Usability and Immersion in a Virtual Reality Hidden Object Game: A Case Study in Cultural Tourism

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ABSTRACT

This study explores the development and evaluation of a Virtual Reality (VR) hidden object game designed to promote awareness and understanding of traditional Malaysian handicrafts among young tourists. By leveraging the immersive and interactive capabilities of VR, the game integrates educational content within a playful digital environment, aiming to enhance cultural learning in tourism settings. The research examines key aspects including users' cultural knowledge acquisition, the effectiveness of game mechanics, and overall user experience through a structured evaluation involving participant feedback and gameplay analysis. Findings indicate that the prototype positively supports informal learning, with respondents reporting increased knowledge of Malaysian crafts, ease of interaction, and motivation to continue exploring cultural heritage. The study contributes to the field by presenting a novel application of the hidden object game subgenre in VR for educational tourism, demonstrating its potential to engage younger audiences in meaningful cultural experiences. While technical challenges such as collider design were encountered, they were resolved through mesh-based solutions, ensuring realistic object interaction. Limitations include a narrow cultural scope and sample size, suggesting future research should expand content diversity and assess long-term learning outcomes. Overall, the project validates VR as a promising medium for enhancing cultural heritage education in tourism contexts.

Keywords: virtual reality, cultural tourism, heritage handicrafts, immersive technology, computer games

INTRODUCTION

Cultural tourism offers a unique opportunity to educate and engage young visitors with local heritage, traditions, and crafts. By playing a vital role in fostering the exchange of historical and cultural traditions, this interaction not only contributes to the preservation of local heritage but also helps rejuvenate national identities, artistic expressions, and traditional craftsmanship [1]. Malaysia has consistently drawn international tourists by showcasing its diverse and vibrant cultural heritage by capitalizing on its rich traditions and history to create compelling travel experiences that appeal to visitors from around the globe [2]. Although cultural tourism holds considerable value, it often faces challenges in engaging younger audiences who tend to show limited interest in conventional presentations of culture, which can lead to a disconnect from traditional heritage experiences [3]. Conventional approaches to delivering information at heritage sites often fall short in engaging visitors meaningfully due to lack interactivity or appeal [4]. This results in missed opportunities to effectively communicate cultural knowledge and leaving a gap in meeting visitor expectations.

Simultaneously, the growing dependence on digital technologies has accelerated innovation within the cultural tourism sector which enabled heritage sites to offer more engaging and efficient services, ultimately enhancing the overall visitor experience through improved quality and accessibility [5]. Eventually, the intersection of Virtual Reality (VR) and tourism has rapidly evolved, especially in the wake of the COVID-19 pandemic, which accelerated the adoption of immersive technologies as alternatives to physical travel. VR offers a playful and engaging way to spark young tourists' interest in cultural heritage by blending education with entertainment in an immersive 3D environment, encouraging motivation and curiosity, making cultural learning more interactive and enjoyable [6]. This because VR constructs a computer-generated virtual environment that allows users to interact with digital elements in a seemingly real space.

Cultural heritage sites serve as valuable spaces for informal learning, where visitors can uncover historical narratives embedded in architectural marvels, gaining knowledge outside the boundaries of formal education [7]. Young tourists can learn about a wide range of tangible cultural heritage such as historical buildings and monuments, traditional clothing, local cuisine, musical instruments and handicrafts. In Malaysia, there is a general lack of interest among young people towards local traditional handicrafts [8] despite how these crafts offer significant value to serving not only as expressions of cultural heritage but also as key elements of cultural tourism. They reflect the customs and traditions of local communities and act as memorable experiences for tourists, often leaving lasting impressions that connect visitors to the places they explore [9].

Thus, based on these importance and gap, this study explores the potential of VR in fostering curiosity, cultural appreciation, and engagement through playful exploration within a hidden object game, where players locate traditional Malaysia handicrafts in a virtual environment. Unlike screen-based games, VR-based games offer a uniquely immersive experience, transporting users into imaginative worlds that feel lifelike and engaging. Hence, this research aims to harness the interactive and immersive capabilities of VR to nurture awareness and understanding of traditional handicrafts, by integrating educational content within an engaging and playful digital environment. Key aspects such as users' knowledge of cultural heritage, the efficacy of game mechanics, and the general user experience are examined to determine the game's potential as a tool for cultural education in tourism settings.

LITERATURE REVIEW

Virtual Reality

VR refers to a computer-generated simulation that utilizes specialized tools to render highly realistic three-dimensional environments, enabling users to experience a sense of presence and immersion within digitally constructed spaces [10]. It encompasses a broad spectrum of technologies, integrating both software and hardware components to create immersive and interactive digital environments (Jensen, 2018). VR systems can be categorized into three types of experiences, depending on the type of device utilized during user interaction [11-15]:

Non-Immersive: Users interact with a virtual environment via a standard computer monitor or television (Desktop VR applications, 3D simulations on a PC, or console-based VR games), using traditional input devices like a mouse, keyboard, or game controller. The VR is displayed in a window, and users remain highly aware of their real-world surroundings. There is no sense of being physically present in the virtual space.

