Virtual Reality and Modern Visitor in the Museum:
The Technological Integration and Its Debates

Yingru Qian[1], [*]

[1] *Goldsmiths, University of London*
[*]Corresponding author. Email: yqian003@gold.ac.uk

ABSTRACT
Virtual reality(VR) experience and VR-style technology change the view of the modern individual. It is a deliberated question for museology to determine whether the satisfactory outcome will redefine the museum's storytelling with immersive VR technology. Successful evidences from other industries are promising to attract more audiences while several worries remain. This article examines the Louvre and related studies based on the sociological explanations of modern museums. It is argued that despite the cost of new technical devices, the value of the modern museum is the main concern in the progress of museum-VR technology integration.

Keywords: virtual reality, museum, experience.

1. INTRODUCTION

Imagine standing inside the Louvre, no longer struggling to take pictures of the Mona Lisa in the crowds, but instead putting on a pair of virtual reality (VR) glasses and immersing yourself in a virtual Mona Lisa rendezvous. Through it you can see the woman in full detail: her textures, manners, and costume. Then imagine, in an exhibition about Alice's Adventures in Wonderland, just putting on a VR headset, entering the world of Alice and fighting against the Red Queen in a bonkers game of hedgehog croquet. Experience falling, shrinking, and growing just like Alice, but without any dizziness or discomfort. These fun-filled experiences are no longer a figment of the imagination. They are in real museums. As the technology continues to evolve, more and more museums are using virtual reality technology. Although there are differences in VR definition, it primarily describes a technology that provides the ability for physical immersion and psychological presence [1]. Over the past few years, many studies have analyzed how these emerging technologies have brought advantages to museums [2]. The wow factor attracts more people to museums and creates a more entertaining and experiential museum atmosphere. But this quest for the 'experience' has been equally questioned: could this consumption of places rather than things lead some museums to prioritize their buildings over their collections? [3].

This paper aims to assess the use of virtual reality technologies in museums and their profound impact. It begins with the development and use of VR in other fields to emphasize its cross-cutting character. By contextualizing the evolution of museums, the paper analyses how VR technology has met and helped museums in their collections conservation and audience development needs. After illustrating successful examples of VR use in museums, the paper provides an in-depth analysis of the limitations and challenges posed by this promising technology. It offers some possible recommendations for its application.

2. VIRTUAL REALITY

Virtual Reality (VR) technology has been used in military and aerospace fields since the 1980s to enable military simulations of combat, flight, and other scenarios. In space exploration, for example, VR can digitally simulate key ground and flight operations, reducing costs and time while greatly reducing the risks associated with hostile environments and unpredictable factors [4]. This effective technology has also made a significant contribution to the medical field. It can help surgeons gain experience with the holographic images with VR headsets [5], which can effectively reduce the risk of surgery and save lives. In relieving patient pain, data shows that VR reduces pain concentration times by up to 48%, compared to a 10% reduction in opioids [6].

With the rapid development of electronic information technologies, VR has been widely expanded and applied in leisure, gaming, and entertainment around the 21st century. There is no wonder that it gradually became better known to the general public as Sony PlayStation VR, Disney's VR development studio, and social VR applications such as VRChat and Facebook Spaces. Technology has shown its huge growth potential. These new and exciting devices and experiences attract many consumers who want to elevate their gameplay and socializing to a truly immersive experience [7]. This is a testament to the cross-disciplinary appeal of VR, and particularly its huge commercial potential to attract customers and stimulate consumption. This demonstrates the interdisciplinary appeal of VR, particularly it is potential to attract users and stimulate consumption.

In contrast, the use of VR in museums is still in its infancy. VR was introduced and engaged with museums for the first time in the last 10 years, most of which came after 2015 [8]. However, despite the increasing use of VR in museums in the past few years, there are still a number of challenges to the arrival of this technology. As Feldman and Fisher, founders of Night Kitchen Interactive (NKI), a company working with museums and cultural institutions on interactive educational projects for 20 years, say.' However [VR technology] has advanced enough to be used in museum space the public may not be ready for it' [9]. Some argue that the incorporation of VR into museums has undermined the sanctity of museums and turned them into places of leisure and entertainment [2]. The integration of VR into museums is not accidental, nor is it blind. The next section will elaborate on this in the context of museum study.

