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Utilization of Virtual Reality for Enhancing the Awareness of Intangible Cultural Heritage in UAE Museum Environments

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Abstract

Objectives: This research investigates the role of virtual reality (VR) technologies in enhancing awareness of intangible cultural heritage within museums in the United Arab Emirates (UAE). Intangible cultural heritage, including traditions, rituals, and customs, is central to the UAE's national identity. As technology evolves rapidly, employing innovative tools like VR is crucial for preserving and presenting this heritage in engaging, interactive ways for diverse audiences. The study assesses VR's effectiveness in presenting intangible cultural heritage at the Al Shindagha Museum and Sharjah Institute for Heritage.

Methods: A descriptive-analytical approach was employed. Data were collected through personal interviews with museum professionals and surveys with visitors.

Results: The results revealed high levels of visitor satisfaction and demonstrated a positive impact on their understanding of intangible heritage, alongside increased enjoyment of the VR experience.

Conclusions: Visitors highlighted VR's potential to deepen cultural understanding and expressed interest in expanding content to include a wider range of Emirati traditions. The research provides key recommendations for improving VR integration in museums, focusing on enhancing accessibility, expanding content diversity, and fostering collaboration with technology providers. These findings emphasize VR's potential as an effective, immersive tool for cultural preservation and educational outreach, offering valuable insights for future museum applications in the UAE.

Keywords: Virtual Reality, Intangible Cultural Heritage, Museum Technology, UAE Museums, Cultural Heritage Preservation, Cultural Identity, Heritage Education, Interactive Museum Exhibits.

استخدام الواقع الافتراضيّ لتعزيز الوعي بالتراث الثقافيّ غير الماديّ في بيئات المتاحف في الإمارات العربيَّة المتَّحدة

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ملخّص

الأهداف: هدفت الدراسة إلى استكشاف دور تقنيات الواقع الافتراضي في تعزيز الوعي بالتراث الثقافي غير المادي داخل المتاحف في دولة الإمارات العربية المتحدة. ويعدُّ التراث الثقافي غير المادي، الذي يشمل التقاليد والطقوس والعادات، جزءًا أساسيًا من الهوية الوطنية لدولة الإمارات. وجاءت تقيم الدراسة فعالية الواقع الافتراضي في عرض التراث الثقافي غير المادي في كل من معهد الشارقة للتراث ومتحف الشندغة بدبي.

المنهجية: اتبعت الدراسة منهج تحليلي وصفي، تم جمع البيانات عبر المقابلات الشخصية مع المتخصصين في المتاحف واستطلاعات الرأي مع الزوار.

النتائج: أظهرت النتائج عن مستويات عالية من رضا الزوار؛ مما أثر بشكل إيجابي في تعلمهم حول التراث غير المادي، واستمتاعهم بتجربة الواقع الافتراضي.

الخلاصة: أشار الزوار إلى إمكانات الواقع الافتراضي في تعزيز الفهم الثقافي، وأعربوا عن اهتمامهم بتوسيع المحتوى ليشمل مجموعة أوسع من التقاليد الإماراتية. كما استعرضت الدراسة النقاط الرئيسة للمناقشة والتوصيات لتحسين تكامل الواقع الافتراضي في المتاحف، مع التركيز على تعزيز الوصولية، وتوسيع تنوع المحتوى، وتعزيز التعاون مع مزودي التكنولوجيا. تؤكد هذه النتائج إمكانية الواقع الافتراضي -بِوَصفِه أداة فعالة وغامرة- في الحفاظ على الثقافة والتواصل التعليمي؛ مما يقدم رؤى قيمة لتطبيقات المتاحف المستقبلية في الإمارات.

الكلمات الدالَّة: الواقع الافتراضي، التراث الثقافي غير المادي، تكنولوجيا المتاحف، متاحف الإمارات، الحفاظ على التراث الثقافي، الهُويَّة الثقافيَّة، تعليم التراث، المعارض المتحفيَّة التفاعليَّة.

1. Introduction

Intangible cultural heritage is a vital component of a society's national identity, deeply tied to collective memory and the social foundations that strengthen intergenerational connections and societal cohesion (UNESCO, 2003). In the United Arab Emirates (UAE), preserving this heritage has become increasingly important amidst rapid technological and urban transformations (Al-Khouri, 2021). Museums play a critical role in communicating cultural, historical, and scientific information to the public. However, they often face challenges such as limited physical space, diverse audience needs, and difficulties in presenting complex or intangible content in engaging ways (Falk & Dierking, 2018). Advances in digital technologies provide new tools to address these challenges, offering interactive platforms, online exhibitions, and 3D modeling as dynamic and inclusive methods for sharing knowledge (Li, Pengpeng, 2024).

