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Audience Preference for Engagement with Online Museums

by Xiang Chen

A Capstone submitted in partial fulfillment of the requirements for the degree of

Master of Science in Media Arts and Technology in the

School of Photographic Arts and Sciences in the

College of Art and Design of Rochester Institute of Technology

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Capstone Advisor: Professor Christine Heusner

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Abstract

With the rapid development of science and technology, “digitization” as a new structure carrier of information codes has been widely used by more and more people. Contemporary museums are no longer confined to the traditional mode of exhibition, but now are able to employ a high degree of integration of conventional physical displays and digital technology. Through various channels, such as social media, website platforms, documentaries and movies, and related apps, museums enhance the interaction and experience of the audience. This research project surveyed Chinese and American college students about their engagement with museums and the effectiveness of digital technology use in museums. This research found that many people have never been to online museums. Moreover, people who visited physical museums consider digital images, sound, video, and 3D images as the most popular digital tools. This research could help museum curators attract a more diverse audience. Not only could this research help inactive visitors generate interest, but also engage and educate active visitors with the museum in new ways through the use of technology.

Chapter 1

Introduction

Museums first sprouted from the consciousness of human collection. From being storage spaces of ancient, private collections to the contemporary centers of art exhibitions, museums are no longer a “showcase” of private collections; rather, they now have profound social connotations of education, protection, entertainment, and transmitting of education (Zilin, 2018). In the minds of many people, the museum represents an ancient concept of collecting treasures and antiquities. Similarly, volunteers who love museums, as well as cultural researchers, consider museums to be a sacred place where they can talk about history (Shen, 2014). Museums are also institutions and agencies for professional curators to protect, utilize, and exhibit physical objects regularly as they serve the purpose of pursuing the educational and aesthetic aim of the collection (Han, 2016). For them, the function of a museum is a collection, an exhibition, research institution, educational facility, and public service. They focus on people's accessibility, elevation, and engagement (Shen, 2014). Only when the museum understands the public's interests and concerns can it hold an exhibition that forms an interactive relationship with the public at a certain stage and in a certain group (Shen, 2014).

Contemporary museums have attracted much attention for their conservation and dissemination of human culture and heritage. If there is no awareness of protecting cultural relics, much historical and cultural heritage will be damaged, and the knowledge of ancient cultures will cease to exist (Shen, 2014). Therefore, staff

members of museums should master excellent professional skills to ensure perfect conservation from the contexts of environmental temperature and humidity and light source control.

Access to a Museum

There are many ways to access a museum. Simply, these access methods are divided into two main categories: onsite and online. According to Dudzik (2018), The “New Media Consortium 2016 Report states that participatory experiences are becoming the norm, both onsite and online, and museums are increasingly finding new ways to encourage and incorporate community contributions”(p.8).

Museums not only provide traditional, readable media, such as text-based materials (e.g., text labels, brochures, and guidebooks), but also interactive and participative media, such as public programs (e.g., docent tours, school programs, and family programs). Through these media, they can create an engaging environment for visitors to explore the knowledge of human cultural heritage in different exciting ways and conceptual exhibitions (Lu, 2012). This interpretative information engages visitors with orientation, a personalized learning experience, and information through non-print media. Recently, museums will often provide audio, video, or digital interactive media (through Mp3 players or free phone calls) to offer visitors diverse engagement with art (Lu, 2012). Using these new media, visitors can acquire knowledge actively and not rely solely on written instruction.

Museums Online

Recently, museums have come to realize the significance of delivering content to attract visitors. Museums all over the world are open to publish their information on the Internet in order to further bolster their outreach (Urban, Marty, & Twidale, 2007). With the advancement of technology, museums have begun to value their digital collection. Objects represented in digital art museums appearing on websites can still deliver knowledge. When museums begin to put their collections and exhibitions online, they can protect their objects more effectively and make them more relevant, accessible, and engaging (Han, 2015). By preserving their physical collection, the efforts made by museums to put every art object in their online museums is a form of conservation (Han, 2015). Since many of the artworks experience deterioration over time, some of them will change appearance (Han, 2015). Therefore, museums have the responsibility to record digital images of artworks (Han, 2015). Thus, a digital collection can document those physical objects in their best condition. As Gunter (2007) argued, “If the physical collections are the main building block of a brick-and-mortar museum experience, digitized museum objects are their equivalent in the online space” (p.1). In the twenty-first century, digitized museums are necessary when most people live their lives online (Han, 2015).

Museum Demographics

There are many collections and masterpieces in museums. Millions of people have the opportunity to access this information, but unfortunately, some people cannot due to reasons such as money, time constraints, or distances (D'Angelo, 2017). In this situation, the Internet is an option for people who otherwise would not have access to the museum experience (Higgings, 2009).

Through globalization, museums can cater to audiences who may never physically enter their premises. This is particularly important for First Nations with a cultural interest in museum collectibles that they are unable to view otherwise (Lu, 2012). Museums generally engage with similar types of people (colleendilen.com, 2019). In the study of demographics, psychographics, and behaviors, these people are more alike than different, which means they like visiting cultural organizations (colleendilen.com, 2019). According to the research of Colleen Dilenachneider (2019), people visiting cultural organizations currently represent only 16% of the US population. For example, one shared characteristic of active visitors in the US to cultural organizations is a higher than average household income, with the average being \$113,000 a year. This data does not mean that all the visitors' income is over \$113,000/year, but it can represent the average level. Therefore, people who live in rural areas or have a low income level are less likely to visit a museum collection.

