerimaan Teknologi Holografik dan Potensi Integrasi Kecerdasan Buatan (AI) bagi Generasi Digital

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ABSTRACT

Technological innovations in broadcast media have opened new dimensions in the delivery of educational content, aligning with the needs of the digital generation and the era of Artificial Intelligence (AI). This study aims to analyze the level of acceptance among a specific cohort of Higher Education Institution (HEI) students regarding the use of holographic technology as an innovative medium in learning Islamic History, while exploring its potential as a foundation for interactive AI-driven learning agents. Employing a quantitative methodology with a descriptive survey approach, 116 students participated in this study. Respondents were exposed to 13 episodes of the television program "Halaqah 2024" which applied holographic technology, before completing an online questionnaire measuring Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Using (ATU), and Behavioral Intention (BI). The analysis revealed highly positive acceptance levels regarding usefulness (Mean=3.97), ease of use (Mean=3.85), and attitude toward the innovation (Mean=4.01). However, reliability analysis uncovered a behavioral anomaly in BI; while students demonstrated high personal commitment to using the technology (Mean=4.08), they were hesitant to recommend it to peers (Mean=3.15). Critical discussion suggests this discrepancy is influenced by individual learning styles and accessibility limitations of 2D screen projections. This study suggests that holographic visual displays hold immense potential as digital pedagogical tools and underscores the necessity of integrating Generative AI to create fully immersive historical learning environments in the future.

Keywords: *Technology Acceptance; Holographic Display; Artificial Intelligence (AI); Digital Pedagogical Innovation; Islamic History; Television Media.*

INTRODUCTION AND PROBLEM STATEMENT

The rapid advancement of the Fourth Industrial Revolution (IR 4.0) and the Artificial Intelligence (AI) era has significantly transformed various sectors, particularly education and digital innovation. This revolution is characterized by the convergence of technologies such as Large Language Models (LLMs),

the Internet of Things (IoT), and immersive display technologies, which have radically reshaped traditional teaching methods (Chen et al., 2024; Schwab, 2016). In education, this transformation has led to a paradigm shift toward interactive digital platforms. The digital generation in higher education has grown up alongside these advancements and exhibits a strong inclination toward technology-driven, visually dynamic, and participatory learning methods (Prensky, 2001).

One high-potential innovation is holographic display technology, which presents three-dimensional (3D) visual representations that breathe life into abstract subjects or complex historical narratives. In early February 2024, the producers of the Islamic talk show "Halaqah," in collaboration with the Faculty of Creative Multimedia and Computing (FMKK) at Selangor Islamic University, developed 20 3D holographic contents focusing on the history of Islamic scholars and innovations from the 8th to the 14th centuries. The broadcast of this technology through 13 episodes of "Halaqah 2024" on TV3 (and the YouTube digital platform) represents a pedagogical paradigm shift in Malaysia.

However, the teaching and learning of Islamic History are often criticized for being conventional, heavily reliant on rote memorization, and sometimes failing to captivate the modern student's interest (Almalki et al., 2020). The primary challenge for educators today is competing with the constant digital stimulation students experience daily. Although immersive technologies have been introduced, their integration through Islamic broadcast media—and the actual acceptance of these innovations by the younger generation—remains under-researched in the Malaysian context.

Furthermore, in the transition toward Artificial Intelligence in Education (AIED), research must evaluate not only whether these baseline holographic tools are accepted (Davis, 1989) but also identify user behavioral challenges (Ouyang et al., 2023). It is important to clarify that the 'potential of AI' discussed in this paper represents a theoretical proposition based on baseline TAM findings for holographic acceptance, rather than an empirically tested component. Understanding the acceptance level of this foundational technology is a critical prerequisite before transitioning to more radical innovations, such as transforming these holograms into interactive, AI-driven conversational agents.

LITERATURE REVIEW

Technology Acceptance Model (TAM) in Immersive Spaces

The Technology Acceptance Model (TAM), established by Davis (1989), remains a robust theoretical framework for measuring the adoption of digital innovations. Although originally designed for traditional information systems, recent literature confirms its suitability for evaluating future educational ecosystems. A study by Wardat and Akour (2024) utilized TAM to prove that Perceived Ease of Use (PEOU) significantly drives student attitudes toward Metaverse platforms compared to conventional e-learning. This empirical support is further strengthened by Bhattacharya and Singh (2024), who extended TAM to virtual and holographic learning environments, concluding that perceived usefulness directly correlates with improved student engagement and performance. Furthermore, in immersive microlearning applications (STEAM), TAM integration revealed that intuitive visual interface design is the primary catalyst for users' behavioral intentions (BI) (Jantakoon et al., 2025). Therefore, TAM provides the empirical parameters necessary to unravel the motivational acceptance of students toward hologram-infused television programs.

