MIKAILALSYS
Journal of Multidisciplinary Sciences

e-ISSN : 2987-2286
p-ISSN : 2987-3924

Index: Harvard, Boston, Sydney, Copernicus, Sinta 4, Scilit, Semantic, Google, etc

https://doi.org/10.58578/mikailalsys.v4i2.11099

The Influence of Digital Interactive Media and Immersive Experiences on Visitors' Educational Experiences at the Jakarta Maritime Museum

Dicky Juansyah Herwanto & Ika Suryono Djunaid
Bunda Mulia University, Indonesia
s19220197@student.ubm.ac.id; ikasuryono@ubm.ac.id

Article Info:

Submitted:	Revised:	Accepted:	Published:
Jun 4, 2026	Jul 2, 2026	Jul 14, 2026	Jul 19, 2026

Abstract

Advances in digital technology have transformed museums from institutions primarily devoted to collection preservation into increasingly interactive and immersive learning environments. Nevertheless, empirical evidence concerning the effects of digital interactive media and immersive experiences on visitors' educational experiences remains limited, particularly in the context of the Jakarta Maritime Museum. This study aims to analyze the partial and simultaneous effects of digital interactive media and immersive experiences on visitors' educational experiences at the Jakarta Maritime Museum. A quantitative survey design was employed, involving 100 museum visitors selected using the Slovin formula. Data were collected through questionnaires and analyzed using SPSS version 25 through validity and reliability testing, classical assumption testing, multiple linear regression, *t*-tests, an *F*-test, and coefficient of determination analysis. The findings indicate that digital interactive media have a positive and significant effect on visitors' educational experiences ($t = 8.061$, $p < .001$), while immersive experiences also exert a positive and significant effect ($t = 7.903$, $p < .001$). Simultaneously, both variables significantly predict visitors' educational

Mikailalsys is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

experiences ($F = 67.933$, $p < .001$), with a coefficient of determination of $R^2 = .583$, indicating that they explain 58.3% of the variance in visitors' educational experiences. The study concludes that optimizing digital interactive media and immersive experiences can strengthen the educational value of museum visits. These findings contribute to research on technology-enhanced museum learning and imply that the Jakarta Maritime Museum should develop more interactive, engaging, and immersive collection-presentation strategies to reinforce its educational function.

Keywords: Digital Interactive Media; Digital Museums; Immersive Experiences; Museum Learning; Visitors' Educational Experiences

INTRODUCTION

The rapid advancement of digital technology over the past two decades has brought significant changes across various sectors, including culture and tourism. Digital transformation has not only reshaped patterns of social communication but has also influenced the ways cultural institutions, such as museums, perform their educational functions. Museums, which were traditionally recognized as repositories for the preservation of historical collections, have undergone a paradigm shift toward becoming learning environments that are more interactive, participatory, and experience-oriented. According to Rusdi (2024), modern museums no longer function solely as institutions for collection conservation; instead, they have evolved into public spaces that integrate digital technology to create more engaging, interactive, and immersive learning experiences. This transformation demonstrates that museums are required to adapt to technological advancements in order to remain relevant to the needs of contemporary society, which has become increasingly accustomed to accessing information through digital media.

This transformation has been further reinforced by the emergence of various technological innovations, including Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI), interactive touchscreen displays, and digital multimedia, all of which have gradually been implemented in museums across numerous countries. Sugiharto et al. (2025) explain that museums in Europe, North America, and Asia have actively adopted digital technologies as part of their strategies to enhance service quality while simultaneously strengthening their educational functions. The application of these technologies enables visitors not only to observe museum collections visually but also to interact directly with the

information presented, thereby making the learning process more active, enjoyable, and meaningful. This condition indicates that museum digitalization is not merely a response to technological trends but rather a strategic necessity for enhancing the quality of public learning experiences.

Within the Indonesian context, museums have likewise experienced a substantial transformation in their functions. Museums are no longer viewed merely as repositories of historical artifacts but have evolved into non-formal educational institutions that play an essential role in promoting historical literacy, cultural awareness, and national identity. Krisnadi et al. (2025) explain that museums in Jakarta have begun implementing more interactive approaches to information presentation through a variety of educational activities, enabling visitors not only to acquire knowledge passively but also to participate actively in the learning process. Consequently, digital interactive media and immersive experiences have emerged as two key components that are expected to enhance the effectiveness of museums' educational functions.

This phenomenon has given rise to the concept of the immersive experience, which has become one of the principal approaches in the development of modern museums. An immersive experience refers to a condition in which visitors become emotionally, cognitively, and sensorially engaged with the exhibition environment, creating the impression that they are part of the narrative being presented. Fardani and Billah (2024) explain that numerous international museums have utilized digital technologies to create more realistic learning experiences through three-dimensional visualization, sound effects, animation, interactive simulations, and VR and AR technologies. This approach has been shown to increase visitor engagement while simultaneously strengthening the learning process throughout museum visits.

