



Audience Engagement at Museums: The Impact of Digitization

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Abstract. As non-profit permanent institutions open to the public, museums are constantly engaged in diverse and sustainable activities to adapt to audience engagement. With the widespread use of digital technology, many museums are also undertaking a number of digital projects in order to engage with different audiences. This study critically assesses the level of audience engagement with museum digital projects. This paper explores the potential contribution of digitization in museums to audience engagement by examining different approaches to museum digitization, the factors by which digitization affects audience engagement, and the critical implications for the impact of museum digitization.

Keywords: Museum, Audience Engagement, Digitization

1 Introduction

Trends in museum research indicate a growing interest in the use of digitization of cultural heritage in museums, with the improvement of technology and the development trend of museums in recent years, the use of digitization in museums has become more popular, that is, the use of digital technology to adjust the audience participation of museums (Barbieri, Bruno & Muzzupappa, 2017). Digital technology plays an important role in museums, and it allows visitors to experience new forms of interaction in museums with more flexible forms of customization (Parry, 2010). The digitization of cultural heritage can meet the needs of audiences for greater participation and can also help museums achieve a transformation, which is from a space for storage and display as its primary function to an effective way of accessing culture recognized by the public. (Carrozzino & Bergamasco, 2010).

In recent years, there have been an ever-growing number of research projects on audience engagement, because in the academic circle, the research on audience engagement is recognized as having the ability to provide information, help enhance teaching and learning and increase social influence (Bailey-Ross et al., 2016). To date, research on the digitization of museums in terms of audience engagement remains limited. The majority of research on digital technology in museums focuses on exploring and discussing from the perspective of technology, while ignoring the

impact of the use of these technologies on visitor learning and participation (Cameron, 2003). Following this, an increasing number of researchers and museum personnel are paying attention to and considering visitor experiences and focusing on the impact of digital technology on audience engagement (Tallon & Walker, 2008). Therefore, it is necessary to study the impact of museum digitization on audience engagement.

This paper uses a qualitative research approach to explore the impact of digitization on museum audience engagement. First of all, the paper discusses what digital methods can adjust the audience's engagement in museums. Secondly, it analyses the factors that influence the digitization of museums on audience engagement. Finally, the impact of digitization on museum audience engagement is explored.

2 Literature Review

2.1 Audience Engagement of Museum

Collecting, editing, recording, learning, researching, maintaining and displaying collections are a series of tasks that are well known as the functions and aims of museums (Duh, 2015), however, as society has developed and cultural expression has become more diverse, the role and goals of museums have also changed. As of the writing of this study, based on an excerpt from the ICOM website (2022), the latest definition of a museum is:

"A museum is a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums foster diversity and sustainability. They operate and communicate ethically, professionally and with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing".

As same as Miller (2017) pointed out that museums offer experiences of enjoyment, reflection, enlightenment, entertainment and understanding, and are a place that can be both intellectually and emotionally fulfilling. On the contrary, due to visitor attributes and environmental attributes (Bitgood, 2002; Falk & Dierking, 2002), once the museum ignores the influence and importance of digitization on audience engagement, it may lead to museum fatigue of audience (Davey, 2005).

Different from passive acquisition, audience engagement refers to the audience's subjective tendency towards cognition, emotion and emotional experience of what they read, watch and hear (Broersma, 2019). According to Falk and Dierking (2000), museums have completed a fundamental transformation from being primarily display Spaces to places where visitors are expected to actively engage and create personalized experiences. Lonsdale et al. (2006) also believed that the main goal of museums and heritage sites is to attract tourists and encourage them to take the initiative and actively participate in museum education activities. Therefore, for museums, listening to the audience, understanding the audience and investigating

audience engagement are the key factors to establish a good, healthy and mutually beneficial relationship with the audience (Komatsuka, 2009).