Immersive Innovation: From Holograms to Artificial Intelligence (AI) Integration

Immersive learning enables students to delve into academic narratives in ways that activate multiple cognitive stimuli. In this context, holograms offer an innovative pedagogical intervention by animating abstract subjects into 3D representations. A large-scale systematic review by Alaidaros and Mohamad (2025) revealed that holographic technology in the education sector consistently yields positive outcomes—particularly in spatial visualization capabilities, active student engagement, and long-term memory retention. This is supported by Kim and Lee (2024), whose empirical study found that 3D holographic learning significantly reduces cognitive load compared to traditional 2D video learning, breaking the barriers of passive pedagogy.

However, current literature suggests that the ideal evolution of history education must move beyond one-way visualization. Since the advent of platforms like ChatGPT, Generative AI (Gen AI) has revolutionized educational delivery through its ability to analyze and generate high-level cognitive dialogue (Baidoo-Anu & Ansah, 2023). According to Lopez et al. (2025), the transition from static historical avatars to AI-driven conversational agents is the next frontier. The combination of immersive innovations (such as 3D holographic displays) with Large Language Models (LLMs) creates a hybrid synthesis expected to alter the post-pandemic paradigm (Chen et al., 2024). Holograms are viewed as the optimal "physical vehicle" to be integrated with the "cognitive" capabilities of Generative AI. This convergence will soon birth AI-powered simulation interfaces where students can dialogue with and interrogate "historical figures" in real-time, creating a fully immersive historical learning environment.

METHODOLOGY

Research Design and Sample

This study employed a quantitative research design utilizing a structured descriptive survey. A total of 116 students from Selangor Islamic University were selected through purposive sampling.

Sampling Justification: The sample is heavily dominated by students enrolled in the Bachelor of Islamic Education with Multimedia degree (93.1%). The selection of this cohort is highly strategic as they represent future pre-service teachers and instructional designers. This group will be directly responsible for integrating digital technology and AI innovations into the mainstream education system in the future. Thus, their perceptions and critical evaluations of this technology hold significant academic value.

Instruments and Data Collection

The research instrument was a questionnaire adapted from established TAM frameworks (Davis, 1989; Venkatesh et al., 2003) specifically tailored for educational technology acceptance. The instrument underwent a content validity process by subject matter experts prior to distribution to ensure the reliability of the items in the context of holographic media. Utilizing a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree), respondents were instructed to watch a compilation of 13 episodes of "Halaqah 2024" featuring holographic applications via the YouTube platform before completing the questionnaire through Google Forms. Data were analyzed using SPSS version 30 software.

Data Analysis and Findings Discussion

Demographic Profile

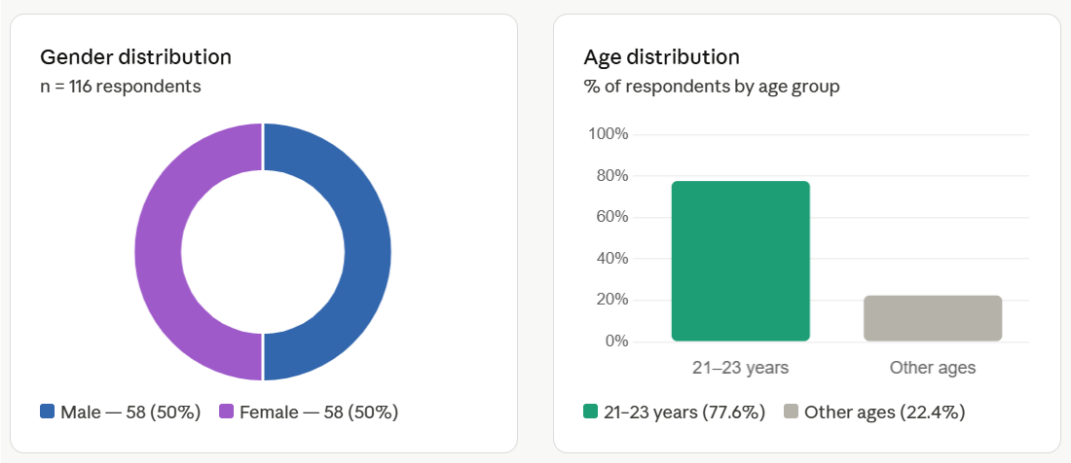

Figure 1: Gender and Age Distribution of Respondents

Figure 1 presents the demographic profile of the 116 respondents across two key characteristics: gender and age. The sample demonstrated a perfectly balanced distribution (n = 58 per group). Regarding age, 77.6% fell within the 21–23 years age bracket. Figure 2 presents the hologram viewing frequency among

respondents (96.6% exposure), showing the majority watch hologram content only "Sometimes" (48.3%) or "Rarely" (44.8%).

