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Digital Inheritance of Chinese Folk Music: Opportunities and challenges of multimedia technology

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Abstract
This paper examines the digital inheritance of Chinese folk music in the context of globalization, highlighting both challenges and opportunities presented by multimedia technology. It explores applications like digital recording and VR/AR, noting how these enhance dissemination and teaching but also face issues such as high costs, potential loss of cultural depth, and limited audience acceptance. The article proposes strategies integrating technological innovation, cultural preservation, and social promotion, and looks ahead to the future use of AI and VR. It aims to provide theoretical and practical insights for the sustainable development of folk music in the digital age.

Keywords: Inheritance of Folk Music; Multimedia Technology; Digitalization; Interdisciplinary

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1.0 Introduction

In the current era, where globalization is accelerating continuously, the cultural landscape is characterized by intense integration and competition among diverse cultures. As a bright pearl of traditional Chinese culture, Chinese folk music is deeply rooted in a long history of thousands of years, carrying rich national emotions and unique regional characteristics. However, its inheritance in modern society faces severe challenges. Firstly, the younger generation grows up in an environment dominated by Western pop music and fast-food entertainment culture, resulting in a gradual decrease in their attention and interest in traditional folk music. It has led to a shrinking audience for folk music, and there are fewer and fewer professionals willing to engage in the study and inheritance of folk music (Zhang Mingzhu, 2020). More professional learners but also enables ordinary enthusiasts to appreciate the unique charm of folk music more clearly. Relevant research shows that digital recording and high-definition videography technologies play an important role in the inheritance of folk music, significantly expanding the dissemination scope of folk music works (Yu Yashen et al., 2023). At the same time, these studies also inspire us to explore further how to combine emerging technologies (such as AI, VR, etc.) to enhance further the dissemination effect and influence of folk music (Liu Qingtang et al., 2023).

2.0 Current Application of Multimedia Technology in the Inheritance of Folk Music

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2.1 Digital Recording and High-definition Videography Technology

The inheritance of Chinese folk music has witnessed the widespread application of digital recording and high-definition videography technologies. For example, the Central Conservatory of Music uses these technologies to record folk music with high quality and promotes it through online platforms. During the recording process, recording personnel pay great attention to accurately capture details such as the performance environment and the timbre of musical instrument. Post-production teams achieve excellent sound quality and clear images through meticulous work. This not only provides precise learning materials for professional learners but also enables ordinary enthusiasts to appreciate the unique charm of folk music more clearly. Relevant research shows that digital recording and high-definition videography technologies play an important role in the inheritance of folk music, significantly expanding the dissemination scope of folk music works (Yu Yashen et al., 2023). At the same time, these studies also inspire us to further explore how to combine emerging technologies (such as AI, VR, etc.) to further enhance the dissemination effect and influence of folk music (Liu Qingtang et al., 2023).

2.2 VR/AR Technology

VR/AR technology brings an immersive experience of folk music to the audience. Take the Palace Museum's use of VR technology to recreate the court music scenes as an example. Through 3D modeling and virtual reality technology, the audience seems to travel through time and space, being in the ancient court, witnessing the wonderful performances of court musicians, and experiencing the solemnity and elegance of court music firsthand. This innovative display method has attracted a large number of audiences, effectively improving their awareness and interest in folk music culture (Wu Yonghui, 2023). At the same time, in some folk music teaching, AR technology is applied to simulate musical instrument performances, enabling learners to more intuitively understand the structure and playing techniques of musical instruments, greatly enhancing the fun and interactivity of learning (Li Linfeng, 2023). For example, through AR technology, students can observe the internal structure of musical instruments in a virtual environment and even simulate the playing process to obtain real-time feedback and guidance. This immersive and interactive learning method not only improves students' learning motivation but also provides new ideas and methods for traditional folk music teaching (Zhang Lingyan et al., 2021).

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2.4 Online Interactive Learning Platforms

The "Cloud Folk Music" online interactive learning platform provides users with personalized learning paths by integrating online learning resources, big data analysis, and artificial intelligence technology. The platform can intelligently recommend suitable courses and practice pieces according to users' learning progress, playing level, and interest preferences (Liu Qingtang et al., 2023). The design of this personalized learning path not only improves learning efficiency but also helps users continuously improve their playing skills through a real-time feedback and evaluation mechanism. In addition, the "Cloud Folk Music" platform regularly holds online concerts, masterclasses, and other activities, providing users with a platform to showcase themselves and communicate. This social design further stimulates learners' enthusiasm and creativity. While improving users' playing skills, it also enriches their social experience (Huang Ying et al., 2023). By breaking the limitations of traditional folk music teaching in terms of time and space, the platform has attracted the active participation of many folk music enthusiasts (Qin Lilan, 2020). In recent years, with the extensive application of artificial intelligence and big data technology in education, similar online learning platforms have emerged continuously. Research shows that big data technology can effectively support educational evaluation and optimize learning paths (Wei et al., 2024), and the successful practice of the "Cloud Folk Music" platform also provides a valuable reference for the digital inheritance of ethnic music.