Semi-Immersive: Users experience a partial sense of immersion, often through large screens, projectors, or multi-display setups. The environment such as CAVE systems (room-sized projection environments), large projection screens, or high-end simulators may include 3D graphics and sometimes limited tracking. The virtual environment occupies a larger portion of the user's field of view, but users can still see or sense the real world. Interaction may involve specialized controllers or motion capture, but not full head tracking.

Fully Immersive: Users are completely surrounded by the virtual environment, typically using head-mounted displays (HMDs) like Oculus Rift, HTC Vive, or PlayStation VR with head, hand controllers and motion tracking, and often with spatial audio and haptic feedback. The real world is visually and auditory blocked out, creating a strong sense of presence and "being there" in the virtual world. Users can look and move around naturally within the environment.

According to [16], VR systems can utilize several strategies for promoting immersion:

System Immersion: Refers to the extent to which a VR system replicates real-world sensory and interactive experiences through high display and interaction fidelity, influencing the user's perceptual engagement.

Narrative Immersion: Arises from a user's emotional and cognitive engagement with a storyline, where storytelling enhances curiosity, motivation, and conceptual understanding within a learning context.

Challenge-Based Immersion: Is driven by intellectual and sensorimotor engagement, where appropriately

designed tasks within a learner's developmental zone promote flow and deeper learning through active problem-solving.

Hidden Object Games

As a widely recognized subgenre of casual puzzle games, a hidden object game; also known as hidden picture games or Hidden Object Puzzle Adventures (HOPA) require players to locate specific items concealed within a detailed scene [17-19]. They typically feature visually rich search scenes where players must identify concealed items relevant to the setting (see Fig. 1). These games often include a main character or guiding figures, a coherent narrative structure, and logic-driven item placement to ensure contextual relevance where the gameplay is goal-oriented, with varying difficulty levels and optional features such as hints or events to maintain engagement and support cognitive development [20]. To progress narrative flow, players pick up objects throughout the game world that either disappear from the scene once found or use them in larger puzzles [21].

Fig. 1. Legacy Hidden Object Games for PC

Previous empirical study on hidden object game genres indicates a clear preference among participants for the digital version of hidden object games, suggesting that digital formats offer a more immersive experience compared to their paper-based counterparts [22]. Due to its' easy to learn game mechanics, hidden object games have been applied in several educational areas, primarily to enhance engagement and support specific learning objectives. The most prominent use of this gameplay is in language learning, especially vocabulary acquisition [23-26], but applications also extend to art history [27] and computer science [28]. The pedagogical impact is achieved various ways from context-rich environments, repeated exposure to target words, guiding spatial relationships, specific elements search within virtual galleries to finding and assembling hardware components.

Notably, hidden object and treasure hunt game mechanics are also used in tourism, especially cultural and heritage tourism to promote informal learning. They are integrated into museum visits and archaeological site tours to increase engagement, deepens understanding of cultural content, and makes learning about history and art more memorable [29]. By encouraging tourists to explore on foot and discover hidden gems, the game element support sustainable tourism practices, promote lesser-known sites, and create interactive itineraries [30]. Hidden object games are designed to be accessible and enjoyable for all ages, supporting critical thinking, problem-solving, teamwork, and cultural appreciation in a relaxed, playful context [31].

IMPLEMENTATION

The hidden object game subgenre is characterized by its reliance on precise visual perception to identify concealed items within complex scenes and is typically designed for short-duration gameplay, often lasting less than five minutes [32]. Therefore, this attribute is particularly well-suited for educational VR applications in tourism contexts due to its ability to engage users through focused visual exploration and quick, rewarding interactions. Its short playtime aligns with the attention span of younger audiences, while the visual search

mechanics naturally encourage observation and attention to cultural details. To investigate how hidden object game mechanics are applied, several existing VR games that incorporate physical object collecting such as selecting, pointing, touching, grabbing, catching, slashing or smashing are firstly analyzed. The intention is to identify unique player actions that can be done in VR environment. These games are downloaded from Meta.com 'Experiences' VR game online store. Results from the analysis are depicted in Table –I.

