Journal of Information System and Technology, Vol. 05 No. 03, Des 2024, pp. 7-14
ISSN : 2775-0272
DOI : 10.37253/joint.v5i3.9981

Contents list available at https://journal.uib.ac.id/
JOINT
(Journal of Information System and Technology)
journal homepage: https://journal.uib.ac.id/index.php/joint/

The Effectiveness of Virtual Reality in Increasing Visitor Satisfaction of Cultural Heritage Sites: A Systematic Literature Review

Safrotus Sa'idah[1], Agus Juhana[2]
1,2 Multimedia Education Study Program, Universitas Pendidikan Indonesia, Bandung, Indonesia
E-mail: safrotuss@upi.edu[1], agus.juhana@upi.edu[2]

Abstract

Cultural heritage is a vital component of history that must be preserved to safeguard it against the homogenizing effects of globalization. In this context, Virtual Reality (VR) has emerged as a promising digital technology for the preservation and promotion of cultural heritage. This study aims to assess the effectiveness of VR in enriching cultural tourism experiences while exploring the potential and challenges of maintaining authenticity and information accuracy. A Systematic Literature Review (SLR) was conducted, utilizing data mining from the Publish or Perish (PoP) database, which initially yielded 992 records. After applying inclusion and exclusion criteria, 32 articles were selected for further analysis. The findings indicate that VR offers valuable applications for cultural heritage preservation, providing immersive, interactive experiences that bridge the past and present. VR technology allows audiences to engage more deeply with cultural heritage, offering enhanced understanding and appreciation. However, the success of VR in cultural tourism hinges on the delicate balance between technological innovation and the preservation of authenticity, as well as the importance of fostering awareness of cultural values in the digital age.
Keywords: virtual reality experience, culture, cultural heritage

Abstrak

Warisan budaya merupakan salah satu bagian penting dari sejarah yang harus kita lestarikan agar tidak terkikis oleh arus globalisasi. Dalam hal ini, VR merupakan salah satu teknologi digital yang saat ini sering digunakan dalam pelestarian budaya. Penelitian ini bertujuan untuk memahami seberapa efektif VR dapat memperkaya pengalaman wisata budaya, serta mengeksplorasi potensi dan tantangan yang muncul dalam menjaga keaslian dan akurasi informasi. Penulis menggunakan metode Systematic Literature Review (SLR). *Proses tambang data artikel dilakukan menggunakan* database Publish or Perish *sebanyak 992 data. Dalam SLR dilakukan proses seleksi artikel sesuai dengan kriteria inklusi dan eksklusi, sehingga didapat 32 artikel yang masuk kriteria inklusi untuk diteliti. Hasil dari penelitian ini bahwa teknologi VR dapat menawarkan aplikasi yang bermanfaat untuk pelestarian warisan budaya. VR berfungsi sebagai jembatan antara masa lalu dan masa kini, memungkinkan pengalaman budaya yang lebih hidup dan interaktif, serta memberikan wawasan yang lebih dalam tentang warisan budaya kepada berbagai kalangan masyarakat. Keberhasilan implementasi VR dalam pariwisata budaya bergantung pada kemampuan untuk menjaga keseimbangan antara teknologi dan keaslian, serta meningkatkan kesadaran akan nilai-nilai budaya di era digital.*
***Kata Kunci**: pengalaman realitas virtual, budaya, warisan budaya*

I. INTRODUCTION

Cultural heritage is an important part of our country's history and identity. In today's digitalization era, many cultural heritage assets are perishable and almost extinct. However, we can preserve them to last longer without the risk of damage [1]. Cultural heritage preservation that has recently been used is digital technology, this technology can increase user awareness about cultural heritage [2][3].

Digital technology has opened up unprecedented opportunities for the development and protection of cultural heritage [4]. Supporting technologies, especially immersive technologies in Cultural Heritage preservation, have experienced rapid development since the mid-2000s [5].

VR technology is a computer-generated simulated environment that allows users to interact and enjoy extraordinary experiences in a virtual world [6]. In the context of technology, VR is at the "extreme end" of the digital experience spectrum because of its ability to provide illusions that are so close to reality, that users actually feel "immersed" in a completely virtual world [5].