Appropriate calls to action for museums are not only “attracting new friends,” but also “expanding our visitor image” (colleendilen.com, 2019). Staff and employees of museums should try to expand the type of visitors by trying unconventional

features in their museums, without distancing themselves from their current, valuable participants (colleendilen.com, 2019). Cultural organizations nowadays have taken a balanced approach: attract new audiences while still serving existing audiences (colleendilen.com, 2019). By developing new technologies onsite and online, museums could provide services to more diverse people in terms of age, race, and income.

Statement of the Problem

Museums are places that allow people to spend time learning and exploring historical and artistic artifacts through new, interesting, and fun encounters. While millions of people have access to that information, unfortunately, there are also millions who cannot access these materials for reasons such as money, lack of time, or distance (D'Angelo, 2017). The Internet offers a choice for the public to explore museum collections, which they could never otherwise experience (Higgings, 2009). This research seeks to understand if an audience can engage with museums effectively through technological devices and an online platform, to determine methods for art museums to engage an online and onsite audience in an enjoyable and educational museum experience. This hopes to determine opportunities for museums to engage an online audience.

Chapter 2

Literature Review

This chapter examines the functions of the museum, in particular, the development of online museums. Strategies for engagement and educational activities for both online museums and physical museums are reviewed.

The Functions of a Museum

A museum staff should be able to understand the needs of its visitors in order to meet their expectations. To accomplish this, museum staff employ several functions to engage and educate their visitors about the exhibits. There are multiple associated functions for museums, which include compiling, conserving, displaying, informing, and becoming a social and cultural center (Alexander & Alexander, 2008). Typically, museums are places that collect, exhibit, and study objects of natural and cultural heritage and classify them according to their scientific, historical, or aesthetic worth for their visitors (Xu, 2014). In order to better engage visitors and meet their expectations, they also function as cultural education institutions for providing services for social development and helping people to learn, educate, and entertain (Xu, 2014).

As museum trend reports continue to encourage the installation of digital devices (such as audio guides, interactive terminals, smartphone applications, personal digital assistants [PDAs], touch screen tables, and kiosks in museum galleries), the art

museum's will adapt to engage their audience through digital tools (Gelb, 2015).

However, simply installing digital equipment into museums is not enough to satisfy the visitor's expectations for a better experience (Gelb, 2015). If museums want to attract more visitors successfully, they need to understand their needs, expectations, and behaviors comprehensively (Gelb, 2015).

The Development of Technology in Museums

The concept of an online museum is controversial to the conventional stature of the traditional museum (Han, 2015). If museums digitize every art object, art will appear as an unemotional representation, instead of as real paintings, ceramics, calligraphy, objects, spaces, or sculptures—making them even less significant when compared to the real world. In addition, when physical objects are exhibited on the Internet, those artworks will become widely available as pictures (Han, 2015). Qing (2016) found that, “the Internet is like a photocopier, which is responsible for generating various copies. When the artwork is displayed onsite and then returned to the warehouse, people do not need to be worried about copyright. However, as long as the pictures of collections are uploaded online, it will persist and propagate” (p.56). Thus, this is a big challenge for online art museums. Despite this challenge, the gradual popularization of the Internet and digital displays has gradually replaced the museum experience in the traditional sense as a new force for museums (Xu, 2014).

However, in recent years, in addition to the Internet, museum technologies have also expanded to include special programs which are location-based and offline.

Not only can new technology facilitate access to stored collections in museums, but it also helps people view and interact with those collections, even if they cannot go to the museum in person (Miller, 2016). Using both online and offline technologies to connect visitors to museum experiences through dedicated museum apps, social media, digital kiosks, and interactive digital exhibits can leave visitors with a new impression of the museum (Miller, 2016). Modern-day museum trends and horizon reports are often filled with models for advanced digital equipment to be integrated into museums when these institutions dive into digital advancement (Gelb, 2015). Individuals who visit museums utilize digital media to access information and even to feel art. Several museums, such as the Metropolitan Museum of Art, the Getty, the Carnegie Museum of Art, and the Tate, have spent time and resources to develop the infrastructure and process to publish their collections' data (Gelb, 2015). Online museums have adapted to modern society where digital life and the online world have played a significant part (Han, 2016).

Social media has brought in several sets of tools and design patterns that make participation more accessible than before (Gelb, 2015). Recently, museums are increasing their awareness to communicate and interact with people via social media (Han, 2016). For instance, to attract more visitors, the Museum of Modern Art in New York City went one step further in its online presence with live streaming events, tours, Google Art Project, and online classes on social media platforms where people can view images and videos published by museums, comment, or share their interests about museums (Bautista, 2014). Combining the innovation of Internet technology

and physical collections of the museum through apps, interactive kiosks, and Virtual Reality (VR) has changed the way people think about their museum experience.

New Media Engagement in Museums

Besides their advancement of online archives, museums have grown other programs using technology to strengthen visitors' education, experience, and accessibility (Han, 2015). Over the past three decades, museums have used diverse media to connect with visitors who cannot visit the museum on their own (Munley, 2012). Many curators and staff in museums think that museums should offer services for everyone, but rarely curators and staff succeed in attracting new populations of people to go to museums. Therefore, museums should create and utilize the most effective tools to reach everyone (Munley, 2012).

“The New Media Institute defines new media as digital technologies that can be manipulated, networked, dense, compressible, and interactive” (Dudzik, 2018, p.6). New media enables visitors to participate in engaging experiences that allow them to create a connection with collections, authors, time, and history of the artworks (Dudzik, 2018). Wei (2017) analyzed the interaction of audiences with new media, and the conclusion showed that new media can help museums to interact with their visitors through better communication and feedback. In addition, new media could contribute to deepening the general public's understanding and recognition of traditional cultural values. Wei (2017) found that the most popular ways for the Palace Museum in Beijing to attract many visitors are by streaming videos and

documentaries about the Palace Museum.