Table- I: Comparative Analysis of VR Games

Game	Genre	Gameplay	In game movement
Agent Hawk	Puzzle, Exploration	Locate hidden objects in the scene.	Teleportation
Beat Saber	Action, Puzzle	Slash blocks in time to music with a virtual lightsaber.	Hand movement
Half-Life: Alyx	Action, Adventure	Fighting enemies and solve puzzles in dystopian city.	Teleportation
Moss	Action, Adventure	Solving puzzles and engaging in combat.	Walking
Pistol Whip	Rhythm, Action	Shoot down enemies to the beat of music.	Stand still while the environment passing
EscapeVR-The basement	Escape Room	Solve puzzle and investigating clues.	Teleportation
Hidden Fortune	Adventure	Solve puzzle and collect peculiar trinket.	Teleportation

Most of the games listed in the table are action genre except Escape VR-The Basement and Hidden Fortune which is of escape room and adventure respectively. The majority of the games involve puzzle solving except for Pistol Whip which is shooting. In terms of game movement, most of the games use teleportation systems excluding Beat Saber, Moss, and Pistol Whip which are hand movement, walking and stand still respectively. Next, to investigate how hidden object game mechanics are applied, several existing games with the aforementioned genre are examined. All the games are varied in platform deployed which are web browser-based, PC, console, mobile and VR. Results from the analysis are depicted in Table –II.

Table- II: Comparative Analysis of Hidden Object

Game	Platform	Object finding method
Murder on a Full Moon	Website	Point and click
Big City Adventure Sydney	PC	Point and click
Family Vacation California	Console	Point and click
Hidden City: Hidden Object	Mobile	Touch on object
Sunken	VR	Aim

Based on the analysis, most of the selected hidden object games primarily encompass collecting or locating a predefined list of items concealed within visually detailed scenes, sometimes supported by visual, auditory or textual hints to guide the player. Some of the games incorporate time constraints and scoring systems to enhance challenge and engagement. The point-and-click object-finding method involves player using controlling the arrow cursor to point to and click on the discovered objects. In the mobile game, player will touch on the object

on smartphone screen. Finally, the aim method requires the player to target a dot to pick an object. The games also include subtypes such as Hidden Object Puzzle Adventures (HOPAs), which integrate puzzles into the narrative, and Fragmented Hidden Object Games (FROGs), where items are discovered in parts and reassembled upon completion.

Grounded on the results from the analysis, a prototype of VR hidden object game is developed using Unity game engine. The game prototype applies point and grab using laser pointer or ray cast as the method of item collection. Player navigate around with continuous movement in VR environment. For the prototype, “Belanga” game object uses Rigidbody scripting API, allowing forces to be applied on the object and to control it in a physically realistic way (see Fig. 2). Rigidbody gives gravity to the object, and it is controlled by the Unity Physics engine. Two script files are included - the XR grab Interactable script that utilize the XR ray cast system, making the "Belanga" grabbable, whereas the Hidden Ob Collide script is used to make the hint text from the hint list disappear when the object collides with the basket. Game art such as assets is made by using Blender software. Fig. 3 shows one of the hidden object assets that is made up from cylinder mesh object by modifying vertices and edges while Fig. 4 shows color is applied to the object by changing the base color hex code. The prototype employs First Person Perspective (FPP), which means that the player sees the virtual environment through the character's eyes. In addition, the player can see the virtual hand that they control in real life with the VR controller. A technical challenge encountered during development involved designing object-specific colliders, which was addressed by applying mesh colliders to achieve a more accurate fit.

Fig. 2. Unity’s Inspector panel

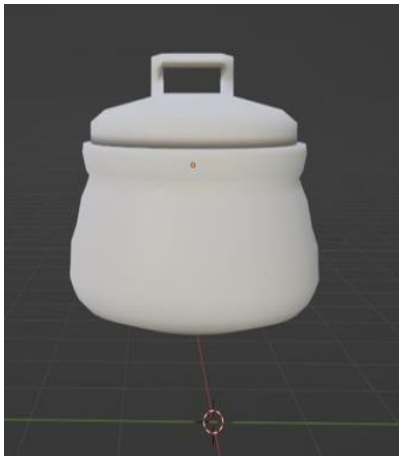

Fig. 3. 3D model of Belanga, a Malaysian traditional craft

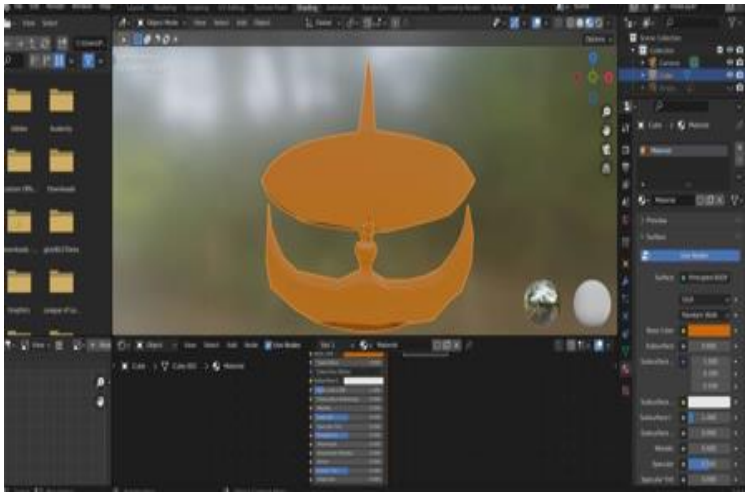

Fig. 4. Wau Bulan 3D model in Blender's shading mode

Fig. 5. Bird eye view of game environment

The VR headset and controller serve as the input device. When a player interacts with the VR controller, the VR device records the interaction and sends feedback to the player's VR headset. Game engine such Unity must be installed with Oculus Integration Kit to make the game playable in VR device. The basic gameplay is that the player must search for hidden objects hidden in the scene using the hint list provided within the gameplay scene. The game starts at the main menu and proceeds to the main gameplay scene once the play button is pressed. In the game scene, there are ten hidden objects to be located by the player (refer to Fig. 6).

