The Museum: From Digital To Metaverse

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Abstract

The use of digital technology has greatly facilitated the interaction between viewers and museum collections. Although the idea of digital museums has received considerable focus in the last decade, the lack of interactivity remains a challenge for digital museums. In this paper, we discuss the combination of the metaverse and traditional museums. The study finds that the integration of the metaverse and museums allows museums to create deeper engagement and achieve higher levels of interactivity.

Key words: digital museum; metaverse; interactivity

1 Introduction

Given the trend of rapid digital growth, the digital design, construction, and operation of museums have become an inevitable development. Digital museums offer improved preservation of cultural heritage while facilitating cross-cultural exchange and dissemination. To evaluate whether digital museums provide a better experience for users and visitors, we conducted a pilot survey at the project's outset.

The pilot survey encompassed questionnaires, offline interviews, and field visits. Upon researching and compiling the collected data, we determined that the current digitalization of existing museums does not adequately cater to the needs of visitor experiences. Issues such as missing or damaged equipment and a limited range of operational modes hinder visitors from engaging in a truly immersive experience, preventing them from fully appreciating the genuine allure of digital museums. Building upon these identified challenges, we combined the findings from our literature review with personal experiences to propose a new improvement program: integrating the metaverse with traditional museums to create a virtual reality museum space.

Furthermore, our research suggests that augmenting the metaverse museum with elements such as music, animation, or a game quest system would further enhance the visitors' immersive experience. These additions deepen the overall engagement and allow visitors to fully immerse themselves in the virtual environment, thereby amplifying the appeal and impact of the metaverse museum.

2 Background

2.1 Digital museum

The research on digital museums mainly focuses on the digital display of museums and the digital communication strategy of museums. Museums increasingly connect all the information related to the objects in a digital repository[14]. The virtualization of information entities breaks the limitation of time and space improves the opening and sharing degree of collection resources, and provides a new

exhibition mode and visiting experiences [11]. Digital museums can offer new ways of interpretation, promoting new modes of understanding art, objects, and concepts, and can allow visitors to explore their ideas on the same.

Although the development of museums seems to benefit from the application of digital technology, digitization of the museum has also brought with it some disadvantages. For example, virtual museums cannot offer the complexity of real objects [3] so the visitors will not be able to enjoy truly immersive experiences [9]. Applications operating in 2D, web-based environments have well-documented limitations and inefficiencies. Users experience a very limited perception of the self in 2D environments.

Therefore, the main challenge involved in the creation of digital museums is to enhance the user experiences. To be specific, the foremost obstacle in the development of digital museums is the intricate process of curating a seamless and immersive virtual experience that successfully emulates the tangible interactions and emotional connections characteristic of traditional physical museums.

2.2 Metaverse

The concept of the metaverse was initially introduced by Neal Stephenson in his novel Snow Crash published in 1992. While Stephenson didn't provide a precise definition of the metaverse in the novel, his description portrays it as a virtual reality universe that acts as a digital counterpart to the physical world[13].

Research on the metaverse has garnered significant attention and interest in recent years. The current research on the metaverse is based on a systematic assumption based on the trend of digitalization and virtualization given by the current technological development[10]. Research exploring the metaverse can be broadly categorized into three areas. Theoretical Research focuses on the theoretical aspects of the metaverse, aiming to define its concept, explore its scope, establish its disciplinary domain, and identify the challenges it faces. Technical Development centers around the technical foundations of the metaverse. This involves advancing technologies such as virtual reality (VR), augmented reality (AR), mixed reality (MR), and related fields that form the basis for creating and operating the metaverse. Application exploration revolves around exploring practical applications of the metaverse, mainly including business, education, and gaming.

The authors found that research on metaverse applications combining metaverse technology with museum establishment is still in the minority. According to Matthew Ball, the metaverse has the following advantages: it possesses a grand scale, enabling users to interoperate while ensuring synchronization between virtual spaces and the real world, and it empowers an infinite number of users to synchronize their experiences, offering them a complete sense of personal presence. Additionally, it maintains the continuity of essential data, including identity, history, rights, objects, communications, and payments[2]. These features of the metaverse greatly fill in the gaps in existing digital museum technology and provide us with new ideas for research.