1.1 Importance of the Study

Given the UAE's rapid modernization, there is an urgent need to explore innovative approaches to preserving and promoting intangible cultural heritage to ensure its continuity across generations (Al-Khalid, 2021). Virtual Reality (VR) is emerging as a promising tool that bridges the gap between heritage preservation and interactive engagement, enabling museums to create immersive learning environments that transcend physical and conceptual barriers (Pujol et al., 2013). VR not only enhances visitor experiences but also facilitates cultural education, identity reinforcement, and global accessibility to Emirati heritage (Paskaleva-Shapira & Besson, 2006).

From a scientific perspective, this study contributes to the growing body of research on digital heritage interpretation, examining how VR can be integrated into museum environments to enhance visitor engagement, learning outcomes, and cultural identity awareness (Styliani et al., 2009). From a practical standpoint, this research offers insights for museum professionals, policymakers, and cultural heritage institutions looking to leverage digital technologies to enhance heritage communication and educational outreach (Damala et al., 2016).

1.2 Research Objectives and Questions

The primary objective of this study is to investigate the role of Virtual Reality in enhancing the awareness, accessibility, and engagement of intangible cultural heritage within Emirati museums. Specifically, this study aims to:

1. Examine how VR can effectively enhance the presentation and interpretation of intangible cultural heritage in museum environments.
2. Evaluate visitor engagement and learning outcomes when interacting with VR-based heritage experiences.
3. Identify the challenges and opportunities in integrating VR technologies in museum exhibitions.
4. Explore the role of VR in bridging generational gaps and fostering cultural identity and heritage preservation in the UAE.

To achieve these objectives, the study addresses the following research questions:

1. How does Virtual Reality enhance visitor engagement with intangible cultural heritage in museums?
2. What impact does VR have on visitors' understanding and appreciation of Emirati traditions and customs?
3. What are the key challenges faced by museums in adopting VR for heritage presentation?
4. How can VR support the transmission of Emirati heritage across generations and promote cultural identity?

1.3 Research Methodology

This research employs a descriptive-analytical method to explore the use of VR technologies in presenting intangible cultural heritage within Emirati museums. By analyzing previous studies on technology in museums and conducting empirical research, the study examines the practical applications of VR and assesses its potential impact on enhancing cultural heritage awareness and interactive presentation (Sylaiou et al., 2010). The study focuses on two key case studies, Al Shindagha Museum (Dubai) and the Sharjah Institute for Heritage, selected for their pioneering efforts in integrating digital technology into heritage education.

1.4 Scope and Contribution of the Study

In addition to preserving heritage for future generations, VR allows Emirati museums to promote intangible cultural heritage on a global scale (Economou & Meintani, 2011). Visitors worldwide can virtually experience Emirati heritage without needing to visit physical sites. By enabling users to interact with traditional rituals, artisanal crafts, and folk practices, VR fosters a deeper appreciation of cultural heritage and its role in national identity formation (Chung et al., 2018).

Despite challenges such as high costs, staff training, and technological demands, the potential of VR to transform museum experiences far outweighs these obstacles (Wang et al., 2018). The findings of this study will be particularly relevant to museum professionals, heritage educators, and policymakers, offering practical insights into how digital tools can enrich the presentation and preservation of cultural heritage.

2. Related Work

2.1 Intangible Cultural Heritage and National Identity

Intangible cultural heritage (ICH) is central to cultural identity, encompassing traditions, rituals, oral traditions, and craftsmanship passed down through generations (UNESCO, 2003). It reflects collective memory and social cohesion, reinforcing national identity, particularly in countries experiencing rapid modernization, such as the UAE (Smith, 2006). As urban and technological developments continue to reshape societal structures, museums must adopt innovative strategies to safeguard and communicate these cultural elements effectively (Damala, Ruthven, & Hornecker, 2019).

2.1.1 Cultural Practices and Social Rituals

Cultural practices, including celebrations, festivals, and communal rituals, are fundamental to preserving identity. These activities strengthen social bonds and create intergenerational connections (Abdullah, 2023). In the UAE, national holidays, such as Flag Day and National Day, exemplify this connection, reinforcing shared values and historical awareness (Al-Hassan, 2021).