The growing adoption of digital interactive media and immersive experiences indicates that the quality of museums in the digital era is no longer assessed solely based on the size or value of their collections but also on their ability to create meaningful educational experiences for visitors. Susetyo et al. (2024) argue that the success of museums in fulfilling their educational functions is strongly influenced by the quality of the experiences perceived by visitors during their visits. These experiences encompass the museum's ability to present information in an engaging manner, encourage active interaction, and foster emotional

engagement, ultimately enhancing visitors' understanding of the historical and cultural values represented in the exhibitions.

Based on these developments, the researchers argue that museum development in Indonesia can no longer focus exclusively on collection conservation. Museums need to develop information presentation strategies that accommodate the characteristics of the digital generation, which generally prefers interactive learning experiences over one-way information delivery. The implementation of digital interactive media and the creation of immersive experiences are expected to represent effective strategies for improving learning effectiveness while simultaneously enhancing the attractiveness of museums as educational tourism destinations. Therefore, investigating the influence of these two variables on visitors' educational experiences is considered essential as a foundation for the future development of museums.

In Indonesia, research on digital interactive media has also begun to develop. Ravelino et al., (2026) demonstrated that the use of touchscreen displays significantly enhances visitor engagement in museums. Heniwaty et al. (2024) found that digital museum educational applications effectively increase visitors' interest in learning as well as their understanding of the educational content presented. Meanwhile, Azhari et al. (2025) concluded that the availability of interactive features is one of the key factors that enhances public interest in visiting museums.

Nevertheless, a review of the existing literature reveals a clearly identifiable research gap. Most previous studies have primarily examined the relationship between digital media and visitor satisfaction, revisit intention, visitor engagement, or museum service quality. Research on immersive experiences has likewise focused predominantly on virtual technologies or visitor behavior. To date, particularly in the Indonesian context, only a limited number of studies have integrated digital interactive media and immersive experiences as independent variables that simultaneously influence visitors' educational experiences, especially in the context of the Jakarta Maritime Museum. This gap is noteworthy because visitors' educational experiences constitute a primary indicator of a museum's success in fulfilling its educational mission for the public.

This study was conducted on the premise that the Jakarta Maritime Museum is one of the largest maritime history museums in Indonesia and possesses considerable potential as a public educational institution. The museum houses a wide range of historical collections

documenting the development of maritime navigation, trade, and the maritime culture of the Indonesian archipelago. In line with technological advancements, the Jakarta Maritime Museum has begun incorporating various forms of digital interactive media into its information delivery system for visitors. The integration of these technologies is expected to enhance the quality of the learning experience by presenting information in a manner that is more engaging, communicative, and accessible. Nevertheless, the effectiveness of digital interactive media and immersive experiences in improving visitors' educational experiences still requires empirical verification. Therefore, a scientific investigation is needed to explain the relationships among these variables.

Based on the preliminary observations conducted by the researchers, several conditions indicate that the utilization of digital media at the Jakarta Maritime Museum has not yet fully generated optimal educational experiences for all visitors. Some visitors continue to use digital media primarily for documentation or entertainment purposes without thoroughly exploring the educational information available. Furthermore, the level of visitor engagement with interactive media varies considerably, influenced by factors such as technological proficiency, interest in history, and the quality of the information presented. These findings suggest that the mere presence of digital technology does not necessarily enhance learning quality unless it is supported by immersive experiences capable of fostering visitors' emotional and cognitive engagement.

Table 1. Visitor Data for the Maritime Museum Over the Past 5 Years

Years	Number of Visitors
2021	7.511
2022	7.237
2023	47.885
2024	41.629
2025	47,010

Based on the statistical data presented in Table 1, the number of visitors to the Jakarta Maritime Museum has fluctuated over the past several years. Visitor numbers declined from 7,511 in 2021 to 7,237 in 2022, subsequently increased to 47,885 in 2023, decreased to 41,629 in 2024, and then rose again to 47,010 in 2025. These figures indicate that visitor attendance has not exhibited a consistent upward trend over time but has instead fluctuated from year to year.

From a theoretical perspective, this study is grounded in the Contextual Model of Learning developed by Falk and Dierking. This model explains that learning processes in museums are shaped by the interaction among personal, sociocultural, and physical contexts experienced by visitors throughout their museum visits. Learning outcomes are determined not only by the information provided by the museum but also by how visitors interact with their surroundings, educational media, and other individuals during the visitation process. Accordingly, the provision of digital interactive media and immersive experiences is regarded as an integral component of the learning environment that facilitates knowledge construction, thereby making visitors' educational experiences more meaningful.

In addition, this study adopts Mayer's Cognitive Theory of Multimedia Learning, which posits that learning becomes more effective when information is delivered through a combination of multiple media formats, including text, images, animations, audio, and video, enabling users to engage actively with the learning content. Multimedia-based information presentation allows individuals to process information simultaneously through both visual and verbal channels, thereby improving comprehension and retention of the learning material. Within the museum context, this theory suggests that digital interactive media can enhance learning quality by providing visitors with more engaging educational experiences than conventional methods of information delivery.