2.3 Metaverse application in museums

The digital world has begun to reshape the museum experience, resulting in transformations in the roles of museums. The roles of the metaverse in museums have been studied extensively[5][7]. Digital games have proven to be impactful within the context of museums. Drotner and Schroder[6] reported that in the museum context, digital games, along with other genres of interactive text, social media, and technology, have particular value in their capacity to extend understanding and increase engagement and empathy through features specific to their form. Cheng et al.[4] pointed out that games enable educators to attract students' attention and interest and engage them in educational experiences with a view to achieving specific learning goals and outcomes. Anastasiadis et al.[1] suggested that games promote excitement, stimulation, engagement, and a feeling of accomplishment: as such, they are widely considered as a great means to facilitate learning and combine meaningful learning with fun.

The above research reflects the fact that the development of digital games as learning tools increasingly comes into play and games can help provide engaging learning experiences. Digital games can serve as effective tools for museums. Their combination, when carefully designed and aligned with the museum's goals, can significantly enrich the museum experience. Therefore, the study attempts to explore the integration of the metaverse and museums to create a virtual reality museum, providing a better experience for visitors by combining virtual and physical elements.

3 Methods and Results

3.1 Site Visit

After collecting information online about the digital British Museum and our group visit to the British Museum in person, we found the following gaps and deficiencies.

3.1.1 Online

1.1 Booking tickets online is much more convenient than the traditional way of buying tickets in a queue.

1.2 The virtual online tour is blurred and distorted. Although the official website offers tourist 3D maps and AR maps online, they are extremely hard for tourists to properly make use of them.

1.3 The gift shop online has much fewer items to choose from than the offline stores in the museum. The online shop is not able to meet the needs of tourists fully.

3.1.2 Offline

2.1 In the museum, there are machines for tourists to interact with to let people learn about certain cultural relics, but most of them are powered off.

2.2 The museum prepared puzzle games in some rooms for tourists to play and learn at the same time, but unfortunately, the network just cannot support the game requirements.

Museums are making their way to become more interactive and convenient using new technologies. However, tourists find it hard to completely immerse themselves in the museum.

3.2 Online Questionnaire

We posted a questionnaire online to understand people's opinions on current digital museums, and we collected 100 results. Our target audience was people who recently visited a museum, and were not engaged in cultural travel work.

Regarding online reserving tickets, 73

Regarding online and offline tour guides, 18

Regarding online consumption, 3

Regarding online and offline interaction, only 8

We discovered that most people were satisfied with making reservations, tour guides, and consumption. But most people felt unhappy about the interaction.

As a result, it is the interaction part of digital museums that we suggest as an area of improvement. In this case, we propose introducing the metaverse into museums.

3.3 Face-to-face Questionnaire

Interviewees include a 65-year-old woman whose occupation was retired, a newlywed couple in which the husband was a bank manager and the wife was an accountant, and a 16-year-old teenager.

We wanted to know how the development of digital exhibits had affected visitors' visits to the museum, so we conducted random interviews in the field about their experiences of using the digital museum. This interview focused on the experience and feedback in using the digital exhibits. The questions are as follows.

Q1: How did you find the digital aspects of the British Museum during your visit? Did they enhance your overall experience?

Q2: In comparison to traditional exhibits, did you feel that the digital presentations were less captivating or engaging?

Q3: How did the use of technology impact your ability to immerse yourself in the museum's collections?

Q4: Did the digital elements detract from your interest in exploring certain artifacts or time periods?

Q5: How would you summarize your overall impression of the digital components and their influence on your visit?

The four respondents generally expressed disappointment with the digital aspects of the British Museum. They found the digital features generally lacked the depth, engagement, and immersion needed to gain enough interactivity through digital museum technology to achieve the desired immersive viewing experience, especially when compared to traditional exhibits. Technical issues, detachment from the artifacts, and a sense of superficiality were common themes in their negative feedback, indicating that the digital integration didn't meet their expectations or add significant value to their museum visit.