VR is used to enhance interactivity and immersion within museums, providing new ways for visitors to learn and enjoy cultural heritage in a more dynamic and modern way [7]. This sensory perception is communicated through compelling stories of the past in a complete realistic environment. With today's technological advances, we can reconstruct the past with more than just photographs or digital images [8]. Compared with traditional computer games, VR can provide users with a more interesting experience and more opportunities to interact through haptic sensations, sounds, images and more [9].

A revolutionary technology to immersively reshape museums' cultural heritage content, create innovative immersive experiences, and enhance visitor perception [10]. VR is also known as a "time travel" mechanism, allowing visitors to visit historical locations, cities, and buildings virtually, effectively replacing physical artifacts, positioning VR as a catalyst for change in the cultural field [11]. The fun VR experience allows users to expand their knowledge, including the general public, in an engaging and interactive way to learn about cultural heritage objects [12]. However, the application of this technology also raises concerns, especially regarding the authenticity of the information presented. There is a view that the use of digital technology may undermine the authority of traditional heritage, as the information conveyed through VR may be inaccurate or inauthentic, thus reducing the authenticity of the cultural experience [13].

Although the goal of VR is to create a highly immersive experience (making the user feel fully immersed in the digital world), sometimes the way users move in the virtual world is not always intuitive, especially for those who are not familiar with this technology [8]. Intuitive VR technology provides an opportunity for visitors to connect more emotionally and intellectually with cultural heritage. However, questions regarding the validity and accuracy of the information remain a major challenge. Therefore, this study aims to understand how effectively VR can enrich the cultural tourism experience, as well as explore the potential and challenges that arise in maintaining authenticity and accuracy of information. This study focuses on how VR can increase visitor engagement and appreciation of cultural heritage, while considering the challenges of ensuring that this technology remains respectful of traditional values. With the growing interest in cultural tourism and limited physical access to cultural sites, the relevance of this topic is increasing in the digital age, as it is important to maintain the integrity of cultural heritage amid the use of advanced technologies such as VR.

II. RESEARCH METHODS

The systematic review conducted followed the guidelines for systematic reviews and meta-analyses (PRISMA) using the PICO framework to frame the background research questions [14]. This paper reviews recent empirical research on the effectiveness of VR to enrich cultural tourism experiences. We systematically collected all relevant literature. Before that, we developed the following research questions.

RQ1: What technologies are often used in heritage tourism?

RQ2: How effective is VR in virtual heritage tourism experiences?

RQ3: How can we ensure the authenticity and authenticity of cultural heritage in the digital age?
RQ4: What factors of the digital museum experience influence the willingness to visit an on-site museum?

This systematic literature review was conducted to explore how different types of immersive technologies affect visitor effectiveness in heritage tourism over a ten-year period, from 2014 to 2023.

A. Search Strategy

To collect literature, I conducted a data mine using the Publish or Perish application found in figure 1. Databases from IEEE, Frontiers, ERIC, Wiley, Science Direct, Springer, Taylor & Francis, and others were used as sources for this evaluation. The keywords used were "virtual reality" OR VR AND "virtual reality experience" AND tourism AND culture AND visitors AND experience. Total records found in the data mine: N = 992 and the PRISMA flow chart was used to exclude literature to ensure the quality of the collection.

B. Inclusion and Exclusion Criteria

The three steps included in the selection process are identification, screening, and including. After conducting the data mining, the screening stage of the files based on the criteria using Excel software was continued. Next, the author will read the articles using scanning and skimming methods to understand their content and relevance, and determine the final articles to be included in the study.

Tabel 1. Inclusion and Exclusion Criteria

	Inclusion Criteria	Exclusion Criteria
By File	Journals written in English over a ten-year period, from 2014 to 2023.	Books, proceedings, theses, dissertations, literature review articles, damaged files, not written in English
By Title	Journals with titles relevant to the research topic	Journals with titles not relevant to the research topic
By Abstract	Journals with abstracts relevant to the research topic	Journals with abstracts not relevant to the research topic
By Full Paper	Journals with full papers relevant to the research topic	Journals with full papers not relevant to the research topic

The final articles selected had to meet the inclusion criteria in table 1. Finally, the author managed to get 32 final articles to be used in the research process. Meanwhile, the articles excluded from the list did not meet the inclusion criteria because they did not address some aspects related to the effectiveness of VR to enrich the cultural tourism experience. Among the articles reviewed to answer the research questions, the authors need to summarize the findings through a systematic description that will be divided into sections based on the research questions.