Museums play a crucial role in sustaining these traditions by integrating digital tools such as Virtual Reality (VR) to enhance engagement. VR applications can recreate traditional performances, enabling audiences to experience rituals interactively, thus preserving these practices for future generations (May, 2000).

Existing research on cultural preservation focuses heavily on tangible heritage, with fewer studies addressing intangible aspects (Pujol et al., 2013). While VR has been explored for its entertainment and educational value, its specific role in fostering cultural identity awareness remains underdeveloped (Styliani et al., 2009).

2.1.2 Language as a Medium for Cultural Transmission

Language is an integral part of ICH, carrying historical knowledge, folklore, and traditions (Salem, 2023). In Emirati society, Arabic dialects and oral storytelling traditions are essential in shaping collective memory and preserving identity (Abdulqader, 2022).

Museums are increasingly utilizing VR to simulate immersive linguistic experiences, where visitors can engage with traditional narratives in an interactive format, thus preventing linguistic erosion (Alawadi, 2020). Previous studies highlight the significance of language in heritage preservation, yet few have examined technological interventions in linguistic heritage conservation (Economou & Meintani, 2011). Research on VR-driven language revival initiatives is particularly limited, creating a gap in the current academic discourse (Žunić et al., 2023).

2.2 Virtual Reality in Museums: A Tool for Engagement

VR has transformed museum experiences, offering immersive storytelling and interactive displays that engage visitors beyond conventional exhibits (Kontogiorgakis et al., 2024). By integrating digital simulations, museums can provide historical reconstructions that bridge generational gaps in heritage education (Shehade & Stylianou, 2020).

VR applications provide multi-sensory experiences, making cultural learning more engaging, particularly for younger

generations (Roussou, 2004). Visitors can explore historical sites or participate in traditional crafts through interactive simulations, enhancing understanding and retention of cultural knowledge (Al Nasiri, 2023). However, accessibility challenges remain a concern, particularly regarding costs and technological literacy (Damala et al., 2016). Museums must balance innovation with user-friendly design to ensure inclusivity.

Existing research confirms VR's ability to enhance learning, yet empirical assessments on its long-term effectiveness in cultural education are still lacking (Falk & Dierking, 2018). Additionally, studies tend to focus more on historical narratives rather than on intangible heritage elements such as oral traditions and social practices (Champion, 2016).

3. Applications of Virtual Reality in Presenting Intangible Cultural Heritage

Virtual Reality (VR) technologies have emerged as innovative tools for presenting intangible cultural heritage in immersive and interactive formats. These technologies offer visitors a deeper connection with heritage elements by simulating traditions, rituals, and crafts within realistic virtual environments (Boboc et al., 2022).

3.1 Reviving Traditional and Popular Rituals

VR enables the recreation of traditional Emirati rituals such as weddings, popular celebrations, and religious practices. Visitors can engage with these events through virtual environments that enhance sensory experiences, fostering a sense of participation (Al Bakhit, 2022). This approach not only aids in preserving rituals but also ensures their accessibility to diverse audiences, promoting cultural understanding and education (Krajnović & Gortan-Carlin, 2017). The use of VR in this context aligns with broader trends in virtual tourism, where museums and cultural institutions have leveraged digital experiences to attract global audiences, particularly during disruptions such as the COVID-19 pandemic (Falaq, Sharafi, & Fouga, 2020).

3.2 Showcasing Popular Arts and Traditional Crafts

Traditional crafts like pottery, sadu weaving, and hand-loomed textiles are integral to the UAE's cultural identity. VR provides interactive experiences where visitors can explore production techniques, transforming passive observation into active learning (Hussein, 2023). Furthermore, VR highlights traditional Emirati arts, such as dances like Al-Yola, offering immersive interactions that deepen cultural appreciation (Miró et al., 2020). Museums worldwide have started leveraging VR for cultural storytelling, as demonstrated in comparative studies of traditional and digital museum experiences (Elgammal et al., 2020).

3.3 Virtual Documentation and Digital Archives

Advanced technologies, including 3D scanning and audiovisual recording, enable the creation of high-precision digital archives of intangible heritage. These archives serve as valuable resources for future generations, ensuring the long-term preservation and sustainable utilization of heritage elements (Wang & Zhiang, 2017). The digital transformation of museums has been a growing focus, with studies emphasizing the strategic role of digitalization in enhancing accessibility and engagement (Kamariotou et al., 2021).

