

Innovative Applications of Digital Technology in the Protection of Intangible Cultural Heritage Sand-gold Dai Pottery

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ABSTRACT

In the information age, traditional intangible cultural heritage is facing the crisis of gradual disappearance, especially those cultural forms that rely on oral transmission and manual skills. With the rapid development of digital technology, new space and possibilities have been opened up for the protection and dissemination of intangible cultural heritage. Taking Sand-gold Dai pottery, a traditional Chinese intangible cultural heritage craft, as an example, this paper explores the innovative applications of digital technology in its protection. Through theoretical analysis, this paper summarizes the potential of digital technology in the protection of Sand-gold Dai pottery and discusses how digital means can provide innovative support for its historical inheritance and cultural continuation. It focuses on analyzing how digital media, virtual display, and digital education platforms can enhance the public's understanding and attention to Sand-gold Dai pottery, thereby promoting the continuous dissemination and protection of intangible cultural heritage. This study provides new ideas and practical directions for the digital protection and dissemination of intangible cultural heritage.

Keywords: Sand-gold Dai pottery, Digital technology, Innovative applications.

1. INTRODUCTION

With the advent of the information age and the acceleration of globalization and modernization, the survival space of traditional Chinese intangible cultural heritage is facing severe challenges. Intangible cultural heritages such as oral transmission, traditional handicrafts, and folk rituals are gradually losing their soil for inheritance and space for existence. At the same time, the rapid changes in the cultural ecosystem have brought unprecedented shocks to intangible cultural heritage. Many traditional skills and cultural forms passed down through generations are gradually disappearing, and many precious cultural assets and historical heritages are being abandoned or lost. Especially in the context of globalization, some cultural heritages are even overdeveloped or misused. Therefore, protecting China's intangible cultural heritage, especially endangered traditional skills, has become an urgent task. With the continuous progress of digital technology, the

application of information technology in the protection and dissemination of intangible cultural heritage has become more and more important. Digital means provide new opportunities for the protection of intangible cultural heritage, especially in the process of inheriting traditional skills such as Sand Gold Dai Pottery. The innovative application of digital technology provides a new perspective and path for its protection and dissemination.

2. CULTURAL VALUE AND CONSERVATION STATUS OF SAND-GOLD DAI POTTERY

Sand-gold Dai pottery, as a traditional pottery-making craft of the Dai people in the Red River Basin, carries rich historical and cultural values as well as unique artistic characteristics. However, with the progress of social transformation and modernization, the inheritance of traditional crafts is facing more and more challenges. Next, we will elaborate on the protection dilemmas that Sand-

gold Dai pottery faces in contemporary times and how to respond to these challenges to ensure the continuous inheritance of its cultural heritage.

2.1 *Historical Background and Artistic Characteristics of Sand-gold Dai Pottery*

Red River Sand-gold Dai pottery, as a traditional pottery-making craft of the Dai people in the Red River Basin, has distinct craft features, with traditional techniques such as "coil-building without a wheel" and "open-fire firing without a kiln." This craft can be traced back to the late Neolithic period over 4,300 years ago, originating in the Central Plains and later spreading to the Dawenkou and Longshan cultural areas. Since the Tang Dynasty, the Dai people's pottery-making skills began to gradually form and spread in the Red River Basin, and until the Song, Yuan, Ming, and Qing dynasties, the traditional pottery-making techniques still maintained their primitive and simple methods of production.

Due to the relatively isolated geographical conditions of the Red River area, the culture here has been able to develop and inherit independently. The clay used for Sand-gold Dai pottery is natural and has a fine texture. The pottery is characterized by its simple and sturdy shapes and a unique "self-cooling" function when holding water, which is highly appreciated by the Dai people. The pottery-making process strictly follows the traditional inheritance method of "mother to daughter, mother-in-law to daughter-in-law," which reflects the cultural wisdom and family culture of the Dai people. Sand-gold Dai pottery is mainly used to make daily necessities such as earthen pots, water jugs, bowls, and cups, with more than twenty traditional types of utensils.