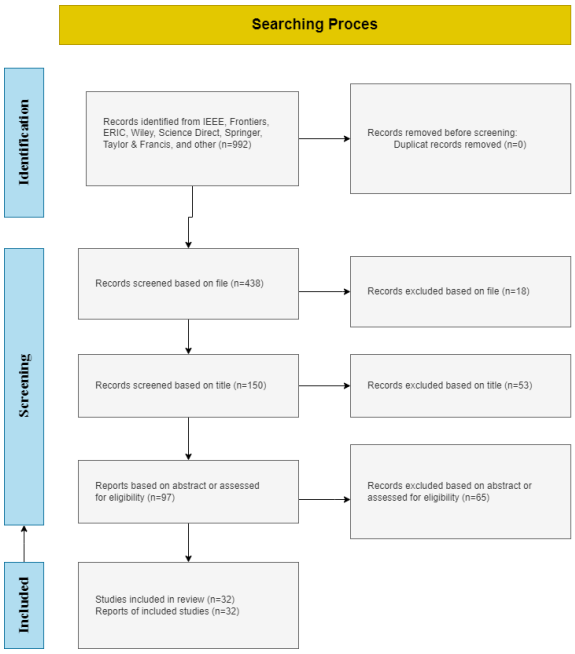

Figure 1. Prism Flowchart

The diagram illustrates the process of searching and screening the literature in a systematic review. At the identification stage, 992 articles were retrieved from various sources, including IEEE, Frontiers, ERIC, Wiley, Science Direct, Springer, and Taylor & Francis. No duplicate articles were found at this stage. The next process was the screening stage, which started with filtering by file (n=438), where 18 articles were excluded. The next stage involved

screening by title, which reduced the number of articles to 150 after excluding 53 articles. The final stage of screening involved abstract evaluation or eligibility assessment, resulting in 97 articles, of which 65 were excluded. After going through the entire screening stage, there were 32 articles that met the criteria for inclusion in the literature review.

III. RESULTS AND DISCUSSION

A. Technology for Cultural Heritage Tourism

The disruptive power of new realities opens unexplored windows to the past and generates imaginative events. VR reframes traditional museum exhibits, increasing heritage value and awareness in preservation and creating innovative experiences [10][15].

VR offers a revolutionary way to experience cultural heritage. VR is used to create immersive virtual tour experiences at cultural heritage sites. Through VR, users can explore and interact with 3D models of the site as if they were in the actual location. This technology is being applied in the cultural sector to enhance the visitor experience, provide more in-depth, complete and accurate information about the site, and increase visit intentions to the physical location. Previous research shows that video-based VR experiences are more effective in increasing positive attitudes and visit intentions compared to basic virtual tours [16][17][12][1][7][18]. Most users can familiarize themselves with the system quickly and the virtual gives them a real sense of immersion. VR technology is very accessible and convenient for cultural heritage sites.

VR is applied in cultural tourism to provide a more immersive and engaging experience for visitors, allowing them to feel and understand the historical context in a way that is not possible through traditional methods [8][2].

VR technology can revolutionize the way we interact with cultural heritage sites, creating immersive experiences that allow visitors to feel as if they are in the actual location. This technology not only increases awareness and the value of cultural preservation, but also enriches the visitor experience with more complete and accurate information. Research shows that video-based VR has a greater impact on building positive attitudes and increasing in-person visit intentions compared to regular virtual tours. With its accessibility and ease of use, VR becomes a practical tool to integrate within cultural sites, encouraging appreciation and a desire to connect more closely with historical heritage.

B. Effectiveness of Virtual Reality in Cultural Heritage Tourism Experience

The effectiveness of VR in the virtual cultural heritage tourism experience is quite high that 82% of visitors showed the highest level of satisfaction and desire to repeat the experience in the future, 86% of visitors gained new knowledge from the virtual museum experience [19]. The importance of designing VR experiences that effectively separate users from reality and immerse them in a virtual environment, thus enhancing their overall experience such as improving presentation (virtual presence), offering a more vivid and enjoyable experience [20][21].

VR is effective in providing immersive and interactive experiences that are not possible in physical museums. VR experiences are considered engaging and educational by various age groups. VR is effective as an educational tool and reflection on ethical topics related to cultural heritage as it gives a more realistic impression [19][22][5][23][24].