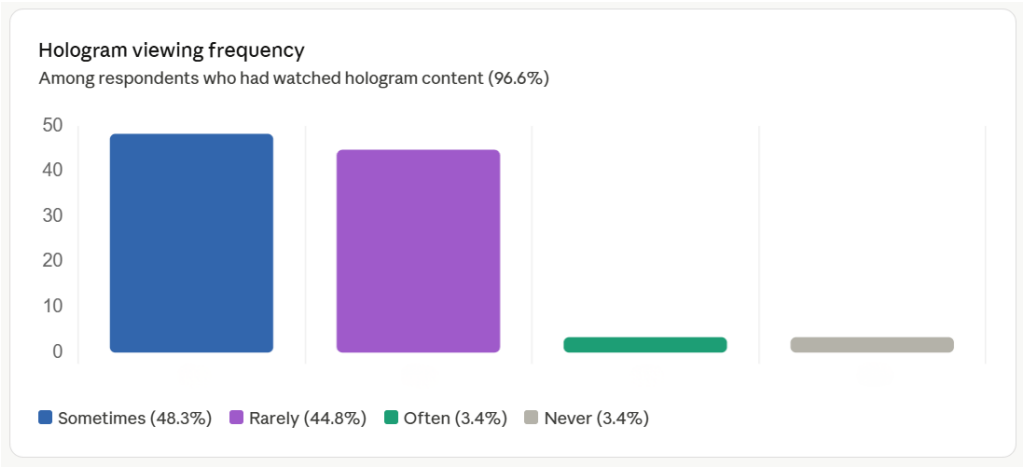

Figure 2: Hologram Viewing Frequency Among Respondents

Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Using (ATU), and Behavioral Intention to Use (BI)

Table 1: Perceived Usefulness

Statement / Item	SD F %	D F %	U F %	A F %	SA F %	Mean Score	Standard Deviation
A1- The use of holograms in TV programs helps me learn Islamic history more effectively.	2 1.7	3 2.6	18 15.5	70 60.3	23 19.8	3.94	.783
A2 - Islamic history content is more interesting when projected using hologram technology.	1 0.9	2 1.7	16 13.8	69 59.5	28 24.1	4.04	.727
A3 - It is easier for me to remember historical facts when they are presented as holographic visuals.	2 1.7	3 2.6	26 22.4	56 48.3	29 25.0	3.92	.856
A4 - Hologram technology improves my understanding of Islamic historical events.	1 0.9	5 4.3	18 15.5	64 55.2	28 24.1	3.97	.807
A5 - I am more motivated to learn Islamic history when the content is delivered using holograms.	1 0.9	3 2.6	21 18.1	61 52.6	30 25.9	4.00	.791
Overall Mean Score						3.97	

(SD: Strongly Disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly Agree)

Based on Table 1, overall, the findings of the study indicate strong agreement that this technology is a highly useful educational tool, with an average mean score of 3.97 out of 5. Participants felt it was most effective in making historical content more interesting and immersive (Mean = 4.04) as well as in increasing their motivation to learn (Mean = 4.00).

Table 2: Perceived Ease of Use (PEOU)

Statement / Item	SD F %	D F %	U F %	A F %	SA F %	Mean Score	Standard Deviation
B1 - Hologram content in TV programs is easy to understand.	3 2.6	1 0.9	19 16.4	70 60.3	23 19.8	3.94	.794
B2 - Holographic visuals help me maintain focus when watching history programs.	1 0.9	4 3.4	18 15.5	64 55.2	29 25	4.00	.791
B3 - I do not experience difficulty in following the narrative when holograms are used.	2 1.7	6 5.2	26 22.4	62 53.4	20 17.2	3.79	.850
B4 - Holographic visuals are clearer compared to other visual techniques I have watched before.	3 2.6	6 5.2	26 22.4	59 50.9	22 19	3.78	.902
B5- I can easily access TV programs that use hologram technology.	2 1.7	5 4.3	36 31	52 44.8	21 18.1	3.73	.868
Overall Mean Score						3.85	

(SD: Strongly Disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly Agree)

Based on Table 2, statistical analysis shows that respondents have a highly positive perception regarding the ease of use of hologram technology, with a high overall mean score of 3.85. The most prominent strength of this technology is its ability to help users maintain focus while watching (Mean = 4.00) and to ensure that the delivered content is easy to understand (Mean = 3.94). Although still rated positively, the aspects receiving lower scores relate to the ease of accessing these programs (Mean = 3.73) and the comparison of its visual clarity with other media techniques (Mean = 3.78).