3.4 Enhancing National Events and Cultural Experiences

VR enhances the presentation of national events such as the UAE National Day and harvest celebrations. It enables international visitors to interact with these cultural moments, deepening their understanding of Emirati traditions and strengthening national identity (Al Khalid, 2021). Virtual cultural experiences have been recognized as a significant contributor to cultural tourism and national branding strategies, particularly in the Middle East (Al-Najjar, 2020).

By leveraging VR, museums can play a crucial role in disseminating Emirati heritage locally and globally, ensuring its sustainability for future generations.

4. Methodology

This research adopts a descriptive-analytical methodology to evaluate the role of virtual reality (VR) technologies in presenting intangible cultural heritage within Emirati museums. To achieve this, the study combines a thorough analysis of existing literature with an applied study conducted in two prominent Emirati museums:

- **Sharjah Institute for Heritage (Sharjah, UAE).**
- **Al Shindagha Museum (Dubai, UAE).**

These institutions were selected for their pioneering use of VR to showcase rituals, customs, and folk practices, fostering deeper connections to Emirati culture. The Sharjah Institute for Heritage utilizes virtual reality to review a range of traditional games, while the Al Shindagha Museum employs VR to demonstrate the art of pearl diving and the profession of diving, offering immersive experiences that highlight essential aspects of Emirati heritage. To further illustrate these VR applications, Figure 1 presents screenshots of the VR experiences used in both case studies.



(a) **(b)**

Figure 1: Illustrative images of VR applications in the two case studies; (a) Traditional games in the Sharjah Institute for Heritage, and (b) Pearl diving simulation in Al Shindagha Museum.

4.1 Data Collection and Research Tools

The study utilized a combination of qualitative and quantitative methods to collect data:

4.1.1 Interviews with Museum Professionals and Heritage Experts

Semi-structured interviews were conducted with museum professionals and heritage experts to gain insights into the technical and operational aspects of VR integration. These interviews focused on:

- The benefits and limitations of VR applications in museum contexts.
- Challenges related to cost, maintenance, and visitor accessibility.
- Future recommendations for improving VR experiences in museums.

4.1.2 Questionnaires for Museum Visitors

A structured questionnaire was developed to assess visitor experiences with VR. The questionnaire consisted of two sections:

- Demographic Information: Collected data on gender, age, and educational background.
- Visitor Experience Evaluation: Measured satisfaction with VR technology, focusing on ease of use, attractiveness, clarity of information, and its effectiveness in enhancing understanding of intangible cultural heritage.

Responses were recorded using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

4.2 Study Population and Sample

The study involved two participant groups:

- *Visitors*: A total of 36 museum visitors participated: 20 from the Sharjah Institute for Heritage and 16 from the Al Shindagha Museum.
- *Museum Professionals*: Seven cultural heritage professionals from both institutions contributed to the research through in-depth interviews.

At the Sharjah Institute for Heritage, 75% of participants were female and 25% were male, suggesting a notable trend of higher female engagement with cultural heritage presented through VR technologies. This gender distribution provides insights into how different demographics interact with emerging museum technologies.

4.3 Research Procedures and Ethical Considerations

The research was conducted in three phases:

1. *Preliminary Study:* A review of existing literature on VR applications in museum settings to establish key research gaps.
2. *Data Collection:* Conducting interviews with museum professionals and administering visitor questionnaires at the two selected case studies.
3. *Data Analysis:* Using a mixed-methods approach, quantitative data from the questionnaires was analyzed through statistical methods, including frequency and percentage calculations. Meanwhile, qualitative data from interviews was thematised and interpreted to identify key patterns, challenges, and opportunities in VR integration within museums.

This study adheres to ethical research standards, ensuring that all participants provided informed consent before engaging in the research. Participants were fully briefed about the study's purpose, their right to withdraw at any time, and the confidentiality of their responses. Approval was obtained from the participating institutions to conduct interviews and surveys within their premises.

By combining a descriptive analysis of prior studies with findings from applied research, this methodology ensures a holistic evaluation of VR's impact on the presentation of intangible cultural heritage. The results aim to provide Emirati museums with practical insights for effectively leveraging innovative technologies to sustain and promote cultural identity in the digital era.

5. Results

The analysis of the study results is presented in a logical sequence, reflecting participant demographics, their experiences with VR, and its impact on understanding intangible cultural heritage.

5.1 Demographics and Educational Background

The study included participants from mixed genders and diverse educational backgrounds, providing insights into how VR is perceived across different levels of Emirati people.