3.0 Analysis of Challenges Faced

3.1 Technological Challenges

With the rapid development of multimedia technology, digital projects of folk music face multiple technological challenges, such as frequent equipment upgrades, complex software maintenance, and high difficulty in data processing. According to relevant research, digital resources of folk music are diverse and complex, covering audio, video, images, and related cultural background materials, which puts forward high requirements for data storage, organization, and analysis. For example, in the process of collecting and extracting digital music resources, network crawler tools need to be used for preprocessing a large amount of data. However, data quality (such as ambiguous naming and inconsistent formats) and data scale (such as excessive data volume and complex types) have become the

main technical bottlenecks (Yue Xiaorong et al., 2022). In addition, the cost of investment in digital projects of folk music is also a significant challenge. According to the "Standards for Operation and Maintenance Fees of Digital Fujian Construction Projects", an average medium-sized digital project of folk music needs to invest hundreds of thousands of dollars in equipment procurement. According to the "Specifications for Calculating Software Operation and Maintenance Fees of Informatization Projects" issued by the Beijing Municipal Bureau of Quality and Technical Supervision, the annual maintenance cost of the software platform is about between 140,000 and 700,000 dollars. With the continuous update of technology, project teams must make large-scale equipment upgrades every few years, which further increases the project's economic burden (Xie et al., 2021). To address these challenges, researchers point out the need to strengthen systematic theoretical construction, deepen interdisciplinary research, and adopt various research methods. At the same time, with the help of artificial intelligence and big data technology, we can optimize the data management and analysis process and improve the resource management efficiency (Xu Fenghua et al., 2023). However, the current research still has not yet fully discussed technological boundaries and is relatively weak in system construction. These technological and economic challenges have deterred many small-scale folk music inheritance institutions, severely restricting the widespread popularization and in-depth development of the digital inheritance of folk music.

3.2 Cultural Challenges

In the digital inheritance of folk music, there are many challenges in conveying cultural connotations. On the one hand, some works overly pursue technical special effects and visual impacts, resulting in the dilution of the cultural emotions and connotations of folk music. For example, in some folk music videos, many 3D animations and lighting effects are used. However, audiences often ignore the etiquette culture and regional cultural characteristics in traditional folk music performances. They are attracted by visual effects and overlook the cultural heritage behind the folk music (He C, 2021). On the other hand, in cross-cultural communication, the dissemination of folk music still faces difficulties. Although some folk music groups have tried to go global, due to cultural differences and limitations in dissemination methods, the international audience's understanding of folk music mostly stays at the melodic level, and it is difficult to appreciate its cultural connotations (He C, 2021). This phenomenon not only affects the international dissemination effect of folk music but also impacts the cultural identity of domestic audiences. Therefore, balancing the expression of technology and cultural connotations in digital inheritance has become an urgent problem that needs to be solved in folk music inheritance.

3.3 Social Challenges

Currently, the inheritance and development of Chinese folk music face the dual dilemmas of insufficient public awareness and inadequate policy support. In recent years, some studies and surveys have revealed the severity of this problem. The public's awareness and participation in folk music are relatively low. According to relevant surveys, the youth's understanding and willingness to actively appreciate folk music are insufficient. For example, in a particular survey of the youth survey, only about 8% of the youth will actively appreciate folk music (Shi Wei, 2022). In addition, the National Music Education Conference in 2019 also pointed out that the participation of primary and secondary school students in folk music in art exhibition activities is relatively low, reflecting the limited interest and participation of the youth in folk music (Ministry of Culture and Tourism of the People's Republic of China, 2019). In terms of policy support, although the government has issued some policies on the inheritance of traditional culture in recent years, the exceptional policy support for the digital inheritance of folk music is still insufficient, and the investment of funds is limited. For example, in some digital inheritance projects of folk music in certain regions, due to the lack of an effective communication and coordination mechanism between the cultural department and the scientific and technological department in terms of technology research and development and cultural resource integration, the project progress is slow. The organic combination of technological innovation and cultural inheritance has not achieved, and some policies are complex to be effectively implemented (Liu Mingzhen et al., 2024). This situation not only affects the widespread dissemination of folk music but also impacts the cultural identity of domestic audiences, restricting the further development of the digital inheritance of folk music.