Furthermore, the concept of immersive experience in this study is based on Immersive Learning Theory, which proposes that learning becomes more effective when individuals experience a strong sense of presence within a learning environment. Technologies such as Virtual Reality (VR), Augmented Reality (AR), digital projection, visual simulation, and interactive multimedia facilitate such experiences by enabling visitors not merely to receive information passively but also to experience the museum environment more directly. The emotional engagement generated throughout this process strengthens attention, comprehension, and information retention, thereby making visitors' educational experiences more profound and memorable.

Based on these theoretical perspectives, it can be understood that digital interactive media and immersive experiences are closely interconnected in shaping museum visitors' educational experiences. Digital interactive media serve as a means of information delivery that enables active interaction between visitors and educational content, whereas immersive experiences reinforce the learning process through emotional, psychological, and sensory

engagement. The integration of these two aspects is therefore expected to enhance the effectiveness of museums in fulfilling their educational functions as non-formal learning institutions.

Previous studies have consistently demonstrated that digital technologies make positive contributions to enhancing the quality of museum visitors' experiences. Widharsyah et al., (2024) found that the use of Virtual Reality technology significantly increased visitor engagement and generated stronger immersive experiences than conventional methods of information presentation. These findings indicate that the utilization of digital technologies has considerable potential to improve the quality of interaction between visitors and museum collections.

Similarly, Natanael et al. (2024), in their study on virtual museums, found that digital interactive media enhance visitors' learning experiences by presenting information in a more engaging and comprehensible manner. These findings are supported by Meng and Youngmee (2024), who reported that the use of 360-degree interactive media improved visitor satisfaction and enhanced the overall quality of museum experiences. Collectively, these studies indicate that technological innovation makes substantial contributions to improving the quality of museum services.

Furthermore, Liu and Sutunyarak (2024) demonstrated that the implementation of immersive technologies has a positive effect on visitor satisfaction and their intention to revisit museums. Likewise, YiFei and Othman (2024) found that the application of Virtual Reality creates more engaging learning experiences, thereby increasing visitor engagement throughout the museum exploration process. Similar findings were reported by Mamur et al. (2020), who concluded that digital learning environments enhance learners' understanding and engagement in museum-based educational activities.

The novelty of this study lies in the development of a research model that integrates digital interactive media and immersive experiences as independent variables that simultaneously influence visitors' educational experiences at the Jakarta Maritime Museum. Most previous studies have primarily focused on the effects of digital technology on visitor satisfaction, revisit intention, or visitor engagement without directly measuring its impact on educational experiences. Furthermore, earlier research has generally examined these variables independently, thereby failing to provide a comprehensive understanding of how digital

interactive media and immersive experiences collectively shape museum visitors' learning experiences.

This study also offers an empirical contribution because it is conducted at the Jakarta Maritime Museum, which possesses characteristics distinct from those of other museums in Indonesia. As a museum dedicated to the nation's maritime history, the Jakarta Maritime Museum features unique collections, exhibition layouts, and digital facilities that facilitate the broader implementation of digital interactive media and immersive experiences. Consequently, the findings of this study are expected to enrich the existing body of knowledge on technology-based museum development while providing practical recommendations for museum administrators seeking to enhance the quality of educational services provided to the public.

In addition to contributing to the advancement of knowledge in the fields of tourism management, communication, and museum education, this study also offers practical benefits for the management of the Jakarta Maritime Museum. The findings are expected to serve as a foundation for designing more effective digital interactive media strategies, improving the quality of immersive experiences, and strengthening the museum's role as a public educational institution capable of adapting to technological advancements. Accordingly, the museum is expected not only to preserve historical heritage but also to provide engaging, enjoyable, and meaningful learning experiences for all visitors.

Based on the foregoing background, this study focuses on analyzing the influence of digital interactive media and immersive experiences on the educational experiences of visitors to the Jakarta Maritime Museum, both individually and simultaneously. This research focus was selected because the three variables are closely interconnected in supporting the transformation of museums into more innovative educational institutions that are oriented toward visitor experiences. This study is expected to address the research gap identified in previous studies while providing empirical evidence regarding the effectiveness of digital technology utilization in enhancing the quality of learning within museum settings.

In line with this focus, the objectives of this study are to analyze the influence of digital interactive media on the educational experiences of visitors to the Jakarta Maritime Museum, to examine the influence of immersive experiences on visitors' educational experiences, and to investigate the simultaneous influence of digital interactive media and immersive experiences on visitors' educational experiences at the Jakarta Maritime Museum.

The findings are expected to make a theoretical contribution by enriching the literature on museum-based learning and digital transformation, while also providing practical insights for museum administrators in improving technology-based educational services to create learning experiences that are more effective, engaging, and sustainable for the public.

METHODS

This study employed a quantitative approach with a descriptive-verificative (explanatory) research design to examine the influence of digital interactive media and immersive experiences on the educational experiences of visitors to the Jakarta Maritime Museum. A quantitative approach was selected because the study aims to test the relationships among variables through statistical analysis based on numerical data collected from respondents. The descriptive design was used to describe the characteristics of each research variable, whereas the verificative design was employed to test the hypotheses concerning the influence of digital interactive media and immersive experiences on visitors' educational experiences.