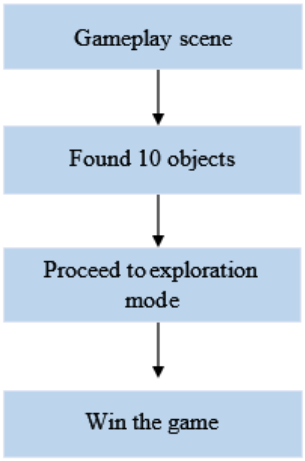

Fig. 6. Gameplay Flow

The hint list is provided on the screen at the wall of the house (see Fig. 7). To collect the objects, the player will point to them, grab them while carrying them, and throw them into the basket. Once the objects have been collected, points are awarded. The scene will change to the last scene which is the exploration scene where player can explore the scene while reading the information about the Malaysia traditional handicrafts which are the hidden objects.

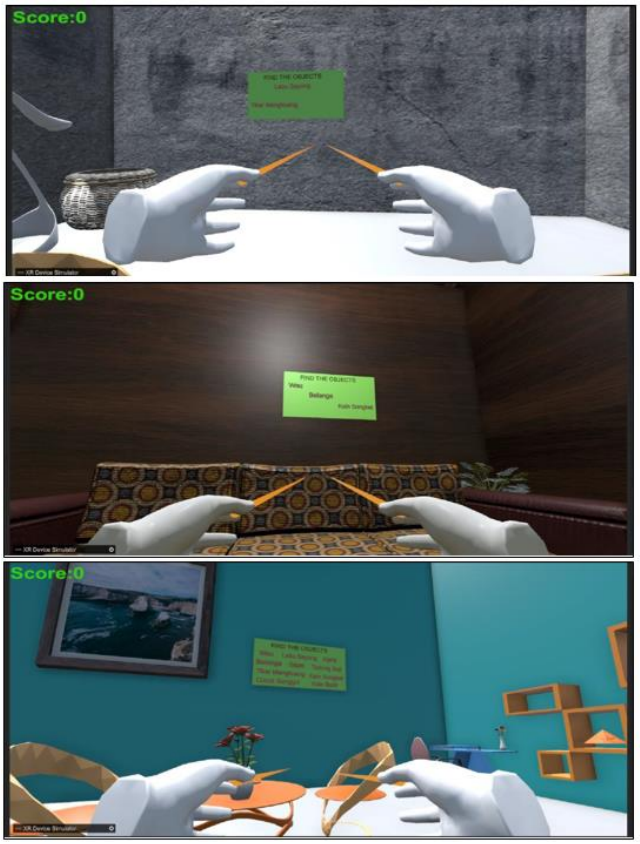

Fig. 7. In-Game Virtual Environment

RESULT AND DISCUSSION

Evaluation phase involves 30 participants - male (20) and (10) female. As VR technology is still in its early stages, not everyone can afford to buy a VR headset. Hence, the target age groups have been expanded to include adults up to the age of 44. Fig-8 exhibits that 43.3% of respondents are between the ages of 19 and 23, 33.3% are between the ages of 24 and 29, 10% are between the ages of 24 and 29, 6.7% are between the ages of 35 and 39, and 3.3% are between the ages of 30 and 34 and another 3.3% are between the ages of 40 to 44.

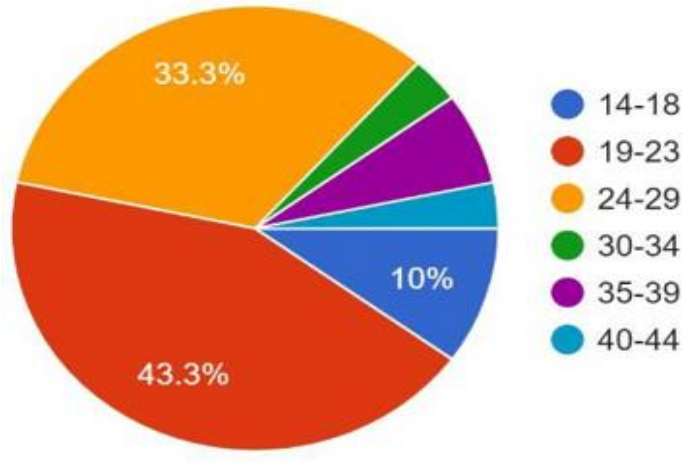

Fig. 8. Participants Demographic

The evaluation of the game prototype focuses on three key dimensions: users' knowledge of Malaysian handicrafts, the effectiveness of game mechanics, and the overall user experience. These components are essential for assessing the educational and experiential value of the VR game. Evaluating users' cultural knowledge helps determine the game's impact on learning outcomes, while analyzing game mechanics ensures that the interactive elements function as intended to support engagement. Assessing user experience provides insight into usability, immersion, and satisfaction, which are critical for the success of educational tools in tourism contexts.