Table 3: Attitude Toward Using (ATU)

Statement / Item	SD F %	D F %	U F %	A F %	SA F %	Mean Score	Standard Deviation
C1- I like watching Islamic history programs that use hologram technology.	3 2.6	3 2.6	20 17.2	63 54.3	27 23.3	3.93	.862
C2 - I support the use of hologram technology in learning Islamic history.	2 1.7	3 2.6	13 11.2	67 57.8	31 26.7	4.05	.800
C3 - I am ready to use hologram technology in the formal learning of Islamic history at Higher Education Institutions (IPT).	2 1.7	3 2.6	24 20.7	59 50.9	28 24.1	3.93	.842
C4 - I hope more educational programs use hologram technology.	1 0.9	3 2.6	12 10.3	68 58.6	32 27.6	4.09	.746
C5 - I believe hologram technology can be an effective alternative learning method	1 0.9	2 1.7	15 12.9	67 57.8	31 26.7	4.08	.736
Overall Mean Score						4.01	

(SD: Strongly Disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly Agree)

Based on Table 3, the analysis shows a highly positive attitude among respondents toward the use of hologram technology, as demonstrated by the very high overall mean score of 4.01 out of 5. The most notable findings are the high desire for more educational programs featuring holograms (Mean = 4.09) and a strong belief that this technology is an effective alternative learning method (Mean = 4.08).

Table 4: Behavioral Intention (BI) to Use Holographics in the Future

Statement / Item	SD F %	D F %	U F %	A F %	SA F %	Mean Score	Standard Deviation
D1 - I will choose to use holographic technology in other subjects in the future.	1 0.9	4 3.4	28 24.1	72 62.1	11 9.5	3.76	.706
D2 - I intend to recommend the use of holographic technology to my friends.	2 1.7	18 15.5	62 53.4	29 25	5 4.3	3.15	.794
D3 - I will continue to use holographic technology in my learning if it is available.	3 2.6	1 0.9	15 12.9	62 53.4	35 30.2	4.08	.836
D4 - I intend to use holographic technology more frequently in my learning in the future.	2 1.7	4 3.4	18 15.5	72 62.1	20 17.2	3.90	.784
Overall Mean Score						3.72	

(SD: Strongly Disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly Agree)

The analysis of future behavioral intention in Table 4 shows a positive outlook, with an overall mean score of 3.72. A key pattern emerges: although respondents show a strong personal commitment to this technology, they hesitate to recommend it to others. The intention to continue using holograms if available is very high (Mean = 4.08). Conversely, the intention to recommend this technology to friends recorded a significantly lower score at a neutral level (Mean = 3.15).

Reliability Analysis and Critical Discussion

Cronbach's Alpha analysis demonstrated excellent values for the PU (0.960), PEOU (0.932), and ATU (0.947) constructs. However, the BI construct recorded a slightly lower reliability value (0.724). In-depth examination revealed a significant empirical anomaly in item D2 (Intention to recommend to friends). This item possessed a very weak item-total correlation (0.175) and recorded the lowest mean score (Mean=3.15). This contradiction is highly intriguing because, in item D3, respondents expressed a very high personal commitment to continue using the technology (Mean=4.08).

Methodological Limitation Note: As this study was designed primarily with a descriptive survey approach to gauge initial baseline acceptance, the absence of inferential analyses such as correlation or multiple regression to empirically test the relationships between the TAM constructs (PU, PEOU, ATU, and BI) serves as a limitation. Future studies should employ structural equation modeling (SEM) to empirically validate these relationships within this specific context.

Pedagogical and Digital Innovation Discussion:

This phenomenon can be explained by several limitations of the current medium:

1. **Differences in Learning Styles:** The students (pre-service teachers) recognize that the effectiveness of holograms heavily relies on visual inclinations. They perceive that this positive experience might be highly subjective.
2. **Limitations of 2D Screen Display vs. Reality:** The holographic technology in this study was evaluated through the YouTube platform, which compresses 3D holographic projections onto 2D flat screens. According to Wang and Zheng (2024), pseudo-holograms on 2D flat screens often create an "illusion of immersion" that restricts true spatial interactivity.

CONCLUSION AND FUTURE AI ENHANCEMENTS

In conclusion, this study confirms the feasibility and positive acceptance among the digital generation toward holographic display innovation for the Islamic History subject. Respondents agreed that this technology is highly useful in capturing focus and motivating learning. However, the findings are constrained by the sample, which focuses on a single academic program at one university, thus requiring future studies across diverse demographics to ensure generalizability.

To revolutionize the delivery of Islamic history post-2025, one-way visual exposure is no longer sufficient. The future expansion of this technology must be directed toward the Integration of Generative Artificial Intelligence (Gen-AI). We propose future studies to explore the development of AI-powered conversational holograms, where students not only watch Islamic historical figures in 3D but can also dialogue and debate in real-time with these digital historical figures, empowered by the integration of Large Language Models (LLMs). This transformation from "Visual Viewing" to "Immersive AI Interaction" is what will complete the evolution of digital educational innovation.

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