The research was conducted at the Jakarta Maritime Museum, located at Jalan Pasar Ikan No. 1, Penjaringan, North Jakarta, Indonesia, because the museum has implemented various forms of digital interactive media as part of its visitor education strategy. Data collection was carried out during the 2026 research period over approximately two months, beginning with the distribution of research instruments, followed by data collection and respondent data verification.

The participants in this study consisted of visitors to the Jakarta Maritime Museum who had utilized the museum's digital interactive media facilities and experienced the exhibition during their visit. Based on the Jakarta Maritime Museum's visitor statistics for 2025, the research population comprised 47,010 visitors. Given the large population size, the sample size was determined using the Slovin formula with a 10% margin of error, resulting in a calculated sample size of 99.78 respondents, which was rounded up to 100 respondents. The sampling technique employed was probability sampling using an accidental sampling approach, whereby every visitor who met the research criteria and agreed to participate had an equal opportunity to be selected as a respondent during the data collection period.

The research instrument consisted of a structured questionnaire developed based on the indicators of each research variable and measured using a five-point Likert scale, ranging

from 1 (strongly disagree) to 5 (strongly agree). The digital interactive media variable (X_1) was measured using four dimensions: interactivity, digital content quality, ease of use, and visual appeal. The immersive experience variable (X_2) was measured based on the dimensions of sense of presence, emotional engagement, and visitors' focus and attention. Meanwhile, the visitors' educational experience variable (Y) was measured using indicators related to improvements in knowledge acquisition and understanding of the educational content obtained during museum visits. Prior to the main survey, the research instrument was subjected to validity testing using the Pearson Product-Moment correlation coefficient and reliability testing using Cronbach's Alpha coefficient to ensure that all questionnaire items satisfied the required standards of validity and reliability.

The research data consisted of both primary and secondary data sources. Primary data were collected through the direct administration of questionnaires to visitors of the Jakarta Maritime Museum who had used the museum's digital interactive media during their visits. Secondary data were obtained from museum documentation, visitor reports, scientific publications, reference books, and previous studies relevant to the research topic. The use of both data sources was intended to strengthen the analysis and support the interpretation of the research findings.

Data analysis was performed using IBM SPSS Statistics version 25. The analytical procedures began with descriptive statistical analysis to describe the characteristics of the respondents and the distribution of responses for each research variable, followed by instrument quality assessment through validity and reliability testing. Subsequently, classical assumption tests—including the normality test, multicollinearity test, and heteroscedasticity test—were conducted to ensure that the regression model satisfied the underlying statistical assumptions. Hypothesis testing was carried out using multiple linear regression analysis to examine the influence of digital interactive media and immersive experiences on visitors' educational experiences. The hypotheses were evaluated using the t-test to determine the partial effects of each independent variable, the F-test to assess the simultaneous effects of both independent variables on the dependent variable, and the coefficient of determination (R^2) to determine the extent to which digital interactive media and immersive experiences explained the variation in visitors' educational experiences at the Jakarta Maritime Museum.

Through these methodological procedures, this study is expected to produce valid and reliable empirical findings regarding the influence of digital interactive media and

immersive experiences on the educational experiences of visitors to the Jakarta Maritime Museum. The findings are expected to serve as a foundation for developing museum digitalization strategies and enhancing the quality of technology-based educational services.

RESULTS

Test of Classical Assumptions

1. Normality Test

Table 2. Normality Test Result

Asymp. Sig. (2-tailed)	**0,200**

Table 2 shows that the Asymp. Sig. (2-tailed) value is 0.200. Since this value is greater than the significance threshold of 0.05, it can be concluded that the residuals of the regression model are normally distributed. Therefore, the regression model satisfies the assumption of normality and is considered appropriate for subsequent statistical analyses.

2. Multicollinearity Test

Table 3. Multicollinearity Test Results

Variable	Tolerance	VIF
X1	0,996	1,004
X2	0,996	1,004

According to the multicollinearity test results presented in Table 3, each independent variable has a Tolerance value greater than 0.10 and a Variance Inflation Factor (VIF) value lower than 10.00. Specifically, the Immersive Experience (X_2) variable has a Tolerance value of 0.996 and a VIF value of 1.004, while the Digital Interactive Media (X_1) variable also has a Tolerance value of 0.996 and a VIF value of 1.004. These findings indicate that both independent variables satisfy the criteria for the absence of multicollinearity, demonstrating that no multicollinearity exists among the predictors included in the regression model.

3. Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results

Variable	Sig.	Description
X1	0,123	Did Not Occur Heterocedasticity
X2	0,859	Did Not Occur Heterocedasticity

According to the results of the heteroscedasticity test presented in Table 4.2.3.3, all independent variables have significance values greater than 0.05. Specifically, the Immersive

Experience (X_2) variable has a significance value of 0.859, while the Digital Interactive Media (X_1) variable has a significance value of 0.123. These findings indicate that there is no evidence of heteroscedasticity in any of the independent variables. Therefore, the regression model satisfies the assumption of homoscedasticity and is considered appropriate for further statistical analysis.