2.2 *Main Issues in the Protection of Sand-gold Dai Pottery*

Chinese culture is gradually gaining recognition and affirmation on a global scale. With the advancement of technology, the technological wave has brought profound changes in society, politics, economy, and culture [1]. In this wave, many traditional handicrafts are gradually disappearing, and their production techniques are being replaced by modern production methods. Since the Industrial Revolution, with the loss of skilled craftsmen, many handicraft techniques have been replaced by industrial production. Because the inheritance of

handicrafts requires teachers and students to invest a lot of time in learning and practice, the products and production processes of these skills are often ignored or abandoned [2], which is undoubtedly a great loss to cultural heritage.

Although Red River Sand-gold Dai pottery has been inherited in an orderly manner in the past few decades, with the passage of time, this traditional craft is facing multiple challenges. Since the 1980s, with the modernization of society, Dai pottery products have gradually been replaced by modern materials and techniques. The traditional manual pottery-making skills have not been inherited by the younger generation, leading to the gradual decline of many traditional skills. In particular, with the popularity of modern materials such as aluminum products, the once popular earthenware products have gradually disappeared, and the number of potters has also decreased, leading to the precious skills facing the crisis of being lost.

And the Dai pottery in the Red River Basin has been listed as a provincial-level intangible cultural heritage protection project, its inheritance still faces severe challenges. In particular, the traditional "open-fire firing without a kiln" technique, due to the lack of modern technological support and market demand, has led to a gradual decrease in the participation of young craftsmen, making it difficult for these skills to be effectively passed down. At the same time, with the continuous progress of modern technology, how to innovate on the basis of retaining traditional culture and integrate into modern society has become another major challenge for Sand-gold Dai pottery. Although local governments and educational institutions have established research centers and ceramic innovation platforms to promote the inheritance and development of the craft, how to effectively combine modern technology with traditional craftsmanship while maintaining its unique cultural value remains an urgent problem to be solved. Even though the government actively takes cultural heritage protection measures, due to limitations in funding and resources, most of the protection work is still at the framework stage, and the restoration work has not yet been realized [3].

Therefore, Honghe County and relevant departments have begun to pay more attention to the protection and innovation of traditional pottery, and have included the Dai pottery craft in the rural revitalization strategy. By combining modern design concepts and developing ceramic products with local characteristics, new opportunities have

been created for the revival and sustainable development of Dai pottery. However, how to achieve innovation while maintaining tradition and ensuring that the cultural value of Sand-gold Dai pottery is effectively preserved remains an important issue that needs to be addressed urgently.

3. APPLICATION OF DIGITAL TECHNOLOGY IN THE PROTECTION OF INTANGIBLE CULTURAL HERITAGE

The application of digital technology in the protection of intangible cultural heritage (ICH) is becoming increasingly widespread, emerging as a crucial means of promoting the protection and transmission of ICH globally. Digital technology not only makes the preservation and documentation of ICH more convenient and efficient but also breaks through the temporal and spatial limitations of traditional protection methods, facilitating the dissemination and promotion of ICH. Globally, digital means have provided strong support for the collection, organization, and presentation of ICH resources. Meanwhile, digital technology empowers the transmission of ICH, especially through digital storytelling and interactive platforms, enabling ICH resources to be conveyed to the public in a more vivid and attractive manner, thereby enhancing the influence and sustainability of ICH. The application of digital technology has brought new opportunities for the protection and transmission of ICH, while also posing new challenges.

