Research on the Application of Digital Technology in the Design of Intangible Cultural Heritage Exhibition

Xiqi Gou *, Jingjing Guan

College of Liaoning Communication University, Shenyang, Liaoning 110136, China

* Corresponding Author: Xiqi Gou

Abstract. This article aims to explore in depth the application of digital technology in the design of intangible cultural heritage exhibitions. By analyzing the innovative changes brought by digital technology to the display of intangible cultural heritage, this paper elaborates on the theoretical basis, technical applications, and practical cases of digital display design for intangible cultural heritage. Digital technology not only effectively protects and inherits intangible cultural heritage, but also plays an important role in enhancing display effectiveness, improving audience experience, and promoting cultural inheritance; Propose corresponding response strategies for the challenges faced in the application of digital technology, providing theoretical support and practical reference for the effective display and inheritance of intangible cultural heritage.

Keywords: Intangible Cultural Heritage; Digital Technology; Display Design.

1. Introduction

As an important component of human cultural diversity, intangible cultural heritage not only carries rich historical memories, but also embodies the unique wisdom and creativity of various ethnic groups. With the acceleration of modernization, intangible cultural heritage is facing severe challenges. Traditional ways of displaying intangible cultural heritage are often limited by time, space, and display methods, making it difficult to fully showcase its rich charm and attract the attention of modern audiences, especially young people. Especially with the reduction of inheritors and the aging of the audience, the use of digital technology to protect and inherit intangible cultural heritage has become a hot research topic.

2. The Current Application Status of Digital Technology in the Display of Intangible Cultural Heritage

The vigorous development of digital technology has brought new opportunities for the display and inheritance of intangible cultural heritage. Digital technology covers multiple fields such as multimedia technology, virtual reality (VR), augmented reality (AR), artificial intelligence (AI), etc. Its powerful information processing, storage, and presentation capabilities can provide new ideas and methods for the display design of intangible cultural heritage, break the limitations of traditional display, and achieve vivid, three-dimensional, and interactive display of intangible cultural heritage.

2.1 Multimedia Display Technology

Multimedia technology is one of the widely used digital means in the display of intangible cultural heritage. The use of technology has become very mature, and through the combination of various forms such as images, text, audio, and video, it can comprehensively and vividly present the relevant information of intangible cultural heritage projects. By using multimedia display devices to play videos of the production process of intangible cultural heritage techniques, the audience can intuitively understand the complex production processes; Cooperate with textual introductions and image displays to deepen the audience's understanding of the historical background and cultural connotations of intangible cultural heritage projects; The touch screen interactive display system can also be used to allow viewers to independently choose the intangible cultural heritage content they are interested in for in-depth understanding, enhancing their sense of participation.

2.2 Virtual Reality (VR), Augmented Reality (AR)

Virtual reality technology can simulate the historical scenes and performance processes of intangible cultural heritage, allowing the audience to experience the charm of intangible cultural heritage in person; Augmented reality technology overlays virtual information of intangible cultural heritage onto the real world through mobile devices and sensors, increasing the interactive experience for viewers. For example, for traditional ancient building construction techniques, virtual ancient building communities can be constructed through VR technology, allowing viewers to travel through time and space, personally participate in the construction process of ancient buildings, and observe the production and installation of each building component up close. AR technology combines virtual information with real scenes to provide viewers with novel interactive experiences. When displaying traditional costumes of intangible cultural heritage, viewers can scan the clothing patterns through mobile devices such as smartphones, and use AR technology to present the dynamic effect of the costumes worn on virtual models. At the same time, they can also obtain detailed information about clothing styles, materials, cultural meanings, and so on.

2.3 Digital Museums and Online Display Platforms

3D modeling technology can realistically reproduce the three-dimensional form of intangible cultural heritage and improve the display effect; Digital museums and online display platforms have become important ways to showcase intangible cultural heritage. They digitize and archive a large amount of intangible cultural heritage resources, and showcase them to global audiences through the internet. Not only can they provide rich graphic and multimedia display content, but they also have interactive communication functions. Viewers can leave messages, ask questions, and share their insights with other enthusiasts on the platform. Some digital museums also use 3D modeling technology to digitally display intangible cultural heritage in all aspects, allowing viewers to appreciate precious intangible cultural heritage without leaving their homes.

