

*Jingjie Zhao^{1,2}**Olga Yezhova², Doctor of pedagogical sciences, Professor**¹School of Media, Xijing University, Xian, China**²Kyiv National University of Technologies and Design, Kyiv, Ukraine*

RESEARCH ON THE DEVELOPMENT OF MUSEUM LEARNING IN THE DIGITAL AGE

Today, we have entered an era that is entirely digitally wrapped. The wide spread of the Internet and the advent of digital technologies extend the learning space and learning time of the public, providing opportunities to reinvent education. Of course, this also innovates how to obtain information, interpersonal communication, and the new way of presenting learning. In the past, museum learning based on on-site visits has changed to a new form of combining on-site visits and online visits (Hooper-Greenhill, 1999). In the digital era, digital technology has expanded the traditional physical learning space to the digital one that integrates virtual and actual reality.

Since the 60s of the 20th century, the model of shifting from museum education to museum learning has been realized, such as the attention to the scientific and technological quality of primary and secondary school students in the United States, making museum learning more focused on science and technology (Donald, 1991). In addition, curriculum and teaching reform have produced more new learning theories, bringing more references to museum learning, such as behaviorist learning theory, situational learning theory, inquiry learning and cooperative learning theory, and social learning theory (Hadwin & Oshige, 2011). However, the current attention of education researchers to learning is still mainly based on the basic theoretical framework of traditional school education. It is easy to neglect the attention to the characteristics of museum learning itself. Digital technology has influenced the learning of venues that used to be based on on-site visits, and has changed to a new form of combining on-site visits and online visits. It is necessary to accelerate the construction of digital museums, carry out online services, and improve the informatization and networking of public cultural services (Tang et al., 2018). In this new landscape, a crucial question emerges - What are the new characteristics of museum learning? What does this Digital technology change mean for museum visitors?

This paper conducts in-depth research and analysis of museum learning in the digital age. It puts forward some reasonable suggestions and measures to further promote the development of museum learning and research.

Characteristics of museum learning. The characteristics of museum learning in the digital age are different from the traditional museum, and the characteristics of museum learning in the digital age are mainly reflected in the following aspects:

Museum learning resources. With the advent of the digital age, the extensive use of digital technology in museum learning and the collection of cultural relics and information resources have been opened and shared by the whole people. The museum has gradually transitioned from a public learning space to the media scene that Groups of any age, occupation, and social background can visit and learn from the venue online or offline (Brown & Duguid, 1996). In traditional museums, museum learning content is limited by physical conditions and collection preservation requirements. Many precious collections can only be displayed to the public sometimes, anywhere, which makes the collection that can be displayed in the venue restrictive. In addition, venue resources often need help to achieve cross-time and spatial communication and sharing due to the limitations of each venue's financial, material, and physical conditions. As institutions for the collection, research, and protection of the cultural heritage of all humanity, museums should open their rich cultural and learning resources to the world and share them with all humanity (Nogare & Murzyn-Kupisz, 2022). The use of digital technology in museums makes it possible to open and share the resources of venues with the world and all humanity.

At present, digital technology is applied in museums, effectively expanding and enriching the learning content of venues, showing the characteristics of sharing and openness. For example, Google Arts & Culture, a sub-site of Google, launched the world's first virtual museum. This pocket gallery consists of 7 exhibition halls and exhibits all 36 original works of Vermeer, which truly restores the scene of people visiting the museum and can experience digital collections on the official website and mobile app (Lussier-Craig, 2015). Google uses AR technology to allow the audience to fully construct a cognitive map, which perfectly simulates the process of visiting the museum, and the exhibits are hung on the walls of each exhibition hall, making people feel immersed as they view moves. These digital collections are not limited to physical collection information but also include digital content of educational, research, and appreciation value related to the collection, which provides as much information as possible about the exhibits and strives to accommodate the diverse needs of visitors. Digital technologies remove traditional barriers between institutions and are freely accessible to the public for mass dissemination, utilization, and restructuring.

Museum learning environment. The learning environment refers to the space or situation where one can come to learn. The museum learning environment can be divided into an offline physical environment and an online virtual environment. The physical museum learning environment mainly refers to the exhibits that learners visit in the physical environment and directly touch the real ones. Virtual learning environment refers to learners accessing digital museums, websites, apps, official museum accounts, etc. (Lee et al., 2021). With the application of digital technology in museum learning, the boundaries between authenticity and virtuality, public and private space, have

also begun to blur. Museum learners can obtain knowledge and information in public spaces and complete their purpose of visiting museums through virtual museums. The convergence of the virtual and the real has become the main feature of the museum learning environment in the digital age.

In order to enhance the learner's experience and restore the situation of making red envelopes, the game initially asked the following question: How do the Chinese celebrate their New Year? In the traditional Chinese concept, what can bring good luck and happiness? Then, the website gives many examples, and based on these introductions, gives learners interesting tasks to design and give red envelopes for tourists. This virtual and natural learning environment created with the help of digital technology reproduces things and environments that cannot be realized in physical exhibitions or reproduced, creating vivid and intuitive situations that maximize the audience's attention and enhance the audience's learning experience.