VR can offer beneficial applications for heritage preservation by providing alternative forms of access to heritage sites that reduce the impact of visitor overcrowding. A larger proportion of respondents (65.2%) strongly agreed to use VR in places where it is not available. 63.6% of respondents believe that displaying heritage sites as virtual 3D models is a valuable tool for heritage preservation. However, 45.2% of respondents disagreed with the use of VR for distant heritage sites. The effectiveness of VR experiences is influenced by factors such as the quality of VR products, the application of high technology, and the ability to create a sense of presence for users [25].

VR integration is proven to be effective in terms of improved visitor experience and satisfaction as well as audience development. The use of VR creates a satisfying experience, where 65% of visitors are satisfied with the digital content presented, despite complaints about low visual and audio quality [10].

Virtual museums can be effective in shaping positive attitudes towards cultural heritage, especially when combined with high levels of attendance and positive thinking from users [26].

VR has significant effectiveness in enhancing the heritage tourism experience, both in terms of

education and visitor satisfaction. With the majority of visitors being satisfied and wanting to repeat the experience, VR is proven to offer an immersive and engaging way to learn and interact with cultural heritage sites. VR designs that support separation from physical reality strengthen immersion and enhance virtual presence, making the experience more vivid and meaningful. In addition to being an educational tool that appeals to a wide range of ages, VR is also beneficial in heritage preservation by providing alternative access that can reduce damage due to overcrowding at physical sites. However, there are challenges in terms of visual and audio quality that must be considered for an optimal VR experience.

C. Authenticity in the Digital Age

VR technology has the potential to enhance cultural experiences. However, there are challenges in maintaining the authenticity of cultural content when faced with digital representations. Digital transformation can lead to distortion or misuse of the original meaning of culture [27][6]. Raising awareness among visitors and users about the importance of maintaining cultural authenticity is also a challenge [28]. Education about cultural values and the impact of digital distortion can help in creating a better understanding of the importance of respecting and protecting cultural heritage [29][27].

Involving cultural communities in the process of digitization and cultural representation is essential. Improving accuracy in the reconstruction and visualization of cultural heritage. With this collaboration, communities can provide valuable perspectives and input to ensure that digital representations remain true to their cultural authenticity [30][4]. Digital heritage is believed to undermine the authenticity of traditional heritage. Most people are still skeptical because the value of digital heritage is not yet clear. In general, a better understanding of the specific functions of digital heritage is needed to reconcile it with traditional heritage and integrate the two positively to provide a more complete cultural heritage [13].

The importance of high quality graphics in representing cultural heritage greatly contributes to the enjoyment of the virtual experience [3]. The challenge arises in balancing high visual quality with the ability of the device to run it. Some other challenges in creating virtual experiences that are authentic enough to enable discovery and deep understanding of lost architectural spaces such as the limitations of current VR technology in reproducing authentic multisensory experiences, challenges in determining the right level of accuracy and authenticity, and the balance between realism and critical interpretation. In this case, what must be done includes incorporating contextual details to create a more authentic and immersive experience and the need for mechanisms to maintain and distribute digital models of cultural heritage in the long term [31].

VR has great potential in enriching cultural experiences while also posing challenges regarding the authenticity and accuracy of digital representations. While VR is capable of delivering immersive cultural visualizations, the digitization process risks distorting the original meaning of culture if not balanced with caution and collaboration involving local cultural communities. Community participation in this process is important to maintain accuracy and ensure cultural values are conveyed correctly. In addition, technological challenges in producing high quality graphics and authentic multisensory experiences remain an obstacle to creating truly immersive virtual experiences. User education on cultural values and the risk of distortion is also needed so that digital heritage can be respected as much as traditional heritage, creating harmony between the two in providing a richer and more meaningful cultural appreciation.

D. Digital Museum Experience and Willingness to Visit in Person

VR technology creates immersive experiences that can increase visitor engagement with cultural content. These experiences allow visitors to experience and interact with cultural heritage more deeply, potentially increasing their interest in visiting a physical museum after experiencing its digital version [32][33][34][28][11].