3. The Advantages of Digital Technology in the Design of Intangible Cultural Heritage Exhibitions

Compared with traditional display methods, digital technology has great advantages. These advantages not only make the display of intangible cultural heritage more fascinating and attract a large number of viewers' attention, but also stimulate the public's interest and love for intangible cultural heritage by enhancing their sense of participation and interaction, injecting a continuous stream of vitality into the inheritance and development of intangible cultural heritage.

3.1 Enhance the Effectiveness of Intangible Cultural Heritage Display

Digital technology can break through the limitations of traditional display methods and present intangible cultural heritage in a more diverse, vivid, and three-dimensional form. The application of multimedia technology makes the display content more diversified and attracts the audience's attention; The immersive experience created by VR and AR technology makes the audience feel as if they are in a real scene of intangible cultural heritage, and can deeply experience the charm of intangible cultural heritage. Through digital technology, comprehensive digital modeling and display of intangible cultural heritage projects can showcase details that are difficult to present in traditional display methods, such as the micro production process of intangible cultural heritage techniques and the internal structure of traditional buildings, greatly enhancing the display effect.

3.2 Enhance the Audience's Experience

Digital technology provides audiences with a more personalized and interactive experience. In the digital display environment, audiences can freely choose the display content and control the display rhythm according to their interests and needs. Through touch screen interactive devices, viewers can gain a deeper understanding of the detailed information of intangible cultural heritage projects that

they are interested in; By utilizing VR and AR technology, audiences can personally participate in the experience of intangible cultural heritage and interact with virtual scenes. This interactive experience can greatly stimulate the audience's interest and enthusiasm for participation, leaving a deeper impression on the intangible cultural heritage.

3.3 Promote the Inheritance and Dissemination of Intangible Cultural Heritage

Digital technology provides a broader space and more efficient means for the inheritance and dissemination of intangible cultural heritage. Through digital museums and online display platforms, intangible cultural heritage can break through geographical and temporal limitations, be displayed and disseminated to audiences worldwide, and enable more people to understand and recognize intangible cultural heritage. Digitized intangible cultural heritage resources facilitate preservation and replication, reducing the risk of damage and loss of intangible cultural heritage materials caused by natural and human factors. At the same time, the application of digital technology can attract more young people to pay attention to intangible cultural heritage, stimulate their interest in intangible cultural heritage inheritance, and inject new vitality into the inheritance of intangible cultural heritage.

4. The Application Strategy of Digital Technology in the Design of Intangible Cultural Heritage Display

Digital technology has been integrated into the field of intangible cultural heritage display in an unprecedented manner, breaking the constraints of traditional display in the spatial and temporal dimensions, greatly improving the display effect and audience experience, and opening up broad prospects for the inheritance and dissemination of intangible cultural heritage. In this process, some issues need to be noted:

4.1 Reasonable Planning and Cost Reduction

Reasonable digital technology application plans should be developed based on one's own actual situation. In terms of technology selection and equipment procurement, it is necessary to fully consider cost-effectiveness and choose technology solutions and equipment that are suitable for one's own needs and budget. We can collaborate with universities, research institutions, enterprises, etc. to share technological resources and research and development achievements, reduce technology research and development costs, actively seek government financial support and social capital investment, broaden funding sources, and provide strong financial support for the application of digital technology in intangible cultural heritage exhibitions.

4.2 Strengthen Talent Cultivation and Introduction

Strengthening the cultivation of versatile talents is the key to promoting the application of digital technology in the display of intangible cultural heritage. Universities should strengthen the construction of relevant professional disciplines, establish interdisciplinary curriculum systems, and cultivate professional talents who understand both intangible cultural heritage and digital technology. Intangible cultural heritage protection institutions and museums should regularly organize internal personnel to participate in digital technology training to improve their technical application abilities; By introducing external professional talents, enriching the digital display team of intangible cultural heritage, optimizing the talent structure, and enhancing the overall technical level.

4.3 Deeply Explore Cultural Connotations

In the process of digital display design, it is important to pay attention to the in-depth exploration and accurate expression of the cultural connotations of intangible cultural heritage. Strengthen communication and cooperation with inheritors, experts, and scholars of intangible cultural heritage, gain a deep understanding of the historical origins, cultural backgrounds, production processes, spiritual connotations, and other aspects of intangible cultural heritage projects, integrate these rich

cultural elements into digital display content, and use storytelling and situational display methods to enable audiences to appreciate intangible cultural heritage while deeply understanding its cultural values and significance, achieving the deep inheritance and dissemination of intangible cultural heritage.