3. MUSEUMS AND VR

As museology has evolved, the concept of the museum has been changing. From its past as an institution for collecting, preserving, and presenting artworks to its current association with experience, education, and entertainment, the museum seems to be evolving into an increasingly dynamic and inclusive place, with the progress in which the visitors gain more and more attention and are increasingly valued [10, 11]. As Serota argues, the change in contemporary museums is fundamentally based on a shift in the relationship between visitors and the artwork [12]. Indeed, museums no longer promote the transmission of information from museum staff, who are seen as experts and educators, to visitors, who are regarded as ignorant students, but rather emphasize the importance of visitors' participation, experience, and sometimes co-curatorship [13]. This is, in fact, a further endorsement of Becker's concept of Art Worlds. He believed that making art was a collective endeavor, not only by the artists or artworks but by the whole system that produced them, and that every aspect of creating art influenced the outcome. From this perspective, for museums, the advancement of audiences is a key and central change in their development.

However, it is important to realize that in the changing relationship with its visitors, the heart of the museum has always been communication, that is, the ability of storytelling. As Bedford argues, it will always be one of the most authentic aspects of museums' work [14]. Storytelling, which combines the articulation of understandings that define museum communication with the narratives that shape it, has developed into a part of postmodern museum communication [15,16]. Specifically, storytelling can be split into story and telling. The construction of an understanding of a story and the production of its meaning is achieved through the process of 'telling'. The same story can have very different effects when told in different ways. In the past, wall text, room brochures, and labels have infiltrated public museums and have become almost standard practice. But in modern times, this format has often been criticized by visitors who argue that the narrative provided by the museum limits their visit to the observation of objects and lacks any interactivity. [17]. In this context, interactional technology arguably opens up new possibilities for storytelling in museums, including the use of VR to immerse visitors in virtual worlds. Digital storytelling can be seen as an extension of traditional oral storytelling, offering a more interactive experience that goes far beyond the mere description of text-based museum objects [16]. And the value of the museum space is increasing in its interaction with the audience.

The benefits of VR for museums are clear. Firstly, it changes the way that heritage is experienced. VR technology can be used to reconstruct historical environments to increase visitor engagement and education [18]. For example, the British Museum developed a 'Virtual Reality Weekend' where visitors were invited to step inside a 4,000-year-old dome. Through art 3D headsets and tablets, objects from the Bronze Age that are part of the museum's collection were projected into an immersive dome. According to curator Neil Wilkin, it is difficult for visitors to engage with and observe bronze objects in their original context. VR makes up for this by using a reconstructed environment [19]. Although some users found wearing the VR headset uncomfortable, this fantastic way of learning received positive feedback [9].

Secondly, for museums, VR is an effective way to increase their visitor numbers and reach a wider public. In recent years, an increasing number of museums aim to increase inclusivity as part of their audience development, but they are also encountering a number of challenges. The first is due to the fierce competition

for leisure activities [20]. Unlike in the past, the increasing development of the internet and information technology now gives visitors many choices about how they spend their leisure time. Thus, it can be argued that the development of the leisure and entertainment industry has inevitably led museums to a new path of development. Research has proven that immersive media can create a "wow" factor for museums that can draw people into museums and increase attendance [21]. As many people have never experienced VR, if museums can incorporate VR headsets into their exhibitions, more people will be willing to go and pay to get a taste of the experience. Another challenge to increasing inclusivity is that most visitors have a limited understanding and appreciation of the stories, particularly in relation to art [22]. It has to be acknowledged that the black and white text on the side of a museum collection does not allow everyone to understand its meaning. Such communication difficulties often prevent museums from connecting with a wider audience. To become more inclusive, they need to make appropriate adjustments in how they experience the art discourse to focus on the needs of disconnected visitors. In contrast to the uniform, fixed information that textual information can provide, VR can allow visitors to participate in the interpretation process for personal involvement [8]. In other words, It helps museums to communicate stories while allowing visitors to generate their answers, understandings, and reflections on them. VR's promotion of active thinking enhances the understanding of objects and concepts and is developed naturally in a fun and relaxed atmosphere.