In a study on audience engagement of drama-related activities in museums, Jackson and Kidd concluded in 2007 that for museums, if they want to influence audience engagement and audience's learning degree, when planning educational activities, they should not only pay attention to the quality and novelty of the content, but also think about how to construct the audience experience. Also a study (2009) of The Natural History Museum of Los Angeles County (NHM) and Randi Korn & Associates, Inc. (RK&A) on audience engagement shows that surveying audience engagement can help museums have a deeper understanding of visitors' views on museums and their value to museums, and help museum staff understand the current and potential experience preferences of audiences, so that museums can more reasonably divide audience groups and arrange activities and visiting experiences more suitable for them, and provide the services they need. Cerquetti (2017) also confirmed that audience engagement is applicable to the current possible problems and future challenges of museums, especially in the stage of museum digital technology innovation, which plays a key role in improving service quality and attracting tourists.

Due to *habitus*, which is a state of existence in which the inner subjective mental state is externalized into the objective performance of action (Bourdieu & Darbel, 1991), whose influence on the museum is mainly reflected in sociology and art (Fyfe, 2004). From the perspective of audiences, Dicks (2016) pointed out that cultural tendencies evolved from *habitus* may make some people unable to obtain meaning and value from cultural heritage, thus preventing them from going to museums. From the perspective of museums, if museums can provide diverse exhibition opportunities and learning experiences in accordance with the principles of constructionism, they may bridge the knowledge gap of these audiences and find comfortable ways to visit and learn (Deeth, 2015).

2.2 Digital Technology of Museum

Because of the diversity of digital environment and new technologies that contain more information resources, museum digitization can make people have new cognition and curiosity about cultural heritage (Povroznik, 2018). In order to survive and make a profit, attract new audiences (especially young ones) and provide a new dimension to the cultural experience in the age of digitization and new technology, museums are also beginning to use digital media and multimedia applications to make activities more engaging and interactive (Alexandri & Tzanavara, 2014). At present, the museum uses many digital technologies such as audio technology, video technology, digital media touch screen technology, digital media scene synthesis technology, virtual reality, 4D dynamic cinema digital media and others try to meet the audience's expectation of lack of sense of interaction in conventional exhibitions (Chiwara & Chipangura, 2018).

Museums can offer innovative services in new ways, creating their own cultural value while also growing new audiences in ways that benefit the local area (Scott,

2008). Deeth (2015) agreed and argued that the traditional form of visiting or interactive learning in museums may not be suitable for all audiences, and that more audiences may need new feelings, experiences and challenges. As suggested by Leouras et al. (2003) in their study, museum digitization can not only enhance audience experience by simulating real museums with digital technology, but also solve many difficulties of museums through virtual environment system, such as solving the limitations of exhibition space, allowing more visitors to visit online and offline, displaying objects that are too precious and fragile to be displayed, and even allowing visitors with visual problems to perceive objects. In addition, Bolognesi and Aiello (2020) proposed that the current virtual reality technology allows the audience to enjoy 3D space remotely and immersed through physical and emotional interaction, which to a large extent ends the limitation of time and space.

From a critical point of view, there were still some problems in the effective use of digital cultural heritage in virtual museums, such as the authenticity of materials, the quality of digital copies, the lack of functional complexity and so on (Povroznik, 2018). For museums, applying digital technology means facing and solving some basic problems, such as accessibility, high technology research and development costs, government funding, inadequate and backward facilities, popularity, audience acceptance and competitiveness (Chiwara & Chipangura, 2018). Addressing these difficulties will provide better quality resources so that education and other sectors can make better use of digital heritage.

While digitization and digital technologies can bring beneficial developments to museums, some researchers have questioned the possibility that these digital technologies may also bring about a loss of visitors to real museums and reduce opportunities for audience interaction (Li et al., 2012). Conversely, Scott (2007) believed that digitization is only a supplement to fill the gaps in museums, and the value of traditional museums is irreplaceable. With the increasing popularity of digitization in museums, although it inevitably brings a higher degree of unpredictability, the benefits to museums are more important and more extensive (Barranha, 2016). According to Bailey-Ross et al. (2016), it is both an opportunity and a challenge for museums to use digital technology to enhance the visitor experience and their own construction of the museum. They believed that the projects involving digital technology include the cooperation among the academic community, cultural heritage institutions and the public, which can not only enable scholars of digital humanities to fully realize the importance of audience engagement, but also stimulate the quantity and quality of relevant researches on audience engagement.