Dudzik (2018) explored how the experience of visitors using Augmented Reality (AR) changes their impression of museums. Dudzik's research strengthened the association between AR and the museum. It offered suggestions to improve the AR technique, and the conclusions show that visitors value the education, engagement, and entertainment of AR. Marques (2017) analyzed the audiences' preferences and responses to technology-oriented experiences in modern museums. The author uses an animal skeleton exhibition at the Smithsonian's National Museum of Natural History in the Bone Hall as an example for that research. The author concludes that technology has a positive influence on visitors, and digital exhibitions in museums are replacing traditional approaches to meet visitors' expectations. Based on the author's findings regarding visitation actions, content preferences, degree of satisfaction, and experiences, museums can enhance visitors' engagement through using AR. Similarly, D'Alba (2013) collected and analyzed the experience of visitors when they participated in museums and their feelings about using technology. This study showed that visitors who experienced the virtual museum admitted that using technology is positive because it not only prepares visitors to visit museums in person, but also encourages people to interact and engage with physical exhibits in the museum.

In the 21st century, the number of millennials who frequently visit museums is decreasing around the world. Fang (2017) used two examples of American museums for that research. Along with other research questions, Fang (2017) focused on the following these issues: "What are American museums doing to enhance their

millennials' interest in art?" and "How are two American art museums using interactive displays and digital technology? Do these technologies help to attract millennials to these museums?" (p.10). She concluded that new media technologies including location-based mapping, 3D viewing, customization of searching, and gesture-based interactive devices can enhance engagement. Moreover, in order to attract more millennials, using digital technology could help museums challenge competition from Netflix and social networks like YouTube and online computer games. What's more, new media could help visitors accept knowledge from curators and artists actively, rather than passively. In short, she determined that new media, no matter online or onsite, is a forceful tool to boost attendance and engagement. Still, museums should analyze the right strategy to offer services to millennials.

D'Angelo (2018) interviewed professionals in sixteen different museums and analyzed the data; it was concluded that museums should take new media into necessary considerations as a means to increase their audience. Additionally, new media can better gather information about digital technology related to museum education and create a strategy for using efficient digital technology. In the end, as technology is changing rapidly, museums should always focus on visitors' behaviors and changing preferences, so that future museum-goers will have more accessible engagement.

New Media for Education

Museums are designed to acquire, preserve, research, communicate, and display their collections to provide education, fun, and the experience of being in a museum environment.

Qing (2016) extracts ways for a digital art museum to enhance the experience of the audience, and to influence public education in the museum from four aspects: distribution, change, challenge, and future. This article classifies digital museums into online exhibitions, new media in art museums, the Google Art Project, apps, and smart museums. In addition, the author thinks the digital museum is not an independent museum based on artworks and functions of exhibition, study, education, and collection. Still, it has changed due to the advancement of technology. As an example, people can view artworks together at home with VR glasses; Qing (2016) concluded that a “digital art museum” or further “wisdom art museum” is the concrete embodiment of “post museum science.”

Han (2016) discussed how museums used technology to help transfer education to people, and new media devices can strengthen the public's engagement with the museum. When museums started going online to reach out to their visitors, the museum is not just about showing artworks, but about educating the public.

Lu (2012) evaluated the traditional interpretation and digital interpretation in the Philadelphia Museum of Art, The Barnes Foundation, and Rosenbach Museum and Library. He concluded that visitors can self-learn about the artist and his or her works on the museum's website and use relevant links to gain supportive information

and the work of the artist and other artworks of the same classification. An online website now provides access to their publications in order to support visitors having a multi-player, interpretative experience, but the website cannot be replaced by digital interpretation.

Wei (2017), Dudzik (2018), Marques (2017), D'Alba (2013), Fang (2017), and D'Angelo (2018) concluded that new media can help museums to enhance interaction and engagement. Qing (2016), Lu (2012), and Han (2016) found that new media can help museums to educate visitors in physical or online museums. To understand and analyze the audience's preference for engagement and education, and to ensure the integrity and accuracy of the study, the researcher will consider online platforms and technological devices in the following research survey.

Chapter 3

Research Objectives

Based on a review of the literature, the researcher has found that there may be an opportunity for museums to use new media and online tools to attract, engage, and educate visitors. However, there has been little research that explores audience preference for online museums and technological devices used in museums.

Therefore, the purpose of this study is to determine if online art museums can engage their remote audiences and what techniques are most effective for education and engagement. At the completion of this research, the researcher hopes to give suggestions for museums to improve their digital collections and online presence in order to attract a broader audience. This research aims to address these two questions:

- (1) Can an online museum be effective for a remote audience to engage in an enjoyable and educational museum experience?
- (2) What techniques, platforms, and forms of media are most preferred for audience learning and engagement?

Chapter 4

Methodology

The researcher used a survey method to study college students' preferences for a museum's digital presence. Participants answered survey questions that were determined to be relevant to the research questions through a literature review. The researcher analyzed the results of the survey, in combination with demographic information collected in the survey, to determine the attitudes and preferences for various technology and media presentations related to the use of digital technology at onsite and online museums. The survey was distributed to college students in China and the United States through email and social media.