An example of the excellent use of the accessibility, inclusiveness, and democratization of VR is Mona Lisa's work: Beyond the Glass in the Louvre. This is the Louvre's response to the use of VR to expand its visitors. As the world's most visited museum, the Louvre's overcrowding has been a challenge for many years. Of its 10 million visitors a year, 80% choose to come to the National Gallery to see the Mona Lisa [23]. The work is carefully placed behind a layer of bullet-proof glass, and most of the time, visitors can only catch a glimpse of it from a distance in a crowded room, vying to have their picture taken. Such crowds reduce the interest of visitors interested in the Mona Lisa and fail to attract potential visitors who are not used to visiting museums. Therefore, the Louvre collaborated with VR headset producer HTC's Vive Arts program to launch its first-ever virtual reality initiative. During the seven-minute digital experience, visitors are immersed in an undisturbed space through interactive design, sound, and animated imagery to see details about the painting up close and revisit one of the world's most famous paintings. Dominique de Font-Réaulx, the head of the Louvre's interpretation and cultural programming department, said, "[VR] is a wonderful tool because it links accurate information on the works of art with

imagination"[24]. In addition to this, VR's role in preserving heritage is a significant advantage. By creating a virtual, immersive environment, VR goes some way to avoiding the risk of putting the original object at risk of wear and tear.

However, while highlighting the advantages and possibilities of VR, it is also important to note the limitations and challenges. Deakin has identified constraints to VR use in museums, and one of the most limiting factors at present is the cost [7]. The application of VR technology often requires a significant investment, not only in terms of expensive headsets and accessories but also in specialist human resource requirements. Moreover, VR devices are prone to damage and hygiene challenges. For example, at the Auckland War Memorial Museum's VR exhibition, there were around 15 broken headsets after just a few weeks. As a result, the use of VR technology is still only applicable to large or well-resourced museums. These technologies and hardware issues alone exclude smaller museums from using VR if they are not adequately funded and equipped, often the ones most in need of expanding their visitor numbers. In addition, as in gaming, the discomfort or motion sickness caused by VR is a major limitation, as the use of VR technology is not yet mature [9]. But with future technological developments, technical and hardware issues will be improved in the future and people can look forward to a non-dizzying, hygienic immersive experience in museums.

The challenges of using VR in museums go far beyond the technical aspects. As mentioned above, VR technology is cross-disciplinary, and before it was used in museums, it was used extensively and positively in the medical and entertainment industries. Thus, it could be argued that one of the main reasons museums are using VR is because they see its potential in other areas and hope that it will do the same for them. However, the significance of VR for museums is much more ambiguous than for other fields. On the one hand, unlike the tangible data often used in the medical field, such as patient pain indices, surgical risks, and mortality statistics, the intangible services offered by museums are difficult to observe, calculate and evaluate [25]. Moreover, as VR provides museums with more diverse and open narratives, it exacerbates the differences in individual understandings, meanings, and experiences. While the openness of narrative increases visitor satisfaction, it also requires museums to do more work to control and ensure that the stories they present are interpreted in harmony with its ideal model. As the modern museum visit is increasingly conceptualized as a personal and customizable experience, it is becoming more difficult to assess the role of technology in meeting the visitor's needs [13]. This makes many Boards of Trustees and executive management reluctant to spend money on technology and take risks, ultimately

leading to the slow and stagnant development of VR in museums. On the other hand, the introduction of technology has initiated a process of disenchantment of the museum. In order to make itself more accessible, the boundaries of the museum are being extended by technology to the whole of the modern entertainment industry [26]. VR is transforming museums into hybrid and complex spaces, creating a sense of mistrust about this technological innovation: what is the value of museums themselves if technology presents them with something almost identical to the games we play and the entertainment we engage in? From the perspective of storytelling, the mistrust can be summarized as a concern that the new ways of 'telling' brought about by VR will weaken people's attention and thus fail to serve the 'story' of the museums.