3 Methodology

In this study, qualitative research and semi-structured interviews were used. Four interviewees were selected to conduct interviews around museum digitization and draw conclusions from different perspectives.

3.1 Semi-structured Interview

Semi-structured interviews are frequently used in social science research as a research method of exploration based on a thematic framework (Maverick, 2009). Unlike standard structured interview questions, semi-structured interviews are more flexible and can be adapted accordingly to the respondent's responses during the interview (Kelly, 2010). Semi-structured interviews are often seen as a simple method of data collection (Wengraf, 2001). However, it is the most suitable research method when studying people's views, opinions and complex emotional issues (Kallio et al., 2016), which is important for audience engagement research. The structure of the SSI interview is made up of questions extended by each participant's answers, where the interviewees are free to answer the questions according to their self-will, and where the questions are open-ended (McIntosh & Morse, 2015). In this study, each interviewee's perspective on the perception of museum digitization was different, so the use of SSI allowed for a better overall understanding and analysis of the data. Therefore, this study uses semi-structured interviews in order to adapt the questions and expand on the answers given by the respondents in real time. For instance, if the respondents are from the technology field, the museum field or just museum visitors, their views on museum digitization technology are all tinged with subjective and different feelings, and using semi-structured interviews is more conducive to obtaining more valid and accurate data.

3.2 Selection of Interviewees

Four museum stakeholders were selected as interviewees to study the impact of audience engagement on museum digitization: a manager of the museum's visitor experience department, museum digitization technicians, a middle-aged museum enthusiast and a foreign visitor. They were invited to discuss a number of issues related to museum digitization. They represent different perspectives on museum digitization research, providing research data to support the study from the perspectives of museums, technology and audiences. This museum staff member is a senior museum educator in the visitor experience department, as he is in contact with different visitors every day and can get first-hand feedback and understand how different visitors feel about digitization, as well as answering questions from a museum perspective. The technical person interviewed was one of the developers of one of the museum's digital technologies and the purpose of the interview was to understand the current level of development of digital technology, the challenges they face in their research process and the areas to be addressed and developed in the future. The interviews with the visitors were the most visual manifestation of audience participation, with different cultural backgrounds allowing for more varied results. The two selected visitors, who differ in language, age, experience and identification with culture and history, therefore differ in their feedback on their attitudes towards museum digitization.

3.3 Date and Location

The four interviews were all conducted between March and April 2023. There were three face-to-face interviews, one from a middle-aged Chinese visitor with a ten-year museum hobby (interview date: 1 March 2023; 30 minutes), one from a foreign visitor (interview date: 1 March 2023; 20 minutes), and one from a senior museum educator in the museum's visitor experience department (interview date: 12 April 2023; 25 minutes). All three interviews were conducted in a museum in Shanghai, China. Another interview with a museum digitization technician via web video (date of interview: 26 April 2023; 23 minutes).

3.4 Interview Design

In semi-structured interviews, different questions can be designed depending on the interviewee, with meaningful questions around the research topic based on the different backgrounds of the interviewees, allowing them to express their views from their own perspectives (Cridland et al., 2015). The interview with the Chinese visitor revolved around her own feelings and experiences of visiting museums. This visitor was a middle-aged visitor with almost 10 years of experience in museums, a lover of cultural heritage and history, and a witness to the changes in museums. Therefore, the interview focused on how her experience of visiting museums has changed over the years and how she feels about the digitization of museums. The museum staff who responsible for museum education have been working in the museum's visitor experience department for many years and are in contact with different audiences every day, so they are able to get feedback from visitors on digitization at first hand. The interview with him focused on the impact of museum digitization on different audiences, and the strengths and weaknesses of museums in the field of digitization. The interview with the museum's digital technician focused on understanding the extent of innovation and development of modern technology and the problems being faced and the difficulties in solving them.

3.5 Ethical Consideration

In qualitative research, ethical issues are very important at every stage of the research, and reflexive and ethical responsibilities cannot be ignored at every stage (Steffen, 2016). During the data collection phase, ensure that sufficient and necessary data can be collected to address the research questions, while also ensuring that the lives of the research subjects are not disturbed too much (Stutchbury & Fox, 2009). This study has obtained the informed consent of all the respondents who participated in the semi-structured interview. The article follows the ethical guideline to ensure the confidentiality and anonymity of the participants' personal information, and guarantee the participants' right to withdraw the information during the research stage. The interview content related to the research was encrypted and no sensitive issues were mentioned.