Hypothesis Testing

1. Test of the Coefficient of Determination

Table 5. Test of the Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,764	0,583	0,575	1,070

As presented in Table 5, the independent variables, Digital Interactive Media (X_1) and Immersive Experience (X_2), collectively demonstrate a strong relationship with the dependent variable, Visitors' Educational Experience (Y), as indicated by the R value of 0.764 (Table 4.2.3.4.1). Furthermore, the R Square (R^2) value of 0.583 indicates that these two independent variables jointly explain 58.3% of the variance in Visitors' Educational Experience (Y), while the remaining 41.7% is attributable to other factors that were not examined in this study.

In addition, the Adjusted R Square value of 0.575 reflects the model's explanatory power after adjusting for the number of independent variables included in the regression model, thereby providing a more accurate estimate of the model's contribution to explaining the dependent variable. The relatively low Standard Error of the Estimate value of 1.070 indicates that the model's prediction error is minimal. Therefore, it can be concluded that the regression model employed in this study demonstrates strong predictive capability in explaining Visitors' Educational Experience.

2. F-Test (Simultaneous)

Table 6. F-Test (Simultaneous)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	155,408	2	77,704	67,933	0,000
	Residual	110,952	97	1,144		
	Total	266,360	99			

The results of the F-test indicate an F-statistic of 67.933 with a significance value of 0.000, as presented in Table 6. Since the significance value is lower than the threshold of

0.05, it can be concluded that Digital Interactive Media (X_1) and Immersive Experience (X_2) jointly exert a statistically significant influence on Visitors' Educational Experience (Y). Accordingly, the regression model employed in this study is appropriate for explaining the effects of the independent variables on the dependent variable.

These findings also support the proposed hypothesis that visitors' educational experiences are significantly influenced by both digital interactive media and immersive experiences. This implies that improvements in the quality of digital interactive media and immersive experiences are associated with corresponding increases in the educational experiences perceived by visitors to the Jakarta Maritime Museum.

1. (Partial) T-Test

Table 7. (Partial) T-Test

Model		B (Koefisien regresi tidak terstandarisasi	Std. error	Beta	t	Sig.
1	(Constant)	1,592	1,034		1,539	0,127
	TOTALX1	0,114	0,014	0,529	8,061	0,000
	TOTALX2	0,154	0,019	0,519	7,903	0,000

Table 3 presents the results of the partial regression analysis (Table 7), showing that the Digital Interactive Media (X_1) variable has a regression coefficient of 0.114, a t-statistic of 8.061, and a significance value of 0.000. Since the significance value is below 0.05, it can be concluded that Digital Interactive Media (X_1) has a positive and statistically significant partial effect on Visitors' Educational Experience (Y). Accordingly, the hypothesis proposing that visitors' educational experiences are influenced by digital interactive media is supported.

The Immersive Experience (X_2) variable has a regression coefficient of 0.154, a t-statistic of 7.903, and a significance value of 0.000. As the significance value is also below 0.05, Immersive Experience (X_2) likewise exerts a positive and statistically significant partial effect on Visitors' Educational Experience (Y). Therefore, the hypothesis that immersive experience significantly influences visitors' educational experiences is also supported.

Based on the standardized beta coefficients, Digital Interactive Media (X_1) has a standardized beta value of 0.529, whereas Immersive Experience (X_2) has a standardized beta value of 0.519. These results indicate that although both variables exert substantial effects on Visitors' Educational Experience, Digital Interactive Media has a slightly stronger influence than Immersive Experience.

2. Multiple Linear Regression Test

Based on the data analysis results presented in Table 2, the multiple linear regression equation obtained in this study can be interpreted as follows:

$$Y = 1{,}592 + 0{,}114X_1 + 0{,}154X_2$$

a. The constant value of 1.592 indicates that the Visitors' Educational Experience (Y) variable has a predicted value of 1.592 when both Digital Interactive Media (X_1) and Immersive Experience (X_2) are assumed to be equal to zero. In other words, the constant represents the baseline level of visitors' educational experience in the absence of the influence of the two independent variables.

b. The regression coefficient for Digital Interactive Media (X_1) is 0.114, indicating that, holding all other variables constant, a one-unit increase in Digital Interactive Media (X_1) is associated with a 0.114-unit increase in Visitors' Educational Experience (Y).

c. The regression coefficient for Immersive Experience (X_2) is 0.154, indicating that, assuming all other variables remain constant, a one-unit increase in Immersive Experience (X_2) leads to a 0.154-unit increase in Visitors' Educational Experience (Y).

DISCUSSION

1. The Influence of Digital Interactive Media on Visitors' Educational Experience

The results of the first hypothesis test indicate that digital interactive media have a positive and statistically significant influence on the educational experiences of visitors at the Jakarta Maritime Museum, as evidenced by a t-statistic of 8.061 and a significance value of 0.000 ($p < 0.05$). Therefore, the first hypothesis (H_1) is supported. These findings suggest that the higher the quality of the digital interactive media implemented by the museum, the greater the educational experience perceived by its visitors.