5.1.1 Gender Disparity

The study revealed a disparity in gender participation, with a notably higher proportion of female participants compared to males, as presented in Table 1. This trend could reflect cultural or social dynamics influencing museum visitation patterns. The higher participation of women might indicate their prominent role in preserving and communicating cultural heritage within family and societal contexts, particularly in interactive environments such as VR. This gender imbalance raises important considerations for designing future VR experiences. Museums should explore strategies to better engage male visitors, tailoring content and programming to align with their cultural and personal interests.

Table 1: Distribution of Study Participants by Gender for Visitors in the Sharjah Institute for Heritage and Al Shindagha Museum

Gender	Sharjah Institute for Heritage		Al Shindagha Museum		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Male	5	25%	6	37.5%	11	30.5%
Female	15	75%	10	62.5%	25	69.5%
Total	20	-	16	-	36	100%

5.1.2 Educational Qualification

The majority of participants (66.7%) held a bachelor's degree, with postgraduate degree holders making up 25%. Diploma holders represented only 8.3% of the sample. These findings (Table 2) suggest that higher education levels are associated with increased engagement in VR experiences related to cultural heritage.

Table 2: Distribution of Study Participants by Educational Qualification (Visitors)

Educational Qualification	Sharjah Institute for Heritage		Al Shindagha Museum		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Diploma	1	5%	2	12.5%	3	8.3%
Bachelor's Degree	14	70%	10	62.5%	24	66.7%
Postgraduate Studies	5	25%	4	25%	9	25%
Total	20	-	16	-	36	100%

5.2 Visitor Satisfaction with VR Experience

Visitors reported high satisfaction levels with the VR experiences: 85% of respondents expressed overall satisfaction, and 93% acknowledged that the VR experience enhanced their understanding of intangible cultural heritage. The results shown in Table 3 highlighted the effectiveness of VR in engaging museum visitors and presenting intangible cultural heritage:

- *Effectiveness in Attracting Visitors:* 100% of participants agreed that VR is an effective tool for attracting visitors, achieving a mean score of 4.75 (SD = 0.44).
- *Enjoyability and Engagement:* 85% found the VR experience enjoyable and engaging, reflecting high visitor satisfaction (mean scores: 4.70 and 4.60, respectively).
- *Clarity and Ease of Use:* 95% appreciated the clarity of information, and 88% found the technology easy to use, highlighting its accessibility for diverse audiences.

Table 3: Statistical Analysis of Visitor Responses to the VR Experience

No.	Statement	Mean	Standard Deviation	Agreement (%)
1	Do you find VR effective in attracting visitors?	4.75	0.44	100%
2	Can intangible cultural heritage be presented traditionally?	4.05	0.88	90%
3	Was the VR experience enjoyable for you?	4.70	0.73	85%
4	Was the VR experience engaging and effective?	4.60	0.68	85%
5	Was the VR experience clear?	4.40	0.75	95%
6	Was the VR experience easy to use?	4.25	0.71	88%

No.	Statement	Mean	Standard Deviation	Agreement (%)
7	Was the VR experience beneficial?	4.30	0.73	92%
8	Did VR help showcase intangible cultural heritage?	4.50	0.61	89%
9	Did the museum presentation enhance your learning?	4.60	0.60	87%

5.3 Learning and Cultural Enrichment

The VR experiences were perceived as valuable tools for fostering deeper cultural awareness among museum visitors.

- *Enhanced Understanding:* The immersive environment allowed participants to gain a comprehensive understanding of Emirati traditions, rituals, and crafts.
- *Interactive Learning:* VR applications offered interactive and engaging methods to learn about intangible cultural heritage, making the content memorable and impactful.
- *Diverse Audience Appeal:* The technology successfully bridged generational gaps, appealing to younger audiences and adults with varying levels of familiarity with Emirati traditions.

5.4 Accessibility Challenges

Although the VR technology proved effective, several challenges were identified:

Table 4: Challenges Identified by Visitors

Challenge Description	Affected Demographic	Suggested Solutions
Difficulty navigating VR devices	Elderly, young children	Provide dedicated spaces
High costs of equipment and upkeep	All demographics	Increase financial support
Need for training to use VR tools	Some visitors	Offer guided workshops

6. Discussion and Recommendations

The findings highlight the transformative potential of VR technology in cultural institutions. As an innovative tool, VR has redefined how intangible cultural heritage is preserved and communicated, offering engaging and interactive experiences for diverse audiences. Below are key insights and actionable recommendations.

6.1 Discussion

6.1.1 Effectiveness of VR in Learning and Engagement

VR serves as a dual-purpose tool, combining entertainment with education. The ability to interact with cultural elements in an immersive environment deepens understanding and makes heritage more accessible. This aligns with previous studies (Damala et al., 2019), which highlight how digital tools enhance museum learning experiences.