4 Team Roles & Responsibilities

li Juan: Organization of data results, pilot survey data analysis.

Wang Yixuan: Inspirational contributions of the concept, metacosmic technology, and the integration of metacosmic and museum applications, writing and editing.

Xia Mingwei: Meta-universe concept, literature search, literature review, writing and editing, questionnaire design, establishing project processes.

Huang Jiamin: Data, literature search and literature review, interview question design and implementation.

Fu Junyi: Interview writing.

5 Conclusions and Future Directions

5.1 Digital museum meets the metaverse

When we talk about the metaverse, we can't help but talk about VR and games with dreamlike fantasies. In the process of virtualization and digitization of the real world, the metaverse needs a large number of material specimens from the physical world and cultural elements from the spiritual world in order to construct a digital living space that is integrated with the real-world social system. The best place in the real world that has rich material specimens and cultural elements at the same time is the museum. As Duan Yong, Professor, Shanghai University said (2022) the purpose and concept of museums are common with the metaverse, and the future and mission of museums are compatible with the metaverse.

"By creating an adaptive system, we get to the museum component," Brad MacDonald, director of Creative Media at Smith Atlas said, and "How do you dissolve the walls of a bricks-and-mortar institution?"[**9**] The answer is the metaverse. When the metaverse meets a digital museum, it can build a much freer place in a virtual space, thus breaking down the walls that enclose the dissemination of knowledge in museums. There are myriad advantages to dissolving the walls because it allows museums to broaden their audience and create deeper engagement. By building a digital museum in the metaverse, when you visit a museum about Roman history, instead of squeezing through a vast crowd trying to see the details of the artifacts, you can just put on your own VR device and immerse yourself in history without even leaving your house!

5.2 Limitations

But digital the museum plus metaverse concept also has many limitations. Metaverse experiences may require users to have certain technical knowledge and equipment, such as virtual reality headsets, powerful computers, etc.[8] [15]. This may limit participation for many, especially those who have not been exposed to these technologies or cannot afford the high cost of equipment. Those who do not have access to high-tech equipment or Internet connectivity will be excluded from this experience. This could lead to increased social inequality.

The metaverse platform itself is also risky. Personal data privacy and cybersecurity issues may be a concern in the metaverse. Users may be required to provide personal information in order to create an account or conduct transactions, and this information may be at risk. Displaying and sharing works in the metaverse may involve copyright and intellectual property issues. The right to use virtually displayed historical artifacts may give rise to disputes, limiting the scope for the development of digital museums.

Despite advances in digital technology, current metaverse experiences still struggle to match real-world museums. Virtual reality technology still has limitations in simulating realism and may struggle to provide the same experience as an actual museum visit.

5.3 The future

After building out a museum in the metaverse, we want to take a step further and figure out how we could make this extremely interesting and engaging for people. With this in mind, we give three possible options. The first one is Virtual Exhibition Design. Through virtual exhibitions, users can enjoy exploring unique collections scattered across different museums, immersing themselves in highly specific categories of artifacts that would otherwise be impossible to experience simultaneously.

The second is Virtual Artifact Restoration. The protection and the conservation of the remains of the past have gained a powerful tool, thanks to the potentialities of immersive visualization and 3D reconstruction of archaeological sites and finds. The reconstruction of these artifacts allows for a comprehensive visual sketch of customs and culture, history and geographical location, and craftsmanship.

The last option is Game-Based User Experiences. VR applications based on video game technologies are known for their realism and fluid interactivity.[16]. Results from the study. *Gaming on the rift: How virtual reality affects game user satisfaction* by Shelstad showed that VR enhanced overall satisfaction, enjoyment, engrossment, creativity, sound, and graphics quality [12]. Gaming experiences can stimulate curiosity and exploration, which can lead to a more active engagement with the museum's knowledge, combining relaxation and entertainment with historical learning: one move, two gains.

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