Sample Population

The target population for the survey was college students from China and the United States (US). In China, the total number of museums has reached 5,136 (Jiexin & Hui, 2019). By the end of 2018, the number of museum visitors nationwide reached 1.008 billion (Jiexin & Hui, 2019). Young people are undoubtedly the main force driving the museum boom. Among people who follow the museum, netizens aged 15-35 account for 74.6% (Jiexin & Hui, 2019). In 2018, among the visitors of the Forbidden City, 40% were under 30, 24% were 30 – 40, and 17.5% were 40 – 50. It shows that young audiences, especially who are aged 15 – 35, have become the main visitors (Jiexin & Hui, 2019). Moreover, young people's love for museums is not only

reflected by their activities on social media channels, but also through the inheritance and development of China's distinctive traditional culture.

People see museums as places where they can visit attractions of historical, authentic, social, or even scientific values. In the United States, visiting historic museums is seen as a cultural activity by 69% of people. Further, more than 14 million American households go to the museums every year, and 63% of Americans regard visiting art or design museums as a cultural activity. In 2017, 81% of Americans took part in museums for “fun” (Alexander, 2020). According to the statistics, in 2018, 20.68% of Americans aged 18 to 29 years visited art galleries or museums, 17.58% of respondents aged 30 to 49 years visited art galleries or museums, and 15.36% of respondents aged 50 to 64 years visited art galleries or museums (Alexander, 2020). In 2018, The Metropolitan Museum of Art’s (The Met) website (metmuseum.org) recorded 31.2 million visits. In addition, the Museum has a very wide social media reach. On Twitter, The Met has more than 4.3 million followers, whereas, on Instagram, The Met has 2.7 million followers. The museum has more than 1.9 million followers on Facebook (The Met website, 2019).

Survey Design

Through a review of the literature, the researcher seeks to determine if the online gallery can engage the remote audience and what techniques are most effective for education and engagement. This research will follow a survey methodology to determine the preference of engagement methods for an online museum audience. The

survey method is the technique of collecting data based on asking questions (Schaefer & Dillman, 1998). This survey methodology is best for measuring, ranking, classifying, and recognizing patterns, and making generalizations because it is considered to be applicable when research problems are subjective and diverse (Schaefer & Dillman, 1998). The survey was built in Qualtrics and began with informed consent. Once participants consented to take the survey, they responded to questions. The survey questions collected: demographic information, the frequency of museum visits, and satisfaction and experience with digital tools for onsite and online museum visits.

Demography

The demography section of the survey used closed-ended questions in order to collect information about age, sex, and education.

Visit

The researcher used closed-ended questions and multiple-choice questions where participants could select all that apply. These questions collected information about frequency of visits, how they gained awareness of the museum, and their distance from the museum.

Satisfaction

Likert scale questions were used to rate levels of satisfaction in digital engagement.

Digital Tools

This section asked about onsite and online museum experiences including experiences with digital media by selecting all tools that apply.

Procedure

The survey was submitted to the Human Subject Resource Office at the Rochester Institute of Technology (RIT) and was approved. The survey was designed in Qualtrics and was sent via email or social media to the target audience of college students in the United States and China. This survey was open for two weeks.

Analysis

Results were analyzed to determine the common preference of various technological devices, methods, and content for museum collections online, according to the survey demographics.

Chapter 5

Results and Analysis

The survey was open for two weeks. The survey participants were from the United States (US) and China. This chapter presents the results of the survey and an analysis of those results.

Demographic information

A total of 95 surveys were received from the US group. After eliminating incomplete or invalid surveys, there were 78 valid surveys. Among the respondents, 20 were male, 57 were female, and one was non-binary. There were 40 undergraduate students, 23 graduate students, four postgraduate students, and 11 professionals. Out of 78 respondents, 75.64% aged between 18 and 24, 11.54% aged between 25 and 36, 5.13% aged between 37 and 55, and 7.69% of them were more than 55 years old. More than 82% of respondents had a career or degree related to art or design. Among 78 respondents in the US, 50% of them lived less than 10 miles from the nearest museum or gallery, 34.62% of them lived between 10 and 20 miles of the nearest museum or gallery, 5.13% of them lived between 20 and 30 miles of the nearest museum or gallery, and 10.26% of them lived more than 30 miles of the nearest museum or gallery.

A total of 130 surveys were received from the Chinese group. Among the respondents, 37 were male, and 93 were female. There were 44 undergraduate students, 65 graduate students, 20 postgraduate students, and one professional. Out of

130 respondents, 85.38% aged between 18 and 24, 8.46% aged between 25 and 36, 4.61% aged between 37 and 55, and 1.55% of them were more than 55 years old. More than 68% of respondents did not have a career or degree related to art or design. Among 130 respondents from China, 42.3% of them lived less than 10 miles from the nearest museum or gallery, 40% of them lived between 10 and 20 miles of the nearest museum or gallery, 5.38% of them lived between 20 and 30 miles of the nearest museum or gallery, and 12.32% of them lived more than 30 miles of the nearest museum or gallery.

The leading group of respondents was college students, which met the target research demographic described in the research methodology.

Visit information

The researcher asked questions in the survey to determine the popular ways US and Chinese respondents knew about museums, why they visited museums, and how often they visited on-site and online museums.

What are the main ways that you to learn about museums? The three most popular ways by which US respondents became aware of museums were: personal recommendations, online searches, and advertisements. However, for respondents in China the three popular ways they became aware of museums were: social media, online searches, and personal recommendations.

What was your reason for visiting a museum? According to the results, general interest, leisure and entertainment, and cultural experience were the main

reasons respondents both in the US and China visit museums.

