A Study of Interactive Installations in Museums

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Abstract: The paper presents the reasons for the use of interactive installations in museums, the current problems exist, and concludes with measures to solve these problems using documentary analysis. It is argued that museums should consider the ease of use for special groups when using interactive installations. Meanwhile, it is important to keep these interactive devices in good condition for subsequent use.

1. Introduction

In 2007, the 21st ICOM Congress in Vienna, Austria, revised the definition of a museum to include "education" as the primary business of a museum. As museums continue to evolve, contemporary museums are emphasizing the educational concept of "immersion" and "interactivity" in contrast to traditional museums. They are gradually using a series of interactive installations in their exhibits to better meet the needs of visitors.

2. Reasons Why Museums Use a Series of Interactive Installations

2.1 The Characteristics of Museum Education

As a special resource and position for national education, museums have a series of characteristics [1]. One of the important ones is that museum education should be interactive and entertaining.

Compared with the window exhibition in traditional museums, modern museums display and their educational activities are lively and diverse, using a large number of models, audio-visual devices, three-dimensional scenery, computer interactive installations and other kinds of interactive installation models in the exhibition process, thus replacing the previous passive learning mode of only "see". In this way, the audience is gradually guided to active learning, get the pleasure of learning. It makes museum education fun and educational. For example, the Arctic Exploration Museum at the Boston Museum of Science has a touchable ice wall.

2.2 The Benefits of Interactive Installations

The term "interaction" emphasizes the ability to display components that respond to audience stimuli, the ability to interchange [2]. A good interactive installation gives the initiative to the audience, motivates them emotionally and intellectually, and elicits thought-provoking responses. On the other hand, a good interactive installation can not only deepen the audience's knowledge and experience of the exhibition, but also bring different values to the exhibition [1]. These include: providing more layers and richer contents for the exhibition; integrating storytelling and emotion in the exhibition; stimulating multiple senses and giving different experiences to the audience; giving the audience more channels to understand the exhibition theme and exhibition contents.

2.3 Insufficient Museum Exhibits

The reason for the use of interactive installations in museums may also be the lack of exhibits in museums, especially in some local museums and school museums. Therefore, the need to use more interactive installations to solve the problem of insufficient exhibits. For example, the Yibin Museum's exhibition "Four Seasons of Nostalgia - A Special Display of Yibin Folklore" used a large number of models, three-dimensional scenery, scene models and computer interactive

installations that can be touched and interacted with by the audience because of the small number of related exhibits.

3. Current Deficiencies in the Use of Interactive Installations in Museums

3.1 Lack of Consideration of the Needs of Some Groups

3.1.1 The Disabled

The Smithsonian Institute conducted research on "exhibitions and their audiences" to explore the relationship between exhibitions and their actual and potential audiences. The study found that people with disabilities are a demographic segment that has the potential to grow if they want to expand their audience [1]. However, the reality is that while museums have both hardware and software facilities for people with disabilities, most museums lack consideration for people with disabilities in the use of interactive installations. For example, most interactive installations do not provide Braille tours or audio tours for the visually impaired. Most interactive installations do not provide sign language tours for the hearing impaired.

3.1.2 Children

For children, games play an important part in their learning process. These are translatable to the museum environment [3]. Many museums currently include games in their interactive installations to attract the interest of the audience, especially children, so that they can learn happily through interaction. However, some museums do not take into account the cognitive characteristics of children at different ages and the different types of experiences children have. The interactive installations are designed with overly complex content, providing information content that does not match the receptivity of children.

3.1.3 Family Members

Today, many museums are developing innovative educational approaches to expand their audiences. One of them is the implementation of "audience-based" project management [1]. Family members play a very important role in this approach. Museums have introduced a variety of services for their family members. However, some museums do not take into account the needs of this group in the use of interactive installations. Children are curious and confused about interactive installations, but parents do not know about them in advance, and museums do not provide information about them, which makes it less effective for parents to bring their children to experience them.

3.2 Interactive Installation Content Design and Exhibition Splitting

A good interactive installation should enable the audience to learn actively and enjoyably through an interesting and interactive way, and gain the relevant information and knowledge that the exhibition wants to convey. However, it is common for museum exhibitions in China to place one-sided emphasis on the technology and presentation of interactive installations, believing that the more complex and high-tech the interactive installation is, the better. They don't pay attention to the clever planning and interpretation of the content. They split the installations from the exhibition, so that the audience cannot associate with the exhibition through interactive installations. The interactive installations are only located in the exhibition, but not integrated into the exhibition, lacking innovation, storytelling and plot.

3.3 Continued Use is a Problem

Some of the museums' interactive installations are not maintained in a timely manner, making their subsequent use problematic. For example, the interactive installations in the second-floor exhibition hall of the Chengdu Museum's "Shadow Dance: Chinese Shadow Exhibition" are almost unusable; the VR interactive installations in the Chengdu Jinsha Site Museum's Ruins Hall are sometimes open and sometimes closed, and the "telescope" in the Ruins Hall is partially damaged

and has not been repaired and replaced.