Digital interactive media enhance the learning process by enabling visitors not only to observe museum collections but also to interact directly with them through various digital technologies, including touchscreen displays, multimedia applications, animations, and visually based information presentations. Such interactions make the delivery of information more engaging, easier to understand, and more effective in sustaining visitors' attention throughout the exhibition.

The findings of this study are consistent with Mayer's (2024) Cognitive Theory of Multimedia Learning, which posits that interactive multimedia enhances learning by integrating text, images, audio, video, and animation into the instructional process. Furthermore, Chen and Liu (2025) argue that digital interactive media function as modern interpretive tools that bridge physical collections with digital narratives, thereby providing visitors with richer and more meaningful learning experiences. Similarly, ElSakhry (2025) explains that the implementation of digital interactive media promotes active participation, independent exploration, and higher-quality learning experiences among museum visitors.

The present findings are also consistent with previous empirical studies. Ravelino et al., (2026) reported that the use of digital touchscreen technology significantly increases visitor engagement in museums. Likewise, Meng and Youngmee (2024) demonstrated that 360-degree interactive media enhance the overall quality of visitors' experiences, while Heniwaty et al. (2024) found that digital educational applications improve both visitors' understanding and their interest in learning. The consistency of these findings reinforces the conclusion that digital interactive media constitute a critical factor in enhancing the quality of educational experiences in museum settings.

From a practical perspective, these findings suggest that the Jakarta Maritime Museum should continue to improve the quality of its digital interactive media by regularly updating multimedia content, expanding the availability of interactive displays, developing user-friendly digital information systems, and enhancing the visual presentation of educational materials. Such improvements are expected to optimize the museum's educational function and provide visitors with more engaging and meaningful learning experiences.

2. The Influence of Immersive Experience on Visitors' Educational Experience

The results of the second hypothesis test indicate that immersive experience has a positive and statistically significant influence on visitors' educational experience, as evidenced by a t-statistic of 7.903 and a significance value of 0.000 ($p < 0.05$). Therefore, the second hypothesis (H_2) is supported. These findings suggest that experiences that enable visitors to feel as though they are directly immersed in historical events or maritime environments enhance the effectiveness of the learning process during museum visits. Such experiences foster emotional engagement, improve concentration, and strengthen visitors' understanding of the information presented.

The findings are consistent with the theory proposed by Makransky and Petersen (2021), which explains that immersive experiences create a strong sense of presence, allowing individuals to perceive themselves as part of a virtual environment. This psychological state enhances attentional focus and facilitates more effective learning. Furthermore, Carrozzino et al., (2024) argue that immersive museum experiences provide more realistic historical reconstructions, enabling visitors to better understand historical and cultural contexts. Similarly, Wu and Zhang (2024) explain that immersive technologies stimulate visitors' curiosity and encourage active participation throughout the learning process.

The results of this study are also supported by previous empirical research. Widharsyah et al. (2024) found that the implementation of Virtual Reality (VR) significantly enhances museum visitors' immersive experiences. Likewise, Liu and Sutunyarak (2024) reported that immersive technologies improve visitor satisfaction and foster more positive visitor attitudes, while Natanael et al. (2024) demonstrated that virtual museums provide deeper and more meaningful learning experiences.

From a practical perspective, these findings suggest that the Jakarta Maritime Museum should further develop immersive exhibition concepts by incorporating technologies such as Virtual Reality (VR), Augmented Reality (AR), three-dimensional audiovisual presentations, and maritime historical simulations. The integration of these technologies is expected to provide visitors with more engaging, meaningful, and effective educational experiences.

3. The Simultaneous Influence of Digital Interactive Media and Immersive Experience on Visitors' Educational Experience

The results of the third hypothesis test indicate that digital interactive media and immersive experience simultaneously exert a positive and statistically significant influence on visitors' educational experience. This finding is supported by an F-statistic of 67.933 with a significance value of 0.000 ($p < 0.05$), indicating that the third hypothesis (H_3) is supported. Furthermore, the coefficient of determination (R^2) of 0.583 indicates that 58.3% of the variance in visitors' educational experience can be explained jointly by digital interactive media and immersive experience, whereas the remaining 41.7% is attributable to factors beyond the scope of the present research model. These findings suggest that visitors' educational experiences are influenced not only by the quality of digital technology or immersive experiences individually but also by the combined effects of both factors. When

museums successfully integrate interactive digital media with immersive exhibition experiences, visitors are more likely to engage in learning processes that are effective, engaging, and memorable.

The findings are consistent with Falk (2021) Contextual Model of Learning, which proposes that learning experiences in museums are shaped by the interaction among the physical environment, educational media, and visitors' personal experiences. In addition, Li et al. (2023) argue that the integration of digital media and immersive experiences enhances learning effectiveness by facilitating the visualization of complex concepts, making them easier for visitors to comprehend. Similarly, Jiang et al., (2025) state that visitors' educational experiences are determined by their level of understanding, emotional engagement, learning satisfaction, and ability to retain information following museum visits.