Effects of Prototype towards Player's Malaysian Handicrafts Knowledge

As illustrated in Fig. 9, over fifteen respondents rated all three evaluation items at a high level, indicating a positive reception of the game prototype. Notably, participants reported increased knowledge of Malaysian handicrafts after gameplay, and expressed that the prototype effectively supported their learning and motivated continued exploration of the subject. No respondents rated any item as very poor, suggesting that the prototype successfully met its educational objectives in enhancing cultural awareness. This result highlights the effectiveness of the VR game in achieving its intended learning outcomes. The consistently high ratings across knowledge acquisition, learning support, and motivation reflect the prototype's potential as an engaging educational tool for cultural tourism, particularly among younger audiences.

Game Mechanics

Fig.10 indicates that over fifteen respondents rated three usability-related questions as "very easy," with specific aspects such as item manipulation (16 respondents), in-game movement (19 respondents), text readability (21 respondents), and object targeting using a laser pointer (22 respondents) receiving consistently high scores. These findings suggest that users adapted well to the game mechanics, demonstrating intuitive interaction and ease of use within the virtual environment.

User Experience

Additionally, Fig. 11 shows that 24 respondents rated the knowledge acquisition question highly, indicating that the prototype successfully delivered an enjoyable and educational experience that enhanced users' understanding of Malaysian handicrafts.