3.1 Overview of the Global Application of Digital Technology

With the rapid development of digital technology and the widespread adoption of the Internet, new opportunities and challenges have emerged for the protection and transmission of intangible cultural heritage (ICH). Digital technology has not only improved the efficiency of preserving and disseminating ICH but also brought unprecedented breadth and feasibility to it. Through digital means, various forms, skills, and historical contexts of ICH can be comprehensively recorded and transcended by temporal and spatial constraints, thus achieving more flexible and diverse modes of transmission. Moreover, the widespread use of the Internet has provided a broader platform for the promotion of ICH. Social media, video platforms, and other online tools enable ICH works and performances to be rapidly disseminated worldwide,

attracting more attention and participation, and significantly enhancing the influence of ICH.

However, the digital age also brings new challenges. The application of digital technology not only requires specialized equipment but also personnel with relevant technical skills, which not all ICH practitioners can master. Therefore, it is crucial to enhance the digital skills of ICH practitioners and conduct targeted training. Meanwhile, during the digital recording and dissemination of ICH, copyright issues have become particularly prominent. To safeguard the legitimate rights and interests of creators and inheritors, it is essential to ensure that the copyright of digital content is protected and to prevent infringement.

Therefore, the digital work in the protection and transmission of ICH should maximize the advantages of technology. Governments should further increase their support for the digital protection of ICH and promote the development of relevant institutions and talent. ICH inheritors should actively utilize digital tools to convey the essence of traditional culture to a broader audience and promote the integration of ICH with modern society. At the same time, establishing a comprehensive legal and regulatory system to ensure the effective protection of the copyright of digital ICH works is key to achieving sustainable transmission.

3.2 Empowering the Protection and Transmission of Intangible Cultural Heritage with Digital Technology

The application of digital technology is not only an innovation in the traditional methods of ICH protection but also a powerful force in promoting the in-depth exploration and widespread dissemination of ICH culture. Intangible Cultural Heritage (ICH) encompasses a variety of social practices, knowledge skills, expressions of ideas, and related tools and objects, carrying rich local cultural connotations. In short, digital technology refers to the means of processing, storing, transmitting, and applying information using computers, software, and communication technologies. When digital technology is combined with ICH, it forms an innovative method of protecting and transmitting ICH in a digital format.

Digital technology empowers the protection and transmission of ICH by collecting, organizing, and visually presenting ICH resources, combined with

narrative expressions, to convey the unique charm and value of ICH to a broader audience. In this process, digital technology not only provides strong technical support for ICH protection but also injects new vitality into ICH transmission. On the one hand, digital technology can help establish databases based on ICH projects to effectively protect and store valuable ICH resources. On the other hand, through digital storytelling, ICH resources can be transformed into engaging and emotionally resonant stories, allowing audiences to more intuitively experience the unique charm of ICH and enhance their understanding and respect for it.

Moreover, digital technology makes the protection and transmission of ICH more efficient and convenient. Through digital means, ICH resources can be quickly organized and classified, and information can be rapidly disseminated and shared. Digital technology also provides platforms for online and offline interaction in ICH transmission, further encouraging more people to participate and jointly promote the prosperity and sustainable development of ICH culture.

4. SPECIFIC APPLICATIONS OF DIGITAL TECHNOLOGY IN THE PROTECTION OF SAND GOLD DAI POTTERY

4.1 Application of Interaction Design in the Protection of Sand-gold Dai pottery Using Digital Technology

From a psychological perspective, the process by which humans receive external stimuli and respond can be interpreted through various perceptual channels. These channels include vision, hearing, touch, and motor responses, among others. When combined with interactive channels in animations or virtual environments, they form an interactive experience. Interaction methods mainly include responses and feedback through hand, foot, body movements, speech, and facial expressions, which are commonly referred to as "natural interaction" [4]. In the application of digital technology for Sand-gold Dai pottery, the design of the virtual production platform integrates multiple interaction methods, such as data interaction, image interaction, voice interaction, and behavioral interaction. The design of these interaction methods is crucial for user experience.

From an ergonomics standpoint, interaction design directly affects the user's experience. Taking gamification design as an example, interaction design follows the principles of ease of use and adaptability, simplifying the operation process as much as possible to avoid too many complex steps and leaving cumbersome operations to the backend. In each operational scenario, video prompts are provided to help users better understand the game functions and interaction methods, thereby achieving two-way interaction of information input and output, ensuring that users can fully experience the functions of the digital platform.