4.0 Discussion on Solutions

4.1 Technological Strategies

To break through the technological bottlenecks in the digital inheritance of folk music, efforts should be made to explore low-cost and high-efficiency multimedia technology solutions actively. In recent years, the cooperation between universities and enterprises has achieved remarkable progress in developing intelligent audio processing algorithms. For example, through the virtual simulation experimental platform developed by the cooperation between universities and enterprises, digital technology is used to sample and edit folk music performances, forming operable teaching projects. This not only reduces the operating cost but also improves the user experience (Bai Deling, 2021). In addition, using digital audio workstations (DAWs) and related sound source plugins allows for the efficient creation and arrangement of folk music works, which further promotes the integration of folk music and modern technology (Luo Chongjia, 2022).Although low-cost technology solutions are attractive, in practical applications, attention should be paid to the challenges posed by long-term maintenance costs and technological updates to ensure project's sustainability. Relevant research points out that the application of digital technology in cultural inheritance still faces many challenges, including the rapid pace of technological updates, high maintenance costs, and inefficiency in cross-departmental cooperation (Xie et al., 2021). Therefore, digital inheritance projects of folk music need to thoroughly consider long-term sustainability during technology selection and implementation. At the same time, cross-departmental cooperation should be strengthened to ensure the organic combination of technological innovation and cultural inheritance.

4.2 Cultural Strategies

In digital inheritance, attention should be paid to the cultural authenticity and uniqueness of folk music. It is recommended to hold workshops on "the Integration of Folk Music Culture and Digital Technology", inviting experts to intensely discuss how to present the cultural connotations of folk music in digital works. In terms of teaching, develop folk music experience courses based on virtual reality technology, enabling students to learn and experience folk music culture in virtual scenarios. In terms of cross-cultural communication, hold international folk music culture seminars to promote the exchange and integration of music cultures from different countries. It is necessary to assess the feasibility of these cultural activities in actual operation, ensuring sufficient funds, suitable venues, and technical support to avoid affecting the project's effectiveness due to insufficient resources.

4.3 Social Strategies

The education department plays an important role in the inheritance of folk music. It is recommended to formulate curriculum standards, incorporate folk music into the music curriculum of primary and secondary schools, and regularly hold relevant activities. At the same time, encourage folk music artists to cooperate with new media creators to produce high-quality short videos and use social media to enhance the dissemination effect of folk music. Efforts should be made to actively seek the support of the government and social organizations and establish special funds for project research, development, and promotion. When implementing educational reforms and new media cooperation, it is necessary to assess the sufficiency and effectiveness of existing educational resources and pay attention to the sustainability of policies to ensure long-term support for the inheritance and development of folk music.

5.0 Conclusion and Discussion of Research Results

Multimedia technology plays an irreplaceable role in the digital inheritance of Chinese folk music. It has significantly improved the sound quality and image quality, broken through the limitations of time and space, and enabled folk music to be more widely disseminated. However, challenges such as the rapid update of technology, the difficulty of integrating with traditional culture, and the audience's acceptance of new technologies remain severe. Through interdisciplinary cooperation, educational popularization, policy support, and social participation, we have injected new vitality into the digital inheritance of folk music. However, continuous exploration and innovation are still needed to ensure the effective inheritance and stable development of folk music in the digital age. In the research process, by comparing with previous relevant research, we found that this study has the following innovative points and values. Firstly, in terms of technology application, we emphasize how multimedia tools can improve the dissemination efficiency of folk music, while previous research mainly focused on the exploration of technology itself. Secondly, in terms of cultural inheritance, this study proposes a strategy that combines intelligent learning and creation, while other research rarely delves into the specific application of educational technology. Finally, through case analysis, we reveal the substantial impact of interdisciplinary cooperation on the inheritance of folk music, a perspective that has not been fully explored in previous research. Overall, this study aims to fill the above gaps and provide new ideas and practical references for the digital inheritance of folk music.

6.0 Future Outlook

Looking ahead, the continuous progress of technologies such as artificial intelligence and virtual reality brings broad development prospects for the digital inheritance of folk music. Intelligent composition systems will quickly generate the framework of folk music works according to users' requirements for themes, emotions, or styles, significantly improving creative efficiency. Personalized learning systems will also customize courses according to learners' levels and styles, providing accurate feedback to help improve skills. Virtual reality technology will enrich the audience's experience of folk music, enabling them to interact with performers from different historical and cultural backgrounds and gain an in-depth understanding of the development context and cultural connotations of folk music. In addition, cross-platform and cross-field cooperation will become a trend. Experts in musicology, computer science, education, and other fields will jointly explore new applications and models of multimedia technology in the inheritance of folk music. We call on all sectors of society to pay attention to and support the cause of the digital inheritance of folk music and jointly promote this precious cultural heritage to regain new vitality in the digital age.

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