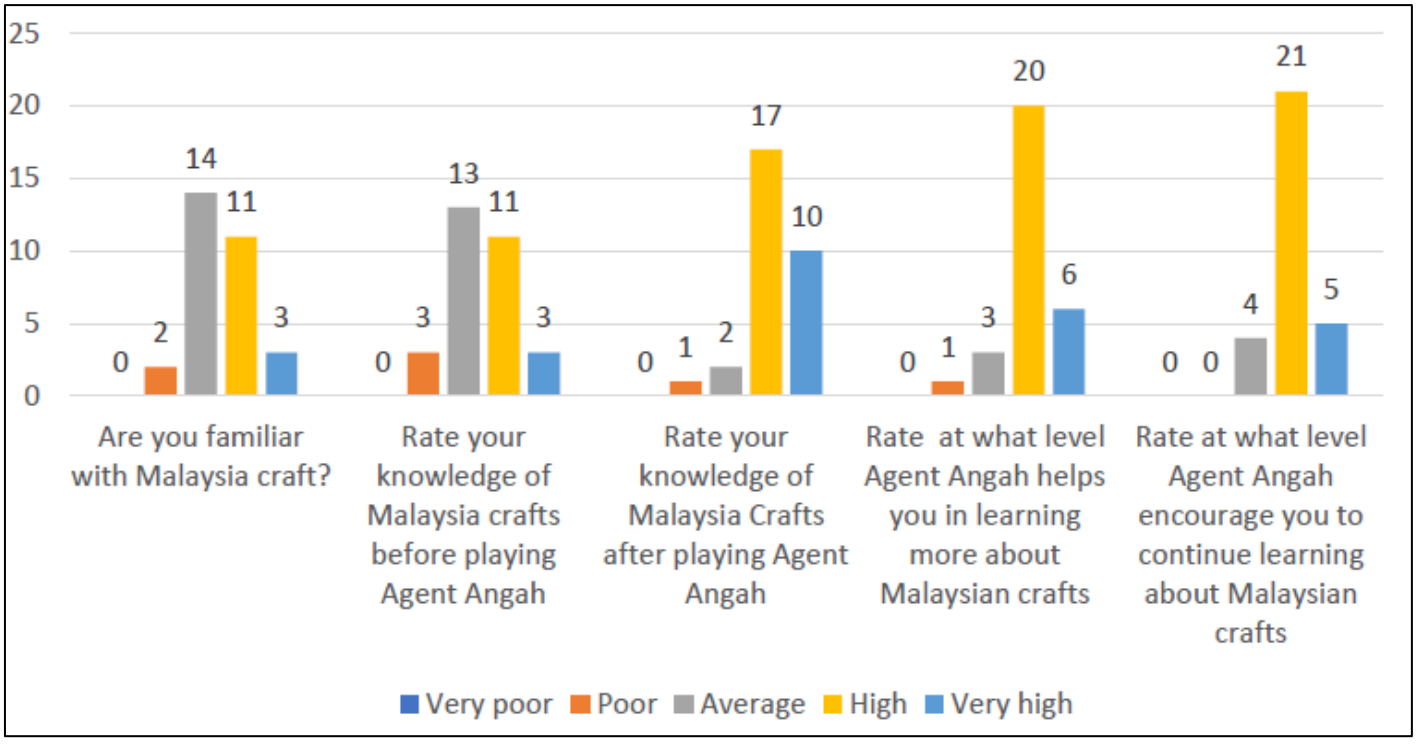

Fig. 9. Knowedge on Malaysian Handicraft

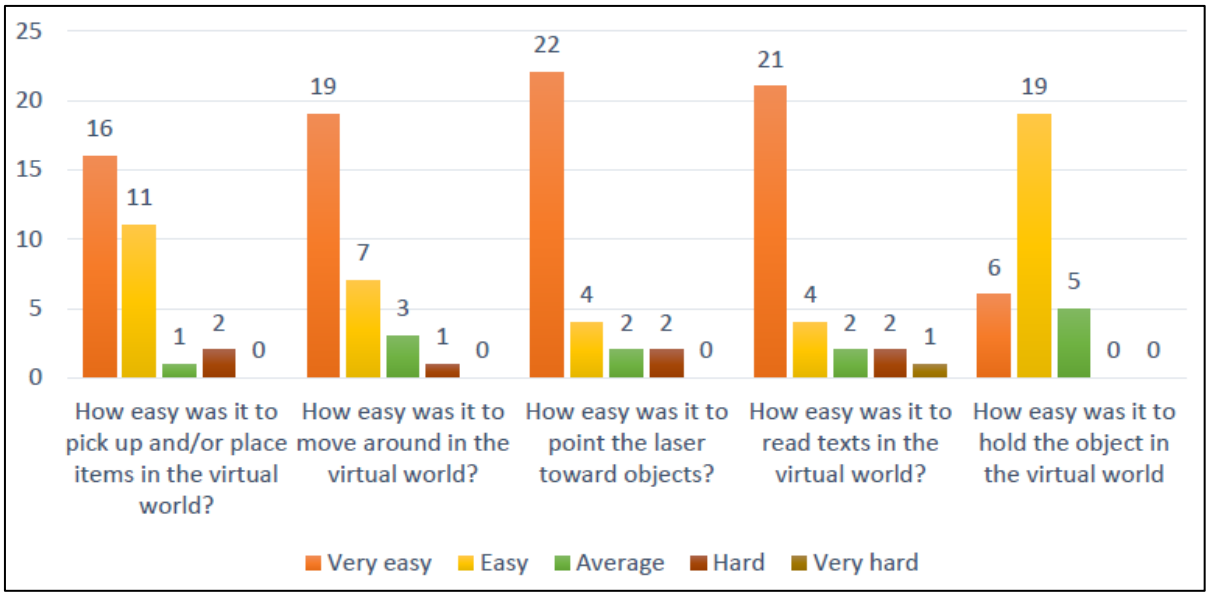

Fig. 10. Rating the Game Mechanics

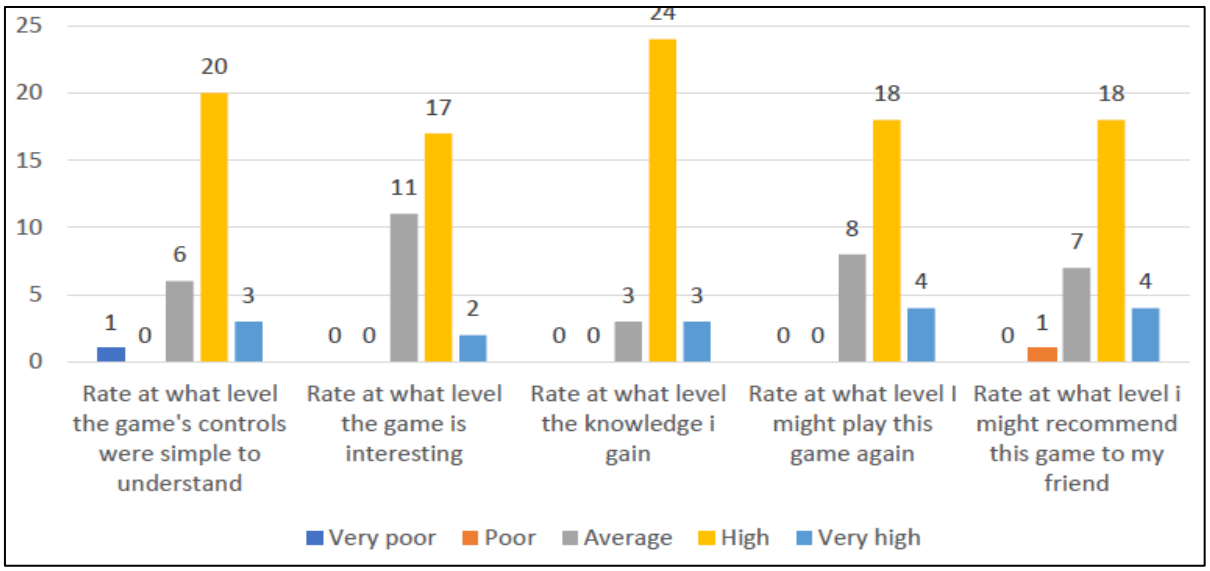

Fig. 11. User Satisfaction

Participants also provided constructive feedback on the VR game prototype, suggesting the use of more low-poly assets and the inclusion of background music to enhance engagement. Additional recommendations include increasing interactivity, incorporating visual cues to highlight hidden objects, and implementing hand-tracking controls to improve immersion. Overall, the prototype successfully evolved into a playable educational game that meets its initial objectives of exploring user needs, developing a functional VR hidden object experience, and evaluating its effectiveness.

CONCLUSION

This study aimed to explore the development and effectiveness of a VR hidden object game designed to promote cultural heritage awareness among young tourists. The findings confirm that the prototype successfully supports informal learning in tourism contexts by combining entertainment with educational content in a culturally meaningful way. This paper contributes to the growing body of research on immersive educational technologies by presenting a novel application of the hidden object game subgenre within a VR environment tailored for cultural tourism. The results have practical implications for heritage site operators, educators, and tourism developers seeking innovative ways to engage younger audiences. By integrating VR into cultural tourism experiences, stakeholders can foster deeper appreciation of local traditions while enhancing visitor satisfaction.

However, the study is limited by its small sample size and the scope of cultural content included in the prototype. Future research should explore broader cultural themes, test with diverse age groups, and examine long-term learning outcomes to further validate the educational impact of VR in tourism.

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REFERENCES

1. Sarker, M. (2024). Preservation of Culture and Economic Sustainability Through Cultural Tourism. International Journal of Research and Innovation in Applied Science, 9(6), 213-221. 10.51584/IJRIAS.2024.906019
2. Xu, P., & Mohamed, F. (2025). The Impact of Local Culture on Theme Resort Design in Malaysia: A Comprehensive Analysis. International Journal of Research and Innovation in Social Science, 9(3), 3978-3984. 10.47772/IJRISS.2025.90300316
3. Liamruk, P., Onwong, N., Amornrat, K., Arayapipatkul, A., & Sipiyaruk, K. (2025). Development and evaluation of an augmented reality serious game to enhance 21st century skills in cultural tourism. Scientific Reports, 15(1), 13492. 10.1038/s41598-025-95615-5