By understanding low-tech and high-impact digitization efforts, as well as programming or other opportunities that may stem from such efforts, as a complement to and not a substitute for in-person visits [35]. Some people consider that VR is lacking in providing kinesthetic experiences compared to in-person visits [13]. While VR may not fully replace the authentic experience of an in-person visit, it opens up new

opportunities for digital preservation, reconstruction hypothesis testing, and deeper public engagement. As such, VR bridges the gap between the past and the present, enabling a more vivid and interactive cultural experience for a wide range of audiences, from experts to the general public [12].

Visual appeal, interactivity, and immersion have a significant effect on users' intention to continue using cultural heritage VR. This may indicate the potential effectiveness of VR in providing engaging experiences related to cultural heritage [9]. The cognitive, physical, sensory, and functional capabilities of VR devices, along with users' digital media literacy, significantly impact visitors' positive emotional experiences. These positive emotions, in turn, have a significant influence on the intention to recommend VR experiences [36]. Immersion, interaction, and available experiences drive willingness to visit on-site [37].

VR technology can increase visitor engagement with cultural content through immersive and interactive experiences, which in turn can generate interest in visiting physical museums. VR paves the way for the public to experience and understand cultural heritage more deeply, even making room for digital preservation and experimentation that can complement the hands-on experience without replacing it. While VR may not provide the same kinesthetic aspect as a physical visit, its visual appeal and ability to create strong emotional engagement can generate positive intentions to continue using this technology and recommend it. Thus, VR not only facilitates wider cultural access but also enriches the way we connect with cultural heritage in a contemporary way, making it relevant to all.

From 32 relevant research shows that Virtual Reality (VR) technology has revolutionized the visitor experience of cultural heritage by presenting a new, more immersive and interactive way. Through detailed 3D models of cultural sites, VR allows visitors to feel as if they are in the original location, providing a depth of understanding that traditional methods cannot achieve. Video-based VR, according to some studies, is even able to create positive attitudes and increase desire for in-person visits better than basic virtual tours, thanks to its ability to immerse users in a visually rich and informative cultural context. VR's effectiveness in providing engaging educational experiences for a wide range of ages also makes it a potential tool in cultural preservation and appreciation, especially for sites that could potentially be damaged by overcrowding. Thus, VR becomes an attractive solution to promote cultural values through a modern approach that simultaneously preserves physical sites.

However, the challenge of maintaining the authenticity of cultural content through digital media needs to be a concern. The representation of culture in VR format has the potential to cause distortion if not done carefully, so collaboration with local cultural communities becomes very important to ensure the accuracy of information and maintain the cultural values contained. In addition, the limitation of VR technology in producing authentic multisensory experiences is an obstacle in providing an experience that truly matches a live visit. Nevertheless, VR offers wider access and can enrich public interaction with cultural heritage, especially by incorporating strong visual elements and the ability to build users' emotional engagement. Further development is expected to balance aspects of realism and critical interpretation, so that VR is not only a means of cultural recognition, but also a bridge that connects digital and physical cultural experiences in a complementary manner.

IV. CONCLUSIONS

Virtual Reality (VR) technology has brought significant changes in the heritage tourism experience by creating an immersive experience that allows users to explore and interact with heritage sites virtually. The use of VR not only increases visitors' understanding and knowledge of the historical context, but also contributes to the preservation of cultural heritage by providing access alternatives that reduce the impact of visitor overcrowding. Although VR offers many benefits, challenges related to authenticity and cultural representation remain a concern, where the importance of involving cultural communities in the digitization process is key to maintaining the accuracy and authenticity of the content.

The effectiveness of VR in increasing visitor satisfaction is very high, with many users showing interest in repeating the experience. While VR does not completely replace physical visits, it opens up new opportunities for digital preservation and deeper public engagement. High graphic quality, interactivity, and visual appeal are important factors in creating an

engaging experience, which in turn can increase visitors' intention to visit the site in person after experiencing the digital version. Future research could focus on understanding how VR elements, such as immersion, interactivity, and virtual presence, influence perceptions of authenticity and cultural value of heritage sites. It is also important to examine the extent to which the involvement of cultural communities in the digitization process can maintain the accuracy of representations and reduce the risk of distortion of cultural meaning. In addition, studies can evaluate the impact of VR on physical visit intentions and satisfaction of visitors of different ages as well as improve the quality of graphics, multisensory capabilities, and kinesthetic experiences in VR to approach the authenticity of live experiences. The results of this study will provide insights into VR design that is not only attractive but also maintains the value of preservation and appreciation of culture as a whole.