Museum learning mode. Museum learning is different from school education off-campus learning, mainly manifested in three aspects: the active construction of knowledge, students' social interaction, and the actual situation of teaching (Ramey-Gassert, Walberg III, & Walberg, 1994). From the perspective of informal learning, museum learning is an essential part of informal learning. The difference from other informal learning is that museum learning is an intuitive and open learning method, which takes place in real physical situations and produces a series of learning interactions, which can effectively promote the improvement of learners' knowledge and practical ability. The above two perspectives generally reveal that museum learning is an essential informal learning method. Its situational, interactive, participatory, accessible, and open characteristics differ from other learning methods. Museum learning is by no means a simple visit; it also requires the participation and integration of context, experience, interaction, and other factors.

The model of museum learning and school learning is as follows school education includes traditional classroom learning, extracurricular learning, online learning, online games, and other typical learning forms. Museum learning activities include traditional extracurricular learning methods, such as visiting experiences and hands-on DIY, and new learning methods in the network multimedia environment, such as gamified learning and fragmented reading (Daniela, 2020). It is an inevitable trend in the development of the learning environment of the information society. To organically combine the advantages of physical museums to promote on-site experience, develop operational capabilities with the advantages of remote online collaboration of online digital museum resource learners, and build a museum that promotes virtual and authentic learning integration for informal learning.

Application of digital technology in museum learning. The intervention of computer networks and multimedia technology has dramatically expanded the traditional physical museum in

time and space, with the in-depth application of new technologies such as mobile Internet technology, virtual reality, and augmented reality (Wang, 2021). The audience can easily visit, experience, and learn in a highly realistic network virtual museum without leaving home. When visiting physical museums, the intervention of new technologies such as indoor positioning, natural human-computer interaction, and immersive experience also enhances the initiative of the audience when visiting and learning in the museum. In addition, digital technology has become a new content for museum learning. Digital technology is not only a tool for disseminating learning content, but it is also constantly generating important information that affects communicators and the public. In 2022, "The Power of Museums" became the theme of International Museum Day, which was elaborated by the International Council of Museums, which mentioned the power of innovation in the digitalization and accessibility of museums (Ajana, 2015). Technology integration and museum learning have become the general trend of venue development. At the same time, the application of digital technology in museum learning is also constantly promoting corresponding theoretical research.

Conclusions and prospects for further scientific research. In conclusion, museum learning has a vital force in promoting the reform of public education. Secondly, the in-depth study of museum learning can promote the development of learning resources, strengthen cultural dissemination, optimize learning context, and promote educational equity. The integration of museum learning and digital technology has become an inevitable trend in the future development of museums, and museums must recognize such development opportunities and challenges. We must also be soberly aware of digital technology's drawbacks, such as technological supremacy and instrumental rationality, which will also involve issues such as information security, digital literacy, and the digital divide.

R

e

f 1. Ajana, B. (2015). Branding, legitimation and the power of museums: The case of the Louvre Abu Dhabi. *Museum and Society*, 13(3), 322-341.

r 2. Brown, J. S., & Duguid, P. (1996). Universities in the digital age. *Change: The Magazine of Higher Learning*, 28(4), 11-19.

n 3. Daniela, L. (2020). Virtual museums as learning agents. *Sustainability*, 12(7), 2698.

c 4. Donald, J. G. (1991). The measurement of learning in the museum. *Canadian Journal of Education/Revue canadienne de l'éducation*, 371-382.

e 5. Hadwin, A., & Oshige, M. (2011). Self-regulation, coregulation, and socially shared regulation: Exploring perspectives of social in self-regulated learning theory. *Teachers College Record*, 113(2), 240-264.

6. Hooper-Greenhill, E. (1999). Learning in art museums: Strategies of interpretation. *The educational role of the museum*, 2, 44-52.
7. Lee, J., Lee, H. K., Jeong, D., Lee, J., Kim, T., & Lee, J. (2021). Developing museum education content: AR blended learning. *International Journal of Art & Design Education*, 40(3), 473-491.
8. Lussier-Craig, A. (2015). *Googling Art: museum collections in the Google Art Project*. Concordia University.
9. Nogare, C. D., & Murzyn-Kupisz, M. (2022). Do museums foster innovation through engagement with the cultural and creative industries? *Arts, Entrepreneurship, and Innovation* (pp. 153-186): Springer.
10. Ramey-Gassert, L., Walberg III, H. J., & Walberg, H. J. (1994). Reexamining connections: Museums as science learning environments. *Science education*, 78(4), 345-363.
11. Tang, Y., Zhou, L., Cao, J., Li, J., & Nie, X. (2018). Integration of digital cultural heritage resources in China: understanding public expectations. *Libri*, 68(1), 59-70.
12. Wang, B. (2021). *Digital Design of Smart Museum Based on Artificial Intelligence*. *Mobile Information Systems*, 2021.