4. Wang, J., Jasni Dolah, & Cao, Z. (2025). Demand-driven digital innovation for cultural heritage tourism development: A Kano model approach. Journal of Infrastructure Policy and Development, 9(1), 10799–10799. 10.24294/jipd10799
5. Li, J., Peng, X., Liu, X., Tang, H., & Li, W. (2025). A study on shaping tourists' conservational intentions towards cultural heritage in the digital era: exploring the effects of authenticity, cultural experience, and place attachment. Journal of Asian Architecture and Building Engineering, 24(3), 1965-1984. 10.1080/13467581.2024.2321999
6. Ali, M. (2024). Fostering cultural heritage awareness through VR serious gaming: A study on promoting Saudi heritage among the younger generation. Journal of Infrastructure, Policy and Development, 8(3), 3084. 10.24294/jipd.v8i3.3084
7. Pendit, U. C., Zaibon, S. B., & Bakar, J. A. (2014). Mobile augmented reality for enjoyable informal learning in cultural heritage site. International Journal of Computer Applications, 92(14), 19-26. 10.5120/16077-5286
8. Hu, Y. L., Hassan, H., & Amri, N. H. Z. (2024). Research On the Influencing Factors of The Lack of Young Successors in Traditional Handicraft Based on The Rooted Theory. Asian Journal of Research in Education and Social Sciences, 6(4), 321-329.
9. Ezzat, M., Mostafa, M., & Farrag, M. M. (2023). Assessing the Role of Handicrafts as a Tourist Attraction in the New Valley. Minia Journal of Tourism and Hospitality Research MJTHR, 16(2), 108-126. 10.21608/mjthr.2024.258851.1133
10. Jumansyah, R. I. Z. K. Y., & Luckyardi, S. E. N. N. Y. (2023). Designing virtual reality game for learning Al-Quran. Journal of Engineering, Science and Technology, 18(1), 227-234.
11. Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. Education and Information Technologies, 23(4), 1515-1529. 10.1007/S10639-017-9676-0
12. Bruni, F., Mancuso, V., Stramba-Badiale, C., Stramba-Badiale, M., Riva, G., Goulene, K., ... & Pedroli, E. (2024). Beyond traditional training: Integrating data from semi-immersive VR dual-task intervention in Parkinsonian Syndromes. A study protocol. Plos one, 19(2), e0294199. 10.1371/journal.pone.0294199
13. Martirosov, S., Bureš, M., & Zítka, T. (2022). Cyber sickness in low-immersive, semi-immersive, and fully immersive virtual reality. Virtual Reality, 26(1), 15-32. 10.1007/s10055-021-00507-4
14. Yu, D., Li, X., & Lai, F. H. Y. (2023). The effect of virtual reality on executive function in older adults with mild cognitive impairment: a systematic review and meta-analysis. Aging & Mental Health, 27(4), 663-673. 10.1080/13607863.2022.2076202
15. Huygelier, H., Mattheus, E., Vanden Abeele, V., Van Ee, R., & Gillebert, C. R. (2021). The use of the term virtual reality in post-stroke rehabilitation: a scoping review and commentary. Psychologica Belgica, 61(1), 145. 10.5334/pb.1033