Table 1. Interviewee's identity

Pseudonyms	Roles
Interviewee A	A middle-aged visitor with a lot of museum experience
Interviewee B	A museum staff from the museum's audience experience department
Interviewee C	A technician responsible for the development and design of digital museums
Interviewee D	A foreign tourist who is very interested in Chinese culture

3.6 Data Analysis

This study provides a qualitative thematic analysis of the four interviewees' interviews. The interviews were recorded and translated and analyzed to draw the research conclusions. The method of thematic analysis is widely used in the data analysis of qualitative research, it is easy to understand and flexible (Braun & Clarke, 2006). The interviews were recorded, converted verbatim into text, and each process was confirmed with the interviewee's and checked and supplemented to ensure the validity of the data for analysis. In order to gain a deeper understanding of the content of the interviews, interview segments were categorized according to themes and individual segments were coded using an inductive approach (Braun & Clarke, 2021).

4 Discussion

4.1 Positive Impacts

Immersive engagement. Digital technology allows for a more immersive visitor experience. From the visitor's perspective, an immersive digital experience can help add to the richness of the museum experience and learn more about culture and history in three dimensions. Interviewee A is a museum visitor who enjoys visiting museums, and in her almost ten years of museum visits, she feels that digital immersion has made museums more innovative and diverse, with a more atmospheric feel. Unlike the usual museum exhibits that are staged, digitization enhances the versatile nature, with new experiences each time, and increases the likelihood that visitors will visit multiple times. Interviewee D, a foreign visitor who loves Chinese culture, said after visiting the museum that digitization is a new form of cultural expression, saying:- "Visiting a museum is no longer about looking at objects, it's about feeling a certain history, a certain culture." From the museum's perspective, digital technology can be a means to attract a more diverse audience, or it can be a tool to assist the museum in education and entertainment. Interviewee B said that digitization can really attract a wider audience to museums, and it has the advantage that it is not static and its engagement is not limited by the literacy level and age of

the audience. Digital can also be used to add interactivity in their museum education process. From a technological point of view, digitization brings the possibility of a more sensory experience to museums. According to interviewee C, one of the digital space technicians, there is an immersive digital space in this museum, a large circular digital space made up of LED screens, complete with AR and 3D animations for an interactive experience. Their team had to use 500 square meters of physical space to present a complete picture of traditional Chinese culture, which he sees as a challenge but also as a new opportunity to open up new possibilities for the expression of museum culture and intangible cultural heritage. He believes that digital technology, in addition to enabling multi-sensory exhibitions in terms of sight, sound and touch, also offers the opportunity to visit museums to a wider audience, such as those with visual or hearing impairments.

Intelligent and Convenient. Digital technology makes museums smarter and offers greater convenience to visitors. Interviewee B said that digital technology could help focus on enhancing museum visits, with things like smart guides and databases, both of which could provide easier, smarter ways of learning and visiting for some visitors. He said that some scholars could also benefit remotely, by having access to materials on the internet. In addition, he expressed that digitization allows some visitors who prefer to visit alone to gain knowledge while having more freedom compared to human interpretation. Interviewee C said that the data built up through techniques such as photo modelling and 3D scanning have made it possible to enrich the data resources and to display the cultural relic or even the entire museum space in a comprehensive way through devices such as mobile phones.

Beyond Time and Space. Digital technology can break the limitations of time and space. Visitors do not have to be physically present in the museum to make their visit possible, enabling the possibility of visiting museums anytime and anywhere. From the viewer's point of view, online remote visits can also save time and the costs that may be incurred. Interviewee A also shared about interactive games on her mobile phone related to cultural heritage, and she felt that this kind of remote operation could help her educate her children about some culture and history at home. Interviewee D, on the other hand, said that he was unable to travel to China during the epidemic, and as a lover of Chinese culture, digitization helped him with the difficulties of locality. From the museum's perspective, digitization can help to divert traffic during times of high patronage and also address some of the space constraints. Interviewee B also pointed out that digitization could also solve existing challenges in the display of objects, such as enabling the display of some valuable and fragile exhibits.