This is probably the most different difference between a game and a museum. The 'wow' factor created in games is only the beginning of what museums can be, rather than the whole point. Yet modern observations and studies of the advantages of VR in museums remain more limited to the momentary awe that it brings to visitors. Both visitors and curators alike commonly use words like 'amazing', 'cool' and 'interesting' when referring to VR [9]. But as Dewdney suggests, is VR a potentially radical moment of change for museums, or is it just another passing fascination [27]? Expectations of VR in museums are still limited to its technical aspects. While technicians strive to make the world presented in VR interesting, informative and realistic, the original purpose of introducing the technology to museums seems to change. It is therefore crucial for museums to consider how VR can be better integrated into the museum.

It is said at the beginning, that at the heart of the museum as a center of cultural understanding, there is always storytelling, which essentially represents a communication and presentation of historical, economic and social values, thus addressing obvious questions [28]. As Coates states, "VR exhibitions are not intended to replace the existing model [of the museum], but to enhance and complement what is already there" [29]. The emergence and application of any technology is not intended to divert or erase the core purpose of museums. However, it is to act as a catalyst, to attract a wider range of people to see and engage with these stories through greater interaction and appeal, and to help contribute to their understanding, reflection and contemplation. This is something that has always been fundamental to museums and is also easily overlooked and forgotten..

4. CONCLUSION

This paper demonstrates the benefits and potential of VR to enhance experiences, increase visitor satisfaction, engage a wide range of target groups and promote positive learning experiences. Indeed, VR and more and more technologies such as AR and XR will be used extensively in museums as a fun and advanced experience as they become more sophisticated. It is important to note that no matter how much these technologies may change how museums 'tell stories', the role of technology in integrating with museums is difficult to measure and evaluate. Not everyone will always understand or appreciate the efforts made by museums. There is a lack of systematic research into the impact of technology in museology. Further research should be conducted to show whether and how technology can act as a catalyst or disincentive to increase visitor numbers, diversity, ticket sales, and other measurable factors. In short, only a true understanding of the nature of museums can help to a better integration of technology, with which the great artefacts and paintings of the past can come to life, into the present and the future.

REFERENCES

[1] Gutiérrez, M, Vexo, F, Thalmann, D., 2008, Stepping into virtual reality. Springer, London.

[2] Jung, Timothy, Tom Dieck, M. Claudia (Eds.), 2018. Augmented Reality and Virtual Reality: Empowering Human, Place and Business, Springer, London

[3] Haseldine, G., 2020., The virtues and vices of virtual museum tours. viewed 28 Jun 2021, <https://www.apollo-magazine.com/virtal-museum-tours-lockdown/>.

[4] Piovano et al., 2013. Virtual reality representation of Martian soil for space exploration. Pattern Recognition and Image Analysis, 23(1), pp.111–129.

[5] Javaid, M. & Haleem, A., 2020. Virtual reality applications toward medical field. Clinical epidemiology and global health, 8(2), pp.600–605.

[6] Grant, A., 2019. Virtual Reality Can Save Lives and Isn't Only for Fun. viewed 17 Jun 2021, <https://readwrite.com/2019/08/20/virtual-reality-can-save-lives-and-isnt-only-for-fun/ >.

[7] Deakin, T., 2021. Is VR the solution to isolation or part of the problem? viewed 17 Jun 2021, <https://www.museumnext.com/article/is-vr-the-solution-to-isolation-or-part-of-the-problem/>.

[8] Shehade, M & Stylianou-Lambert, T., 2020. Virtual Reality in Museums: Exploring the Experiences of Museum Professionals. Applied sciences, 10(4031), p.4031.