4. Ways to Improve Deficiencies

4.1 Interactive Installation Accessibility Design

4.1.1 Visually Impaired

Depending on the specificity of the visually impaired audience, museums should consider using interactive installations with audio guide systems and Braille alongside them, as a way to help visually impaired visitors understand and use the interactive installations. Alternatively, museums may design installations that engage multiple senses, including hearing and touch, to meet the needs of visually impaired visitors. For example, the National Museum of American History's "Polio in All Its Aspects" exhibit [4] featured an iron lung model that allowed visually impaired visitors to feel the shape of the lung with their hands, listen to the sound of the lung with their ears, and even reach into the lung to feel the pressure generated by the lung.

4.1.2 Hearing Impaired

Museums can consider sign language tour systems and augmented reality technologies to remove barriers to hearing-impaired visitors. For example, the Smithsonian National Museum of Natural History has released an augmented reality app called "Skin and Bones" [5] that allows users to access information through a camera and provides visual support for hearing-impaired visitors to overcome auditory barriers to accessing information.

4.2 Consider the Experience Needs of Children

4.2.1 Age Grouping of Children

Children are in the formation stage of worldview and life view, and their ability to accept new things varies at different ages, and their knowledge and understanding of new knowledge are also different. Psychologist Piaget proposed that the development of children's thinking and understanding has the characteristics of continuity and segmentation, and he divided the mental development of children aged 0-15 years into four stages, as shown in Table 1: action perception stage, preoperational stage, concrete operational stage, and formal operational stage [6].

Table 1 Piaget's Cognitive Stages of Child Psychological Development and Their Characteristics

Stages	Ages	Characteristics
action perception stage	0-2	Thinking comes only from perception
preoperational stage	3-6	Mostly rely on appearances for self-understanding
concrete operational stage	7-12	Have some logical reasoning and mental arithmetic ability about specific things, not yet perfect
formal operational stage	13-15	Learn to use hypotheses to analyze and reason about problems, gradually approaching adult thinking patterns

Therefore, when considering the use of interactive installations to attract children, museums should pay attention to the content of the information provided by the interactive installations to match children's ability to receive information and focus on age-specific education. For example, for children before the age of 3 years old audience for object awareness from their own perception, so the museum in the use of interactive devices, especially some large and conspicuous, not necessarily to let children actually use, but can guide children through touch to have a sense of size, height.

4.2.2 Different Types of Experiences

Zhang Yiyi categorized the demand for experience by using "content of experience" and "mode of experience" as two axes [7]. When using interactive installations, museums should focus on stimulating "interest cultivation" and integrating "cultural experience".

(1) Stimulate "interest-building": The "interest-building" experience requires stimulating children's interest in the museum's cultural knowledge, and the museum's design of interactive

installations can be considered by enhancing children's sensory stimulation to make children aware of the museum's interactive installations can be designed to enhance children's sensory stimulation to make them aware of the fun nature of knowledge. For example, in the British Museum's display of the "Gebelein Man" mummy, children can learn more about the mummy's body, bones, and internal organs through interactive touch screens, and can virtually create slices of the mummy's internal organs and brain [8]. Children can directly feel the joy of exploration and discovery, which keeps children in a state of excitement during the learning process.

(2) Integration of "cultural sensory": The demand for "cultural sensory" experiences lies in the identification with the museum and its culture [7]. Therefore, museums can add a variety of interactive forms in the design of interactive installations, so that children can have an immersive experience. For example, the Cleveland Museum of Art's "ARTLENS" gallery is a multifaceted digital gallery with innovative experiences. Its "Gallery One" digital gallery features a "Lens" interactive screen, which uses sensors to detect the similarity between the viewer's movements and the sculptures displayed on the screen, using skeletal data to match the pose of the sculptures in the gallery. The installation uses skeletal data to match the pose of the sculptures in the gallery and allows visitors to download the mimic images to their email [9].

4.3 Services for Family Members

According to George E. Hein, to create an ideal "constructive museum", it is not enough to rely on the exhibition itself, but to allow visitors to communicate socially within the museum using language, and even to deliberately provide a "social space" for visitors [10]. For family members, it is more of an interactive exchange between children and parents, where children get the parts they can understand through the practicality of the interactive installation, and then the parents explain the abstract information. Therefore, museums can consider adding parent-child interaction programs in the design of interactive installations to build effective interaction mechanisms between children and parents. For example, Teamlab, a Japanese new media art group, collaborated with the internationally renowned Pace Gallery, and Teamlab set up a separate exhibition area for family members to participate in the "Future Playground. The "Genius Hopscotch" is one of the highly interactive installations for both parents and children, which combines the real action of the children's game "hopscotch". This interactive device incorporates the real action of the children's game "hopscotch", which promotes the parent-child relationship and allows parents to re-experience their child-like fun time through the act of interacting with the children at the same time [11].