4.2 Critical Impacts

On the contrary, while digitization improves audience participation in museums, it still has some controversial effects worth discussing.

Limitation of operation and application. There may be some operational problems in the application of digital technology in museums. Interviewee A is a middle-aged woman who is interested in some new technologies, but finds them difficult to operate and unable to adapt and use quickly without help. She said that digitization will attract many people, while the use time of some machines or interactive places is limited, and there are many people waiting in line, which will reduce her willingness to participate in the use of digitization. Moreover, the use time of some intelligent machines is limited, and the content is fixed, which leads to the visitors wandering around, unable to deeply understand the exhibits. D also said that some devices may have poor contact, and the time spent for adults to help children debug the machine will be consumed, which reduces immersion and experience to some extent. He also argues that the English version of the digital machines is twice as expensive as the Chinese version and is only available in Chinese and English.

Contradiction between digital value and museum value. From the museum's point of view, on the one hand, museums use digitization to attract audiences, but at the same time, whether the value of digitization will outweigh the value of the museum itself should be considered. Interviewee B said that it is undeniable that digitization has brought about a readjustment of audience participation in museums, but it has also made people pay more attention to digitization, making people ignore regular exhibitions. Apart from a series of special exhibitions, most visitors chose not to participate in the paid digital experience. In terms of cost, for museums, the initial technology development, upgrading and maintenance all require a large amount of financial support. On the other hand, interviewees C said that in terms of technology, besides the technology needs to be upgraded, solving the deficiencies in accuracy, sense of reality and navigation requires a lot of money and time to complete. From the perspective of the audience, respondent A also worries about the impact of digitization on children, who seem to regard digitization as a game, thus reducing the educational significance, and they will ignore the value of the existence of museums.

5 Conclusions

In summary, the impact of digitization on audience engagement in museums is the theme in this study. According to the study, digitization can indeed affect museum audience engagement to a certain extent, but it has some equally controversial issues. The aim of this research is to fill the gap in the impact of digitization in museum visitor engagement, to discuss which digital technologies can adapt museum visitor engagement, and to analyse what impact digital technologies have had on museum visitor engagement and the factors that have influenced it.

In order to attract a wider audience to provide a sustainable economic and social contribution, a number of new models have emerged in response to the greatly changing environment in which museums operate (Barron & Leask, 2017). Digitization has undeniably had an impact on museum audience engagement, with audiences being drawn in, but research has also shown that different audiences feel

differently about digitization and that different digital projects have different impacts. These effects are therefore two-sided, and the use of digital technology in museums to adapt audience engagement is effective, but not necessarily suitable for everyone; different digital approaches work in different ways, and there are certain problems with current digital technologies.

The results showed that different ages, different levels of literacy, different levels of acceptance, cost and language environment are all factors that make up the impact of digital technology in museums audience engagement. Digitization makes museum visits more immersive and informative, aids the entertainment and educational functions of museums, and also provides a degree of intelligence and convenience. However, on the other hand, the accuracy, cost and difficulty of operation can also be a problem for some visitors. For museums, digitization has solved some of the problems, but new ones have come along with it.

From a museum perspective, digital technology can attract a wider audience, but it can also reduce the flow of visitors to general heritage displays. Digitization will bring in some revenue, but the technology consumes a huge amount of money. Digitization can help museums to better present their educational functions, yet it is important to consider the suitability for different audiences and to control whether it will be more entertaining than educational. Museums also need to consider whether digital technology can have a lasting impact on audience engagement. From the visitor's point of view, digital technology is fresher, more immersive, more experiential and more entertaining, breaking the limits of space and time, but also more time and money consuming. Moreover, it is perceived differently by different audiences, so it will have different effects. From a technological point of view, to meet human needs, digital is constantly updated and progressing, and there are existing technical issues that continue to be key to digital engagement with audience.

In further research, digital methods and audiences can be further categorized to examine their impact on audience engagement in museums, and to try to examine how to reduce the current problems caused by digitization.

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