V. REFERENCES

[1] Iacono, S., Scaramuzzino, M., Martini, L., Panelli, C., Zolezzi, D., Perotti, M., Traverso, A., & Vercelli, G. V. Virtual Reality in Cultural Heritage: A Setup for Balzi Rossi Museum. Applied Sciences (Switzerland), 14(9). (2024).

[2] Okanovic, V., Ivkovic-Kihic, I., Boskovic, D., Mijatovic, B., Prazina, I., Skaljo, E., & Rizvic, S. Interaction in eXtended Reality Applications for Cultural Heritage. Applied Sciences (Switzerland), 12(3). (2022).

[3] Paladini, A., Dhanda, A., Reina Ortiz, M., Weigert, A., Nofal, E., Min, A., Gyi, M., Su, S., van Balen, K., & Santana Quintero, M. Impact of Virtual Reality Experience on Accessibility of Cultural Heritage. ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 42(2/W11), 929–936. (2019).

[4] Zhong, H., Wang, L., & Zhang, H. The application of virtual reality technology in the digital preservation of cultural heritage. Computer Science and Information Systems, 18(2), 535–551. (2021).

[5] Li, J., Wider, W., Ochiai, Y., & Fauzi, M. A. A bibliometric analysis of immersive technology in museum exhibitions: exploring user experience. Frontiers in Virtual Reality, 4. (2023).

[6] Shen, S., & Ghani, D. A. Design a Virtual Reality Interface to Enhance the User Experience of Intangible Cultural Heritage Protection. Global Journal of Emerging Science, Engineering & Technology, 1(1), 37–47. (2023).

[7] Bachiller, C., Monzo, J. M., & Rey, B. Augmented and Virtual Reality to Enhance the Didactical Experience of Technological Heritage Museums. Applied Sciences (Switzerland), 13(6). (2023).

[8] Pisani, S., Miller, A., & Hall, M. Digital modes of interpretation of Pictish sculpture. Education and Information Technologies, 29(8), 10009–10042. (2024).

[9] Qiu, T., Li, H., Chen, Y., Zeng, H., & Qian, S. Continuance intention toward VR games of intangible cultural heritage: A stimulus-organism-response perspective. Virtual Reality, 28(3). (2024).

[10] Trunfio, M., Lucia, M. della, Campana, S., & Magnelli, A. Innovating the cultural heritage museum service model through virtual reality and augmented reality: the effects on the overall visitor experience and satisfaction. Journal of Heritage Tourism, 17(1), 1–19. (2022).

[11] Tsipi, L., Vouyioukas, D., Loumos, G., Kargas, A., & Varoutas, D. Digital Repository as a Service (D-RaaS): Enhancing Access and Preservation of Cultural Heritage Artifacts. Heritage, 6(10), 6881–6900. (2023).

[12] Spallone, R., Lamberti, F., Calandra, D., Mezzino, D., Auenmüller, J., & Rinascimento, M. Re-contextualizing the standing Sekhmet statues in the Temple of Ptah at Karnak through digital reconstruction and VR experience. DISEGNARECON, 16(31). (2023).

[13] Li, H. How can Digital Technologies Inform or Disrupt Traditional Engagements with Heritage Sites? (Vol. 4). (2022).

[14] Richardson, W. S., Wilson, M. C., Nishikawa, J., & Hayward, R. S. The well-built clinical question: A key to evidence-based decisions. ACP Journal Club, 123(3), A12–A13. (1995).

[15] Kargas, A., & Loumos, G. Strategic Development and Internationalization of Cultural Industry with Virtual Reality and Augmented Reality Technologies. (2023).

[16] H Park, J. K. S. B. W. W., & Thwaites, Harold. The effect of applying film-induced tourism to virtual reality tours of cultural heritage sites. IEEE. (2018).

[17] de Luca, V., Marcantonio, G., Barba, M. C., & de Paolis, L. T. A Virtual Tour for the Promotion of Tourism of the City of Bari. Information (Switzerland), 13(7). (2022).

[18] Kargas, A., & Loumos, G. Cultural Industry's Strategic Development: Reaching

International Audience by Using Virtual Reality and Augmented Reality Technologies. Heritage, 6(6), 4640–4652. (2023).