4.4 Interactive Installations Are Simple, Intuitive and Story-Telling

Only when an interactive installation is simple and intuitive, can it get closer to users. Complexity often confuses users and leads them to leave midway or refuse to use it at all. Therefore, the instructions for interactive installations should be simple and clear. Secondly, the design of interactive installations must have innovative thinking and clear goals, which can be intuitively expressed. For example, in the exhibition "Leonardo da Vinci: A Life in Painting" at the National Gallery of the United Kingdom in 2019, an interactive light and shadow area was set up with three embedded wall spaces with built-in plaster models, each with six spotlights at different angles, which were connected to six switches that can be touched by the audience, so that the audience could adjust the lights at any angle through the switches, thus experiencing how the light and shadow effects in da Vinci's works come about.

A storytelling interactive installation is more attractive to the audience and expresses the theme of the exhibition than the completely scientific interactive installation. Through the storytelling narrative design method, the history, culture and philosophy of the nation and region are naturally and subtly integrated into the modern design vocabulary [12], leading the audience to connect with their own knowledge and experience when using the practical interactive installation, and to fully integrate into the exhibition through role-playing. For example, the "Archaeological Paradise" at Guilin Zengpiyan Assemblage Museum allows children to play the role of archaeologists, holding professional archaeological tools such as hand shovels and brushes, and excavating underground

"artifacts" on site.

4.5 Regular Maintenance

In addition to the maintenance of exhibited artifacts, museums should also perform regular maintenance on interactive installations. First, museums should hire people with strong technical skills in electrical and mechanical equipment to maintain the equipment. In addition, the museum can set up a management department, whose responsibility is to daily management and maintenance of the exhibition hall collections and exhibition hall installations, especially for the use of more interactive devices of regular inspection, once the problem is found to deal with. For example, the Museum of Xayi County has set up an exhibition management department to manage and maintain the exhibition and collections in the exhibition hall on a daily basis. In addition, interactive installations may also be subject to emergencies, and museums should develop contingency plans for such emergencies.

5. Conclusion

At present, some museums are more mature in the use of interactive installations. However, most of the museums do not consider the actual needs of the audience for the use of interactive installations, only pursuing the ornamental and high-tech nature of the museum, and overly pursuing the form. They do not consider and design the content of interactive installations, and do not do the follow-up maintenance of interactive installations in a timely manner.

Museums should learn the evolution of the use of interactive installations without going formalistic. In practice, they should optimize their own installation settings to guide visitors to interactive participation. In addition, museums should use interactive installations systematically and purposefully, simplifying them and designing them narratively according to the exhibition, so that different types of visitors can be truly integrated in order to truly understand what the museum is trying to convey and transform what they feel into intrinsic knowledge.

References

[1] Yi Zheng. Research on museum educational activities [M]. Shanghai: Fudan University Press, 2019, pp.27, 213, 270 & 94.

[2] Anna Johnson. The museum educator's manual [M]. California: Altamira Press, 2019, pp.144.

[3] Edited by Patrick Boylan. Running a museum [M]. Yilin Press, 2010, pp.85.

[4] compiled by Huijun Li. U.S. experts focus on "museums and universal design" [DB/OL]. [[online] Available:] http://www.gxmuseum.cn/a/science/31/2013/2854.html

[5] Rong Chen, Meirong Liang, Xudong Zheng, et.al. Trends in the innovative application of emerging information technologies to optimize the museum-going experience for people with disabilities [J]. Modern Distance Education Research, 06, pp.60-62, 2016.

[6] Shidong Pei, Tong Zhang. Study on educating children according to age groups in museum [J]. Journal of Linyi University, 39 (04), pp.127-128, 2017.

[7] Yuxin Deng, Xiang Chen. Research on children's situational interactive experience design in museum [J]. Design, 34 (11), pp.96, 2013.

[8] Huanqiu.com. British Museum introduces interactive visual technology that allows visitors to dissect ancient mummies [EB/OL]. [[online] Available:] https://go.huanqiu.com/article/9CaKrnJxQJo

[9] Cleveland Museum of Art. ARTLENS Gallery. [[online] Available:] https://www.clevelandart.org/artlens-gallery

[10] George E. Hein. Learning in the Museum [M]. London: Routledge, 1998, pp.160-179.

[11] Art and Design. Teamlab's new media installation art profit model [DB/OL]. (2018-11-08) [2021-11-24] http://www.artdesign.org.cn/article/view/id/676

[12] Qi Wang. The use of narrative thinking in the design of digital museums [J]. Design, 32 (19), pp.159, 2019.