The results of this study further reinforce the findings of previous research demonstrating that museum digitalization and the development of technology-enhanced visitor experiences constitute effective strategies for improving the quality of museum-based learning. Therefore, the integration of digital interactive media and immersive experiences may serve as a key strategic approach for the Jakarta Maritime Museum in strengthening its role as a public educational institution and enhancing the educational value of visitors' experiences.

The findings of this study provide both theoretical and practical implications. From a theoretical perspective, the study reinforces the concept that digital interactive media and immersive experiences are important determinants of museum visitors' educational experiences. These findings enrich the existing literature on modern museums by highlighting digital technology as a fundamental component of experiential learning strategies that enhance visitor engagement and learning outcomes.

From a practical perspective, the findings offer valuable insights for the management of the Jakarta Maritime Museum in improving the quality of information delivery through the development of digital interactive media, the implementation of Virtual Reality (VR) and Augmented Reality (AR) technologies, the enhancement of more participatory exhibition designs, and the provision of learning experiences that actively engage visitors through visual, auditory, and emotional elements. The implementation of these strategies is expected to enhance the museum's attractiveness while strengthening its role as a public educational institution.

This study has several limitations. First, the research was conducted exclusively at the Jakarta Maritime Museum; therefore, the findings cannot be generalized to all museums in Indonesia. Second, the study involved only 100 respondents, which may not fully represent the diverse characteristics of museum visitors. Third, the research model included only two independent variables—digital interactive media and immersive experience—whereas visitors' educational experiences may also be influenced by other factors, such as service quality, the quality of museum guides, supporting facilities, visitor satisfaction, visit motivation, and the quality of museum collections. Therefore, future studies are recommended to employ larger sample sizes, expand the research to multiple museum settings, and incorporate additional variables to develop a more comprehensive research model.

CONCLUSION

Based on the results of the data analysis and discussion regarding the influence of digital interactive media and immersive experiences on visitors' educational experiences at the Jakarta Maritime Museum, the following conclusions can be drawn.

First, digital interactive media have a positive and statistically significant influence on the educational experiences of visitors to the Jakarta Maritime Museum. The results of the partial hypothesis test yielded a t-statistic of 8.061 with a significance value of 0.000 ($p < 0.05$), thereby supporting the first hypothesis. These findings indicate that the use of interactive digital media, such as multimedia applications, interactive displays, and technology-based information presentation, enhances visitors' understanding, interest, and engagement throughout the museum learning process.

Second, immersive experience has a positive and statistically significant influence on visitors' educational experiences at the Jakarta Maritime Museum. This result is supported by a t-statistic of 7.903 and a significance value of 0.000 ($p < 0.05$), confirming the second hypothesis. Immersive experiences that create realistic, engaging learning environments by integrating visual, auditory, and emotional elements significantly enhance the quality of visitors' learning experiences during museum visits.

Third, digital interactive media and immersive experience jointly have a positive and statistically significant influence on visitors' educational experiences at the Jakarta Maritime Museum. The simultaneous hypothesis test produced an F-statistic of 67.933 with a

significance value of 0.000 ($p < 0.05$), thereby supporting the third hypothesis. Furthermore, the coefficient of determination (R^2) of 0.583 indicates that 58.3% of the variance in visitors' educational experiences can be explained by digital interactive media and immersive experience, while the remaining 41.7% is attributable to factors beyond the scope of the present research model. These findings demonstrate that the integration of digital technology with immersive experiences constitutes an effective strategy for strengthening the educational function of museums.

This study contributes to the advancement of knowledge in the fields of museum management, educational tourism, and educational technology. The findings reinforce the theoretical perspective that the integration of digital interactive media and immersive experiences is a critical factor in creating more meaningful learning experiences for museum visitors. Moreover, this study provides empirical evidence regarding the effectiveness of digital technology in enhancing the quality of educational services in Indonesian museums, thereby offering valuable references for museum practitioners and researchers investigating technology-driven museum transformation.

Based on these findings, future research is recommended to expand the scope of investigation by including multiple museums in different regions to improve the generalizability of the results. Future studies may also incorporate additional variables that potentially influence visitors' educational experiences, including museum service quality, the quality of museum guides, visitor satisfaction, visit motivation, the quality of museum collections, and the application of emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI). Furthermore, the adoption of mixed-methods or qualitative research approaches is recommended to provide a deeper understanding of visitors' learning experiences during museum visits.