4.4 Strengthen Data Security and Privacy Protection

Establish a sound data security management system and strengthen the security management of the collection, storage, transmission, and use of intangible cultural heritage data. Adopting advanced data encryption technology, access control technology, firewall technology, etc. to ensure the security of intangible cultural heritage data; Strengthen data security training for staff, enhance their awareness of data security and emergency response capabilities. In terms of protecting personal information and sensitive information related to intangible cultural heritage inheritors, relevant laws and regulations must be strictly followed, necessary privacy protection measures must be taken, and data security and privacy must be ensured.

5. The Challenges Faced by Digital Technology in the Design of Intangible Cultural Heritage Exhibitions

The application of digital technology in the design of intangible cultural heritage exhibitions has not been smooth sailing. Under its vigorous development, many challenges have emerged, which restrict the full potential of digital technology in the field of intangible cultural heritage. The following are some challenges that digital technology faces in the design of intangible cultural heritage exhibitions.

5.1 High Technical Costs

The application of digital technology requires a significant investment in technology research and development, equipment procurement, content production, and other aspects. If a high-quality VR display system is developed or a fully functional digital museum is built, professional hardware equipment and software tools need to be purchased, and professional technical personnel need to be hired for development and maintenance. This is a considerable burden for some intangible cultural heritage protection institutions and museums with limited funds; The updating and upgrading of digital content also require continuous financial investment to ensure the timeliness and attractiveness of the displayed content.

5.2 Shortage of Technical Talents

The application of digital technology in the display of intangible cultural heritage requires versatile talents who understand both intangible cultural heritage and possess digital technology capabilities. At present, there is a relative shortage of such versatile talents. On the one hand, most professionals in the field of intangible cultural heritage possess profound cultural heritage and traditional technical knowledge, but their understanding and mastery of digital technology are limited; On the other hand, personnel engaged in digital technology development have relatively insufficient understanding and cognition of intangible cultural heritage, making it difficult to organically integrate digital technology with intangible cultural heritage. The imbalance of this talent structure to some extent restricts the application and development of digital technology in the display of intangible cultural heritage.

5.3 Insufficient Exploration of Cultural Connotations

In the process of applying digital technology, some display designs focus too much on the cool effect of technology, while neglecting the in-depth exploration and accurate expression of the cultural connotations of intangible cultural heritage. Some digital displays only present intangible cultural heritage projects in a simple digital way, lacking in-depth interpretation and explanation of the historical culture, spiritual values, social significance, and other aspects behind intangible cultural

heritage. This leads to the audience being attracted by technological means during the experience process, but their understanding and perception of intangible cultural heritage are not profound enough, and they cannot truly achieve the goal of inheriting and disseminating intangible cultural heritage.

5.4 Data Security and Privacy Protection Issues

The application of digital technology involves the collection, storage, and transmission of a large amount of intangible cultural heritage data, and the issues of data security and privacy protection cannot be ignored. Intangible cultural heritage data may contain sensitive information, such as personal information of non-genetic inheritors, core formulas of traditional skills, etc. If these data are leaked, tampered with, or destroyed, it will have a serious impact on the inheritance and protection of intangible cultural heritage. With the increasing threat of network security, how to ensure the safe and stable operation of digital display platforms, prevent security incidents such as hacker attacks and data leaks, is also an important challenge faced in the application of digital technology.

6. Conclusion

Through advanced technologies such as virtual reality and augmented reality, it is possible to simulate the historical scenes and performance processes of intangible cultural heritage, allowing the audience to experience the charm of intangible cultural heritage firsthand. This can enhance public awareness and participation in intangible cultural heritage, providing new ways and means for its inheritance and development. However, there are still some challenges in the design of intangible cultural heritage exhibitions using digital technology, such as high technical costs and a shortage of professional talents. In the future, it is necessary to continue to strengthen the research and application of digital technology, and promote the continuous development of the protection and inheritance of intangible cultural heritage.

References

[1] Feng Jie, Li Xinhua Research on Traditional Bamboo Weaving Craft Display Design Based on Digital Virtual Display Technology - Taking Shengzhou Bamboo Weaving as an Example [J]. Industrial Design, 2024, (09): 135-138.

[2] Yang Simiao Research on the Design of Digital Exhibition Space in Museums [D]. Anhui Jianzhu University, 2024. DOI: 10.27784/d.cnki.gahjz.000239.

[3] Wang Yun Analysis of Digital Display Design of Traditional Cultural Relics in Museums under Immersive Experience [J]. China Ethnic Expo, 2023, (15): 244-246.