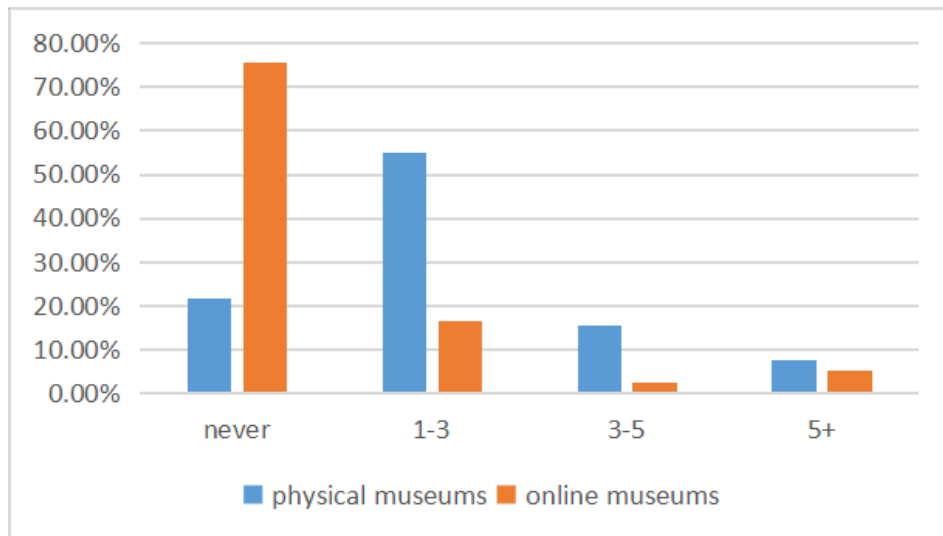


Figure 1. A comparison of the frequency of visits to a physical museum and an online museum for US respondents this year

Frequency of museum visits. As shown in Figure 1, in the past 12 months, 7.69% US respondents had been to physical museums more than five times whereas 5.13% of them had been to online museums. Of US respondents, 15.38% had been to physical museums three to five times, while 2.56% of them had been to online museums. US respondents who had been to physical museums one to three times was 55.13%, and 16.67% of them had been to online museums. US respondents who had never been to physical museums was 21.79%, and 75.64% of them had never been to online museums.

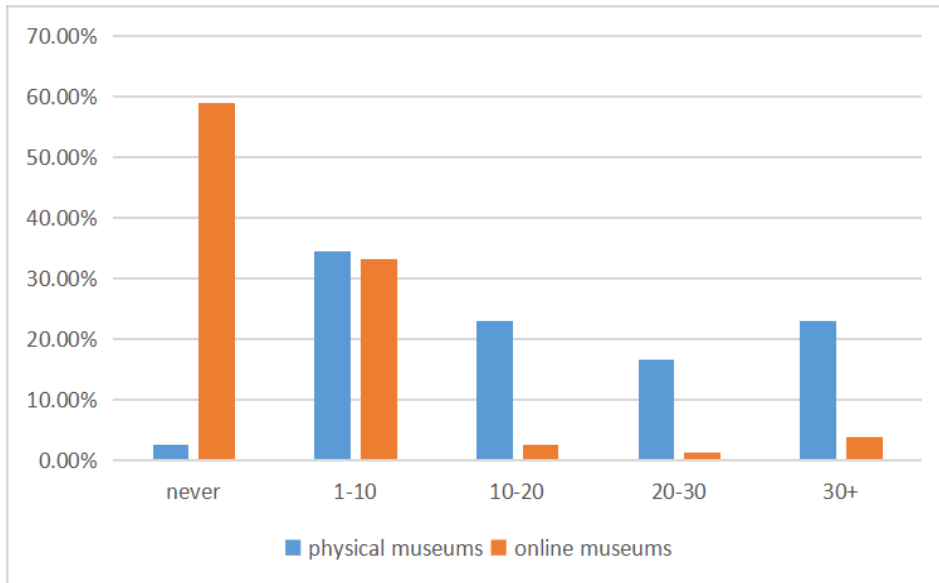


Figure 2. A comparison of the frequency of visits to a physical museum and an online museum for US respondents in their lifetime

In comparison, Figure 2 shows, 23.08% of US respondents had been to physical museums more than 30 times in their lifetime whereas 3.85% of them had been to online museums more than 30 times in their lifetime. US respondents who had been to physical museums 20 to 30 times in their lifetime was 16.67%, and 1.28% of them had been to online museums 20 to 30 times in their lifetime. US respondents who had been to physical museums 10 to 20 times in their lifetime was 23.08%, whereas 2.56% of them had been to online museums 10 to 20 times in their lifetime. US respondents who had been to physical museums one to 10 times in their lifetime was 34.62%, although 33.33% of them had been to online museums one to 10 times in their lifetime. Finally, 2.56% of US respondents had never been to physical museums in their lifetime, and 58.97% of them had never been to online museums in their lifetime.