[19] Aiello, D., Fai, S., & Santagati, C. VIRTUAL MUSEUMS AS A MEANS for PROMOTION and ENHANCEMENT of CULTURAL HERITAGE. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 42(2/W15), 33–40. (2019).

[20] Gong, Q., Zou, N., Yang, W., Zheng, Q., & Chen, P. User experience model and design strategies for virtual reality-based cultural heritage exhibition. Virtual Reality, 28(2). (2024).

[21] Kiourt, C., Koutsoudis, A., & Kalles, D. Enhanced Virtual Reality Experience in Personalised Virtual Museums. International Journal of Computational Methods in Heritage Science, 2(1), 23–39. (2018).

[22] Dogan, E., & Kan, M. H. Bringing heritage sites to life for visitors: Towards a conceptual framework for immersive experience. Advances in Hospitality and Tourism Research, 8(1), 76–99. (2020).

[23] Poux, F., Valembois, Q., Mattes, C., Kobbelt, L., & Billen, R. Initial user-centered design of a virtual reality heritage system: Applications for digital tourism. Remote Sensing, 12(16). (2020).

[24] Pybus, C. New tools for cultural heritage tourism: Accessible virtual reality for milan's basilica sant'ambrogio. ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 42(2/W11), 1003–1010. (2019).

[25] Allah, H., & Sayed Gaafar, A. Virtual Reality: A Technological Tool for Preserving Built Heritage. In Journal of Association of Arab Universities for Tourism and Hospitality (Vol. 12). (2015).

[26] Besoain, F., González-Ortega, J., & Gallardo, I. An Evaluation of the Effects of a Virtual Museum on Users' Attitudes towards Cultural Heritage. Applied Sciences (Switzerland), 12(3). (2022).

[27] Trunfio, M., Campana, S., & Magnelli, A. Measuring the impact of functional and experiential mixed reality elements on a museum visit. Current Issues in Tourism, 23(16), 1990–2008. (2020).

[28] Ren, W., Zhu, Y., Du, M., & Lai, J. A Holistic solution integrating multiple interpretation technologies to enhance sustainability of poorly accessible world cultural heritage: The example of hailongtun. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 46(M-1–2021), 617–624. (2021).

[29] He, Z., Wu, L., & Li, X. (Robert). When art meets tech: The role of augmented reality in enhancing museum experiences and purchase intentions. Tourism Management, 68, 127–139. (2018).

[30] Errichiello, L., Micera, R., Atzeni, M., & del Chiappa, G. Exploring the implications of wearable virtual reality technology for museum visitors' experience: A cluster analysis. International Journal of Tourism Research, 21(5), 590–605. (2019).

[31] Kruiff, A.D., Swinburne, Marcello, F., Champion, E.M., & Burry, J.R. Learning from lost architecture: immersive experience and cultural experience as a new historiography. (2018).

[32] Hulusic, V., Gusia, L., Luci, N., & Smith, M. Tangible User Interfaces for Enhancing User Experience of Virtual Reality Cultural Heritage Applications for Utilization in Educational Environment. Journal on Computing and Cultural Heritage, 16(2). (2023).

[33] Ji, S., Zhang, L., Zhou, Z., Yang, H., & Shi, M. Exploiting Virtual Reality Visualisation Feature for Intangible Cultural Heritage in a Tourism Industrial Chain. Journal of Internet Technology, 25(4), 587–596. (2024).

[34] Trunfio, M., & Campana, S. A visitors' experience model for mixed reality in the museum. In Current Issues in Tourism (Vol. 23, Issue 9, pp. 1053–1058). Routledge. (2020).

[35] Clarke-Vivier, S., Bishop, R., & Markin, J. Small Tech, Big Impact: Twenty-First Century Educational Collaborations to Preserve and Share Rural Museum Collections. Journal of Museum Education, 46(1), 127–137. (2021).

[36] Lee, J., Jung, T., tom Dieck, M. C., García-Milon, A., & Kim, C.-S. Affordance, digital media literacy, and emotions in virtual cultural heritage tourism experiences. Journal of Vacation Marketing, 0(0). (2024).

[37] Deng, Y., Zhang, X., Zhang, B., Zhang, B., & Qin, J. From digital museuming to on-site visiting: The mediation of cultural identity and perceived value. Frontiers in Psychology, 14. (2023).