[9] Knise, FA., 2017. Immersive Media in Museums and Museum Education. PhD thesis, Drexel University.

[10] Yoon, Sojung & Son, Jai-Yeol. 2021. The Roles of Digital Exhibition in Enhancing Immersive Experience and Purchase Intention.

[11] Stead, N., 2002. In the vernacular: on the architecture of the national museum of Australia. Journal of Australian studies, 72, pp.121–130.

[12] Serota, N. 1996. Experience or interpretation. The Dilemma of Nuseums of Modern Art. Mew York: Thames and Hudson.

[13] Rodney, S., 2015. How Museum Visitors Became Consumers. viewed 17 Jun 2021, < https://culture-communication.fr/en/how-museum-visitors-became-consumers/>.

[14] Bedford, L. 2001. "Storytelling: The Real Work of Museums." Curator: The Museum Journal. 44 (1): 27–34.

[15] Nielsen, J. K. 2014. "Transformations in the Postmodern Museum." Museological Review. (18): 22–30.

[16] Nielsen, J.K., 2017. Museum communication and storytelling: articulating understandings within the museum structure. Museum management and curatorship, 32(5), pp.440–455.

[17] Dal Falco, F & Vassos, S., 2017. Museum Experience Design: A Modern Storytelling Methodology, The Design Journal, 20.

[18] Bruno et al., 2010. From 3D reconstruction to virtual reality: A complete methodology for digital archaeological exhibition. Journal of cultural heritage, 11(1), pp.42–49.

[19] Kennedy, M., 2015. British Museum uses virtual reality to transport visitors to the bronze age. viewed 17 Jun 2021, <https://www.theguardian.com/culture/2015/aug/04/british-museum-virtual-reality-weekend-bronze-age>.

[20] Erlick, N., 2017. 20,000-YEAR-OLD ARTIFACTS, 21ST-CENTURY TECHNOLOG. viewed 17 Jun 2021, <https://www.theverge.com/2017/5/6/15563922/museums-vr-ar-apps-digital-technology>.

[21] Deresiewicz, W., 2015. The Death of the Artist—and the Birth of the Creative Entrepreneur. viewed 17 Jun 2021, <https://www.theatlantic.com/magazine/archive/2015/01/the-death-of-the-artist-and-the-birth-of-the-creative-entrepreneur/383497/>.

[22] Jane Deeth, Engaging Strangeness in the Art Museum: an audience development strategy, museum and society, Mar 2012. 10(1)

[23] Rea, N., 2019. The 'Mona Lisa' Experience: How the Louvre's First-Ever VR Project, a 7-Minute Immersive da Vinci Odyssey, Works. viewed 17 Jun 2021, < https://news.artnet.com/art-world/louvre-embraced-virtual-reality-leonardo-blockbuster-1686169>.

[24] McGivern, H., 2019. 'Reality check: is VR set to revolutionise museums?', Art Newspaper, 29(318).

[25] Rentschler, R., Hede, A.M. & White, T.R., 2007. Museum pricing: challenges to theory development and practice. International Journal of Nonprofit and Voluntary Sector Marketing, 12(2), pp.163–173.

[26] Carrozzino, M. & Bergamasco, M., 2010. Beyond virtual museums: Experiencing immersive virtual reality in real museums. Journal of cultural heritage, 11(4), pp.452–458.

[27] Dewdney, A. 2018. What Is the Current Fascination with VR on the Part of Museums and Art Galleries? In Contemporary Art Society Annual Conference: The Virtual in Museums: Hot Medium? viewed 17 Jun 2021, < https://openresearch.lsbu.ac.uk/item/86qyq>.

[28] Alexander, VD. 2020. 'Introduction: What is Art?' in Sociology of the Arts: Exploring Fine and Popular Forms, 2nd Edition. Oxford: Wiley-Blackwell.

[29] Coates, C., Virtual Reality is a big trend in museums, but what are the best examples of museums using VR? viewed 28 Jun 2021, <https://www.museumnext.com/article/how-museums-are-using-virtual-reality/>.