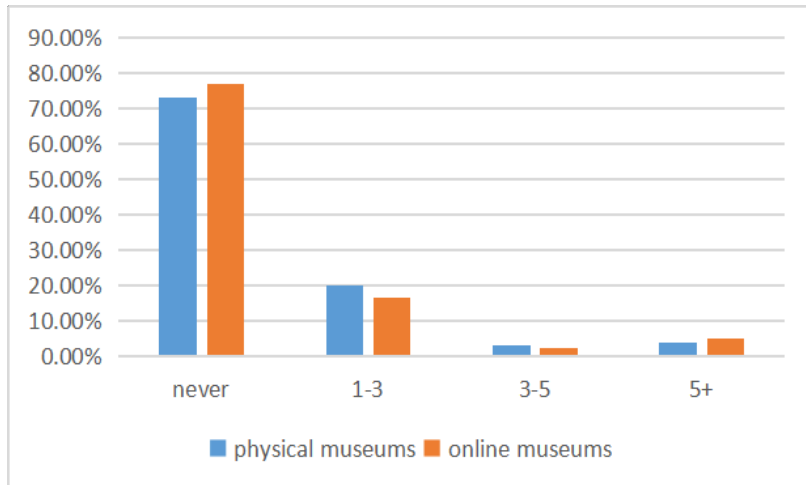


Figure 3. A comparison of the frequency of visits to a physical museum and an online museum for Chinese respondents this year

As Figure 3 shows, in the past 12 months, 3.8% of Chinese respondents had been to physical museums more than five times whereas 1.5% of them had been to online museums. Three percent of Chinese respondents had been to physical museums three to five times, while 2.3% of them had been to online museums. Twenty percent of Chinese respondents had been to physical museums one to three times, although 19.2% of them had been to online museums. Chinese respondents who had never been to physical museums came in at 73.1%, and 76.9% of them had never been to online museums.

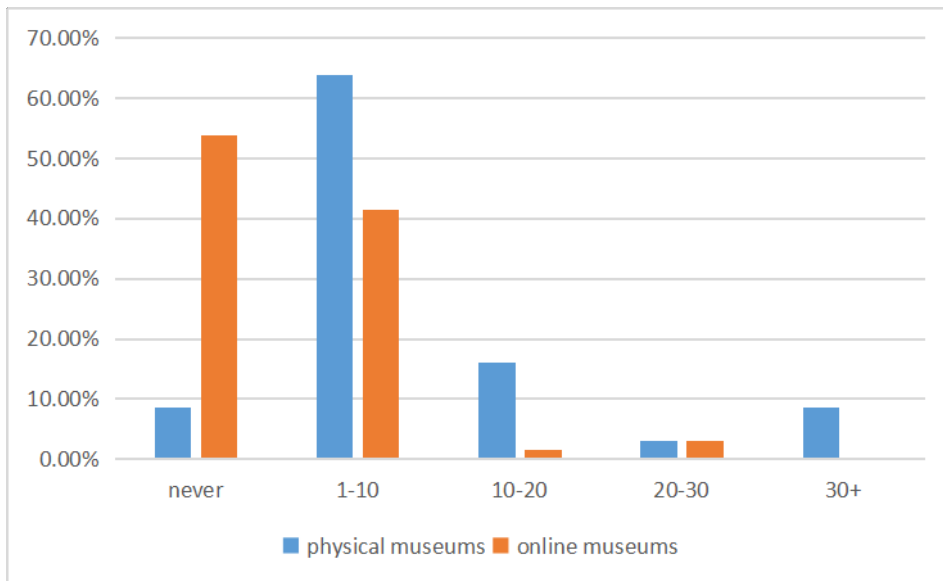


Figure 4. The frequency of a comparison of visits to a physical museum and an online museum for Chinese respondents in their lifetime

In comparison, 8.5% Chinese respondents had been to physical museums more than 30 times in their lifetime whereas none of them had been to online museums more than 30 times in their lifetime. Three percent of Chinese respondents had been to physical museums 20 to 30 times in their lifetime but 3.1% of them had been to online museums 20 to 30 times in their lifetime. Chinese respondents who had been to physical museums 10 to 20 times in their lifetime was 16.1%, whereas 1.5% of them had been to online museums 10 to 20 times in their lifetime. Chinese respondents who had been to physical museums one to 10 times in their lifetime was 63.8%, although 41.5% of them had been to online museums one to 10 times in their lifetime. Chinese respondents who had never been to physical museums in their lifetime was 8.5%, but 53.8% of them had never been to online museums in their lifetime.

Comparing Figure 3 and Figure 4, the results shows that nearly 91.5% of people have been to physical museum in their lifetime, but only 26.9% of respondents have been to physical museum this year. This could be because of the 2019–2020

coronavirus pandemic and many respondents were unable to go out to visit museums.

Education and Engagement

Two questions asked respondents to quantify their experience with digital tools in a museum on a five-point Likert scale. One question sought to measure education and the other engagement. The results of these questions are as follows.

Did the digital tools or experiences increase your knowledge of artifacts in the museum? A large number of respondents in both the US and China believed that digital tools or experiences are very likely or moderately likely to increase their knowledge of the artifacts in the museum. However, a few respondents thought that these digital tools or experiences cannot increase their knowledge of the artifacts in the museum at all. Similarly, most respondents believed that the experience of using digital tools in the museum is very enjoyable or somewhat enjoyable, however rarely any of them thought the experience of using the digital tools in the museum is not enjoyable at all.

Digital Tools and Experiences

Respondents were asked a series of questions about digital tools, techniques and experiences in museums. For these questions, respondents were prompted to choose all options that applied.