16. Torrence, K. (2024). Leveraging Learning Engineering to Advance Authentic Learning in Virtual Reality. The Journal of Applied Instructional Design, 13(4). 10.59668/2033
17. Isbister, K., & Schaffer, N. (2008). Game usability: Advancing the player experience. CRC press.
18. Carpenter, N. (2021, October 5). Video game culture owes a lot to hidden object games. Polygon. https://www.polygon.com/features/22708672/hidden-object-games-history-folks-ravenhearst-mystery-case-files
19. Fahey, M. (2016, May). Hidden Object Games Are Mindless Fluff, And That's Why I Love Them - Kotaku. Kotaku. http://kotaku.com/hidden-object-games-are-mindless-fluff-and-thats-why-i-1774145603
20. Anna, L. (2022, September 8). Hidden Object Games: Analysis, History, and Creation Process. Voki Games. https://vokigames.com/hidden-object-games-analysis-history-and-creation-process/
21. Chess, S. (2013). The Mystery of the Hidden Gamer: Women, Leisure, and Hidden Object Games. AoIR Selected Papers of Internet Research, 3
22. Jahsy, I., Nuryasin, I., & Wibowo, H. (2025). Comparing the Immersive Levels of Trivia Hidden Object Game Paper-based and Game Applications. Journal of Games, Game Art, and Gamification, 10(1), 1-7
23. Hong, Z. W., Shen, W. W., Chin, K. Y., & Chen, Y. L. (2022). The impact of a hidden object game on English vocabulary learning and motivation. Journal of Internet Technology, 23(1), 73-78.
24. Triana, N., Ariyani, A., & Sunra, L. (2023). The Implementation of the Hidden Object Interactive Game Using Powerpoint in Improving Students' Vocabulary Mastery. EduLine: Journal of Education and Learning Innovation, 3(3), 359-369. 10.35877/454RI.eduline2029
25. Possumah, H. Y. (2024). The Potential of Hidden Object Games to Assist English Vocabulary Acquisition for ESL Learners: A Comprehensive View. Klasikal: Journal of Education, Language Teaching and Science, 6(3), 1053-1065.
26. Nashikhin, M. K. (2023). The Effect of Learning Vocabulary in Acquisition and Descriptive Text through Hidden Object Games for Junior High School Students. RETAIN: Journal of Research in English Language Teaching, 11(02), 52-60.
27. Cecotti, H. (2023, June). A serious game based on hidden objects for Art History in fully immersive virtual reality. In International Conference on Immersive Learning (pp. 223-238). Cham: Springer Nature Switzerland. 10.1007/978-3-031-47328-9_17
28. Checa, D., Miguel-Alonso, I., & Bustillo, A. (2023). Immersive virtual-reality computer-assembly serious game to enhance autonomous learning. Virtual Reality, 27(4), 3301-3318. 10.1007/s10055-021-00607-1
29. Mortara, M., Catalano, C. E., Bellotti, F., Fiucci, G., Houry-Panchetti, M., & Petridis, P. (2014). Learning cultural heritage by serious games. Journal of Cultural Heritage, 15(3), 318-325.
30. Slavec, A., Sajinčič, N., & Starman, V. (2021). Use of smartphone cameras and other applications while traveling to sustain outdoor cultural heritage. Sustainability, 13(13), 7312. 10.3390/su13137312
31. Siri, A., Di Nuzzo, A., & Marchesini, S. (2024). Playing with the cultural pilgrimage to stimulate tourism: the x FORMAL project on cultural heritage and informal learning. Open Research Europe, 3, 93. 10.12688/openreseurope.15321.3
32. Ahn, J., Kim, J., Yun, H., Son, J., Park, D., Cho, J., & Kim, G. (2025). Flash Adventure: A Benchmark for GUI Agents Solving Full Story Arcs in Diverse Adventure Games. Ar Xiv preprint arXiv:2509.01052.