4.2 Specific Applications of Digital Art in the Production and Transmission of Sand-gold Dai pottery

Digital art shows great potential in the production and transmission of Sand-gold Dai pottery, especially in revitalizing traditional crafts through digital technology. With the help of 3D modeling and digital design, the production process and artistic characteristics of Sand-gold Dai pottery can be presented and innovated in a virtual environment. The application of this technology is not limited to aesthetics but also includes the physical properties of pottery, such as the texture, luster, and firing effects of the materials, thereby enhancing the realism and immersion of the works.

More importantly, digital art provides personalized and customized display methods for the traditional transmission of Sand-gold Dai pottery. Through digital platforms, craftsmen and audiences can customize the appearance and details of pottery according to their individual needs and interests. This digital design not only enhances the audience's participation but also offers new possibilities for the innovation and development of Sand-gold Dai pottery. Audiences can understand the history and production techniques of pottery through virtual display and interaction, allowing everyone to experience and express their identification with this traditional culture in virtual space.

Digital art also provides powerful tools for the global dissemination of Sand-gold Dai pottery. By integrating the elements, cultural symbols, and historical background of traditional pottery into digital displays, Sand-gold Dai pottery can attract the attention of a broader global audience. The interactivity and accessibility of digital platforms allow audiences from diverse cultural backgrounds to gain a deeper understanding of this traditional art

and provide a shared space for pottery enthusiasts and creators worldwide [5]. Moreover, by combining augmented reality (AR) and virtual reality (VR) technologies, digital art offers new display and interactive methods for the cultural transmission of Sand-gold Dai pottery, sparking the interest of younger generations in this traditional craft. The application of these technologies not only promotes the protection and transmission of intangible cultural heritage but also provides local potters with a global showcase. Through the establishment of digital archives and cultural databases, key information about Sand-gold Dai pottery can be documented and preserved, ensuring that this cultural heritage continues to be passed down and revitalized in modern society.

5. INNOVATION OF DIGITAL TECHNOLOGY IN THE PROTECTION OF INTANGIBLE CULTURAL HERITAGE SAND-GOLD DAI POTTERY

With the continuous development of digital technology, the protection and transmission of Sand-gold Dai pottery as an intangible cultural heritage (ICH) have encountered new opportunities. Digital technology not only provides strong support for the documentation, preservation, and display of Sand-gold Dai pottery but also propels its modern transformation. During the protection process, digital technology accurately records every detail of Sand-gold Dai pottery through methods such as 3D scanning, virtual display, and digital restoration, enabling this traditional craft to be permanently preserved on digital platforms [6]. Meanwhile, the introduction of digital art and interaction design allows the cultural value of Sand-gold Dai pottery to be more vividly demonstrated, enhancing the audience's participation and immersion.

The innovative application of digital technology offers new possibilities for the transmission of Sand-gold Dai pottery. Through virtual display and interactive platforms, global audiences can more conveniently understand and experience this traditional craft. This not only expands the influence of ICH but also arouses the interest of younger generations in traditional art [7]. In addition, digital technology provides local craftsmen with the opportunity to showcase their works to a global audience, promoting cultural dissemination and innovation.

However, digital preservation and dissemination also face certain challenges. How to balance tradition and innovation, ensuring that the core culture of Sand-gold Dai pottery is protected while meeting modern demands, is a key issue that needs to be addressed in future development. By continuously exploring ways to combine digital technology with traditional handicrafts, more reliable guarantees can be provided for the sustainable development of Sand-gold Dai pottery.

6. CONCLUSION

Sand-gold Dai pottery is a cultural tradition of China. This study takes sand-gold Dai pottery as an example, provides new ideas for the digitalized communication of Chinese intangible cultural heritages.

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