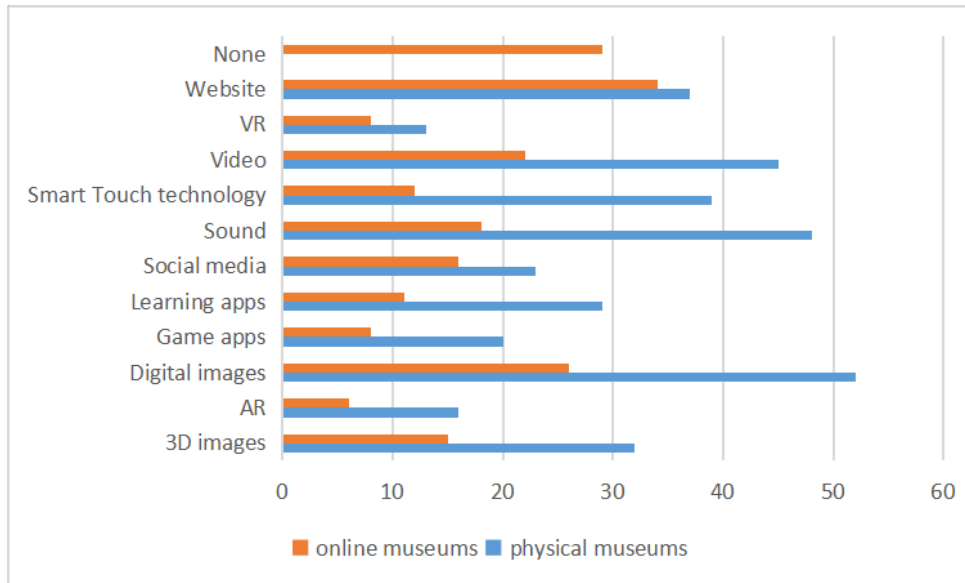


Figure 5. The Usage of digital tools in the United States

Figure 5 shows the experience US respondents have had with digital tools and experiences. Digital images, sound, and video were the most popular responses for at a physical museums. While most US respondents had experiences with websites and digital images for online museums, respondents had little experience with other tools for the online museum.

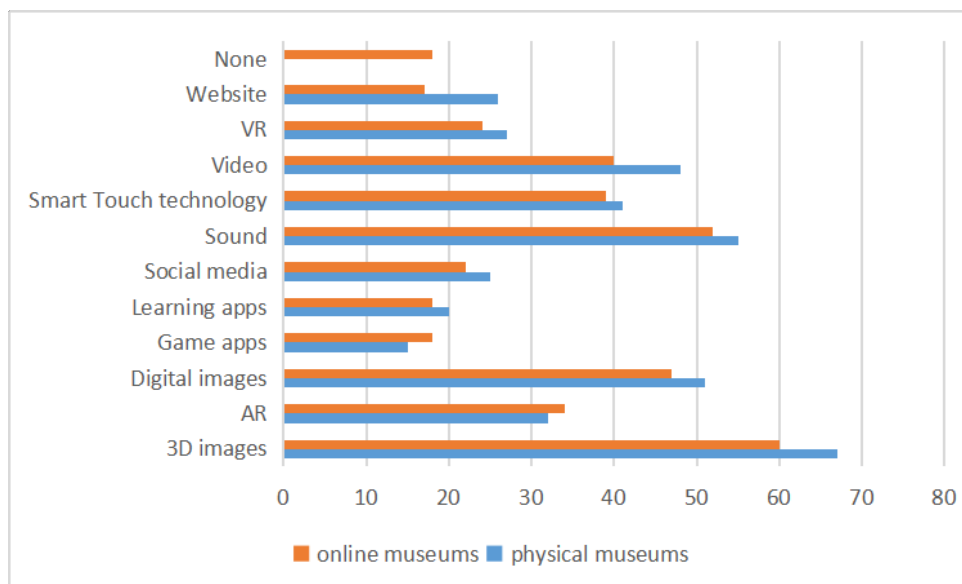


Figure 6. The Usage of digital tools in China

Figure 6 shows that for respondents in China, 3D images, sound, and digital images were the most popular techniques used at a museums. 3D images, sound, and digital images were the top three techniques they had used while interacting with online museums.

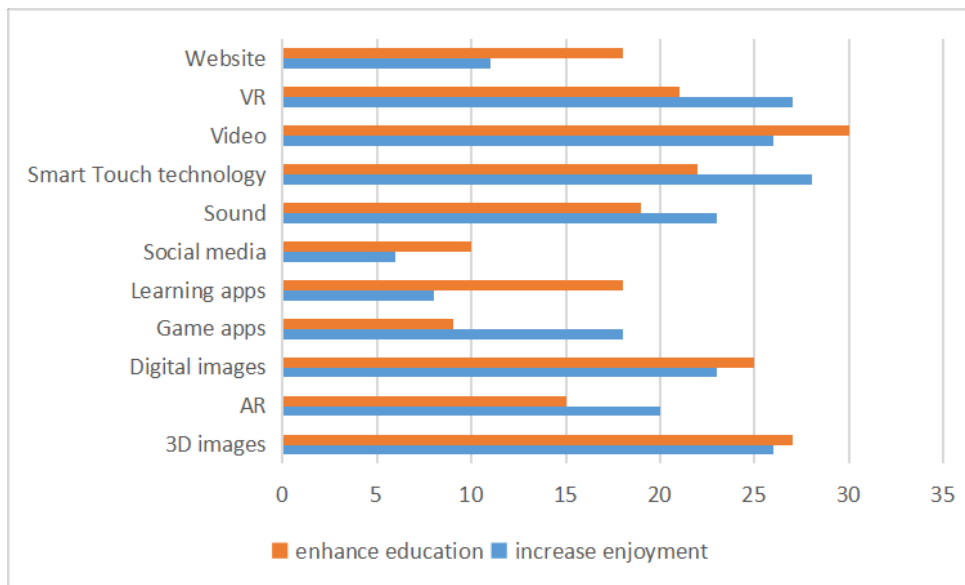


Figure 7. The Usage of digital tools in the United States

According to Figure 7, smart touch technology, VR, video, and 3D images were the most effective digital techniques used to increase the enjoyment of respondents in the US. However, to enhance education, video, 3D images, and digital images were the most effective techniques for respondents in the US.