REFERENCES

Carrozzino, M. A., Lanfranco, E., Rignanese, G., Adornato, G., & Bergamasco, M. (2024). Enhancing archaeological research through immersive virtual reality. *IEEE Computer Graphics and Applications, 44*(4), 69–78. https://doi.org/10.1109/MCG.2024.3403299

Chen, L., & Liu, Y. (2025). Research on digital interactive narrative design in museums from the perspective of user experience. In *2025 8th International Symposium on Big Data and Applied Statistics (ISBDAS)* (pp. 485–489). IEEE. https://doi.org/10.1109/ISBDAS64762.2025.11117126

Dion, S., & Dewantara, Y. F. (2026). Pengaruh Muslim-Friendly Tourism terhadap Minat Berkunjung Kembali di Kawasan Pantjoran PIK. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 11*(2), 260–271. https://doi.org/10.23969/jp.v11i02.57580

ElSakhry, A. R. (2025). Role of digital technologies in enhancing museum interaction and visitor experience: Rijksmuseum in Amsterdam a case study. *International Journal of Tourism, Archaeology and Hospitality, 5*(2), 32–52. https://doi.org/10.21608/ijtah.2025.392307.1153

Falk, J. H. (2021). *The value of museums: Enhancing societal well-being*. Rowman & Littlefield.

Fardani, M. M. A., & Billah, A. F. A. S. (2024). Pengaplikasian Teknologi Digitalisasi dan Penataan Ruang sebagai Kunci Peningkatan Pemasaran Museum Mandala Bhakti Semarang. *Misterius: Publikasi Ilmu Seni dan Desain Komunikasi Visual, 1*(4), 144–158. https://doi.org/10.62383/misterius.v1i4.474

Heniwaty, Y., Haryadi, H., & Mulyana, D. (2024). Pengembangan Media Pendidikan Seni dan Budaya Berbasis Multimedia untuk Penguatan/Rintisan Museum Digital. *Jurnal Pembangunan Kota Medan, 1*(2), 58–69. https://jpkm-brida.medan.go.id/index.php/jpkm/article/view/6

Jiang, Y., Pashkevych, K., & Bi, S. (2025). Evaluating visitor perception and spatial preferences of various museums based on machine learning from 2016 to 2024. *PLOS ONE, 20*(7), Article e0327112. https://doi.org/10.1371/journal.pone.0327112

Liu, Q., & Sutunyarak, C. (2024). The impact of immersive technology in museums on visitors' behavioral intention. *Sustainability, 16*(22), Article 9714. https://doi.org/10.3390/su16229714

Makransky, G., & Petersen, G. B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): A theoretical research-based model of learning in immersive virtual reality. *Educational Psychology Review, 33*(3), 937–958. https://doi.org/10.1007/s10648-020-09586-2

Mamur, N., Özsoy, V., & Karagöz, İ. (2020). Digital learning experience in museums: Cultural readings in a virtual environment. *International Journal of Contemporary Educational Research, 7*(2), 335–350. https://doi.org/10.33200/ijcer.799643

Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review, 36*, Article 8. https://doi.org/10.1007/s10648-023-09842-1

Meng, Y., & Youngmee, K. (2024). Development of interactive 360 degree for enhanced visitor experience in Luoyang Museum. *Rajapark Journal, 18*(61), 45–67. https://so05.tci-thaijo.org/index.php/RJPJ/article/view/275217

Ravelino, P., Kusmara, A. R., & Adhitama, G. P. (2026). Evaluasi Inklusivitas Tata Pamer Interaktif dan Multisensori Museum Berbasis Integrated Museum Engagement Model (IMEM). *Idealog: Ide dan Dialog Desain Indonesia, 11*(1). https://doi.org/10.25124/idealog.v11i1.9415

Rusdi, E. R. (2024). Dari Konvensional ke Digital: Tranformasi Digital Museum Nasional Indonesia untuk Membangun Pusat Edukasi Publik yang Menarik Generasi Muda. *Konferensi Nasional Prasejarah Indonesia 2024*, 229–246. https://doi.org/10.55981/konpi.2024.153

Sugiharto, S., Rahmadi, M. T., Sidauruk, T., & Anjakusumawati, E. S. (2025). *Virtual Tour 360° dalam Pembelajaran Geografi dan Pengembangan Pariwisata: Inovasi Teknologi untuk Eksplorasi Destinasi*. CV Eureka Media Aksara.

Susetyo, B., Hanika, S. A., & Natarsyah, M. (2024). Kajian Pengunjung Museum: Upaya Menarik Pengunjung Potensial ke Museum Perjuangan Subkoss Garuda Sriwijaya. *Museion Bulletin: Jurnal Kajian Museum, 1*(1), 1–21.

Widarsyah, R., Wiradarmo, A. A., Palesangi, M., & Arief, F. H. (2024). Exploration of visitors' experience and preferences on virtual-reality application in museum. *Jurnal Sosioteknologi, 23*(3), 374–386. https://doi.org/10.5614/sostek.itbj.2024.23.3.6

Wu, X., & Zhang, X. (2024). Immersion tourism context: Scale development and influence mechanism of tourist multiple interactions. *Asia Pacific Journal of Tourism Research, 29*(12), 1456–1472. https://doi.org/10.1080/10941665.2024.2397778

Li, Y., & Othman, M. K. (2024). Investigating the behavioural intentions of museum visitors towards VR: A systematic literature review. *Computers in Human Behavior, 155*, Article 108167. https://doi.org/10.1016/j.chb.2024.108167