6.1.2 Challenges in Accessibility

Despite its potential, challenges such as high costs, technical maintenance, and accessibility issues remain barriers to the widespread adoption of VR in museums. Studies like Kamariotou et al. (2021) also emphasize financial and logistical constraints as critical factors in digital heritage projects.

6.1.3 Preservation of Emirati Identity

By showcasing traditions, rituals, and crafts, VR contributes significantly to safeguarding cultural identity, ensuring intergenerational transmission of heritage knowledge (Elgammal et al., 2020).

6.2 Recommendations

To enhance the integration and effectiveness of VR technologies in Emirati museums, the following actions are recommended:

- *Increase Investments in VR Technologies:* Museums should allocate sustainable financial and technical resources to adopt, maintain, and upgrade VR systems. This investment is essential to ensure the long-term viability of VR applications in cultural institutions.
- *Develop Strategic Partnerships with Technology Companies:* Collaborating with local and international companies can facilitate the creation of innovative VR applications tailored to the unique needs of museums, enhancing the overall user experience.
- *Expand VR Content Representing Heritage Diversity:* Developing virtual experiences that reflect the diverse cultural traditions across the seven emirates will offer a more holistic and inclusive cultural narrative, helping to represent the full breadth of Emirati heritage.
- *Integrate VR into Educational Curricula:* Introducing VR-based heritage content in schools and universities will foster interactive learning experiences for students. This integration can help future generations develop a deeper appreciation of cultural heritage through technology.
- *Enhance Accessibility:* Museums should create dedicated, accessible VR spaces to accommodate visitors with physical limitations, particularly the elderly and children. Additionally, offering training and guidance for visitors will ensure a smooth and enjoyable VR experience.
- *Promote Emirati Museums Globally:* Museums can utilize VR technologies to develop international platforms, showcasing Emirati culture to global audiences. Virtual tours, for example, can significantly broaden the global reach of UAE museums, bringing local traditions to international attention.
- *Conduct Training Workshops for Museum Staff:* Offering continuous training for museum staff on VR content development, device management, and maintenance will ensure that they are equipped with the skills needed to manage the technology effectively, providing a high-quality experience for visitors.

7. Conclusion

In conclusion, the adoption of VR technologies in Emirati museums represents a significant advancement in enhancing awareness of intangible cultural heritage. VR offers innovative and immersive methods that align with the rapid development of technology, enabling visitors to engage with cultural heritage in dynamic and interactive ways. These experiences foster a deeper understanding and appreciation of Emirati traditions, contributing to the preservation and promotion of national identity.

This research explored the opportunities VR presents in enhancing museum experiences by showcasing heritage through interactive and accessible applications. The study utilized a mixed-methods approach, combining qualitative and quantitative data gathered through surveys, interviews, and statistical analysis. These methods enabled an in-depth understanding of visitor satisfaction, learning outcomes, and the effectiveness of VR in engaging diverse audiences. Notably, VR allows for the display of traditional rituals, arts, and practices in a way that is both accessible to local and international visitors, thereby promoting cultural tourism and raising global awareness of Emirati heritage.

While VR offers substantial benefits, the study also identified several challenges, including high costs, the need for specialized training, and the importance of ensuring accurate and authentic representation of cultural heritage. Addressing these challenges is essential for optimizing VR applications and ensuring they continue to represent cultural heritage in a meaningful and historically accurate manner.

The findings confirm that VR technology has the potential to be a highly effective tool for engaging visitors with intangible cultural heritage. With continuous development and improvement of VR experiences, Emirati museums can enhance cultural awareness, attract more visitors, and broaden the global reach of Emirati heritage. This can help position the UAE as a leader in innovative cultural presentation, combining technology and heritage in an impactful way.

In addition, the research highlights several actionable recommendations to improve the integration of VR in Emirati museums, such as investing in VR technologies, expanding content that reflects the diversity of Emirati heritage, and enhancing accessibility for all visitors. These steps, when implemented, can further enhance the educational and cultural value of VR applications in museums.

Ultimately, the integration of VR technologies in Emirati museums opens new possibilities for safeguarding and disseminating intangible cultural heritage. By overcoming existing challenges, Emirati museums can set a global standard for presenting cultural heritage through digital platforms. This approach will contribute to preserving and promoting Emirati culture, ensuring its relevance for future generations while engaging global audiences through interactive and immersive technologies.

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