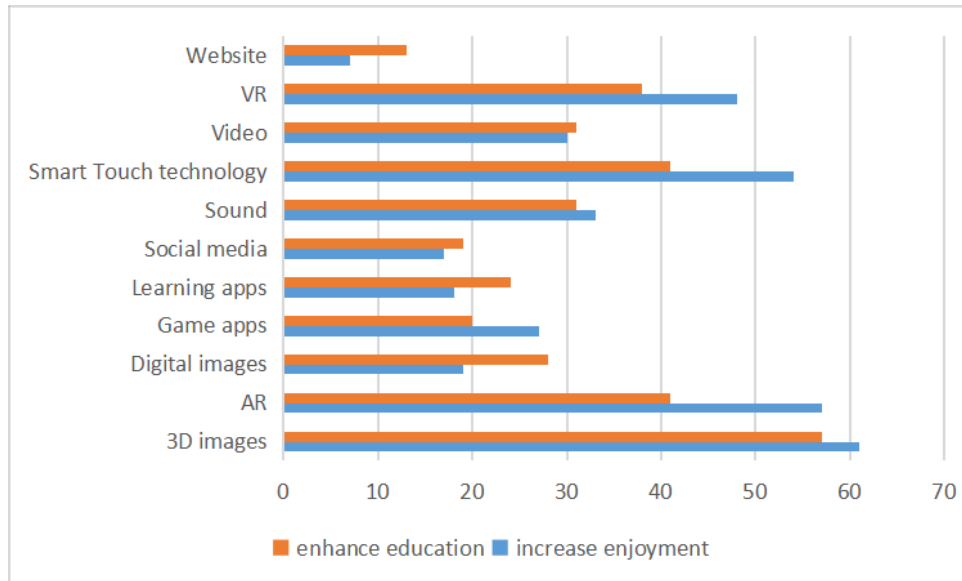


Figure 8. The Usage of digital tools in China

As Figure 8 shows, respondents in China selected 3D images, AR, and smart touch technology as the most effective techniques to increase their enjoyment. Meanwhile, 3D images, AR, touch smart technology, and VR were the most effective techniques to enhance education for respondents in China.

In summary, more respondents from China and the US visited physical museums than online museums. Most respondents have never visited online museums. The preferred digital technologies for respondents were 3D images and digital images. The respondents felt that digital technology increased engagement and enhanced education. The final chapter will discuss the conclusions derived from this research.

Chapter 6

Summary and Conclusion

This chapter will summarize the conclusions to the research and review limitations of this research study. Finally, opportunities for further research will be suggested.

Frequency of visit

Most Chinese respondents did not go to the physical museums this year, but most American respondents visited physical museums one to three times this year. Most respondents have never visited an online museum.

Satisfaction of engagement

Research Question 01: Can an online museum be effective for a remote audience to engage in an enjoyable and educational museum experience?

The researcher concluded that most of the respondents, from both China and the US, have never been to an online museum. However, respondents did find that digital tools or experiences are very likely or moderately likely to increase their knowledge of artifacts in the museum. Respondents overall also believed that the experience of using digital tools in the museum is very enjoyable or somewhat enjoyable.

Select the most preferred digital tools

Research Question 02: What techniques, platforms, and forms of media are

most preferred for audience learning and engagement?

The respondents had experience with many of the digital tools at the museum, but digital images, sound, video, and 3D images at museums were the most popular ways for the audience to interact with the museum artifacts. This could be because technologies such as video and sound are common and more affordable for museums. As museums begin to implement digital technologies, they may begin with more traditional methods such as text, sound, and videos.

Among technology trends to attract visitors, smart touch technology, 3D images, AR, and VR have become more important, which is similar to the findings of studies by Dudzik (2018), Fang (2017), and Qing (2016). Most people are longer satisfied with simple sound and video interactions, instead they are beginning to pursue new and more interactive digital methods. For respondents in the United States, smart touch technology, VR, video, and 3D images were chosen as the most effective ways to increase enjoyment. Video, 3D images, and digital images can be very effective in enhancing education. Chinese respondents reported that smart touch technology, 3D images, AR, and VR can increase not only enjoyment but also education.

Limitations

Because of the outbreak of the 2019–2020 coronavirus pandemic, most of the respondents in China could not go outside to visit museums during the 2020 year. As the pandemic became more severe, the United States was gradually affected and

people there were also beginning to stay home because of the widespread pandemic. Therefore, many respondents to this survey had few chances to visit physical museums this year. The quarantine measures in the United States started only in March 2020, so they could still visit museums from January to March, which may have resulted in a greater number of US respondents visiting museums when compared to Chinese respondents.

Future Research

In this project, the researcher summarized and analyzed if online museums are effective for a remote audience to engage in an enjoyable and educational museum experience. In addition, the researcher also analyzed the most preferred digital tools for audience's learning and engagement.

Perhaps because of insufficient publicity, many people were not familiar with online museums. Further research could investigate opportunities for increasing awareness of online museums or look further into the reasons for the low rate of visitor to online museums.

The researcher did not use open-ended questions to collect information from respondents. Future studies could use interviews and open ended questions to obtain qualitative information about preferences for digital tools and online museums.

Most respondents from America and China did not have experience with online museums. Digital tools such as digital images, sound, video, and 3D images used in physical museums were effective for visitors to increase enjoyment and

enhance education. The researcher believes there is opportunity for further research on this topic as digital media evolves and people become more comfortable with and aware of online museums.

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