



Research on Digital Inheritance and Protection of Chinese Guqin Music

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Abstract: Among China's rich musical intangible cultural heritage, guqin music occupies a pivotal position. With the continuous progress of science and technology, digitalization and informationization have become an important way for people to exchange information and acquire knowledge. However, this change also constitutes a certain degree of impact on the inheritance and development of guqin music culture. The purpose of this paper is to analyze the history and current situation of the inheritance and protection of guqin music, and then analyze the dilemmas faced in the process of digital inheritance and protection, and put forward targeted countermeasures and suggestions combined with the successful cases in China, with a view to providing useful reference for the digitization process of domestic guqin music.

Keywords: guqin music; digitization; intangible cultural heritage; inheritance and preservation

1. Introduction

Entering the new era of digitalization, we are experiencing an unprecedented scientific and technological revolution and industrial change, with the emergence of digital media and cutting-edge technologies such as AI, which have greatly broadened the horizons of human beings' cognition of the world and strengthened their power to transform the world.²⁰ In June 2023, President Xi emphasized at a symposium on the development of cultural inheritance that only through a comprehensive and in-depth understanding of Chinese civilization can we more effectively promote the creative transformation and innovative development of China's outstanding traditional culture, and then forcefully promote the construction of socialist culture with Chinese characteristics and build a modern Chinese civilization. In June 2023, President Xi emphasized at a symposium on the development of cultural inheritance that only through a comprehensive and in-depth understanding of the history of Chinese civilization can we more effectively promote the creative transformation and innovative development of China's outstanding traditional culture, and thus vigorously promote the construction of socialist culture with Chinese characteristics and the building of a modern civilization for the Chinese nation. This speech pointed out the direction for the protection and inheritance of intangible cultural heritage. Subsequently, at the World Internet Conference on November 20, 2024, President Xi once again proposed that we should grasp the development trend of digitization, networking, and intelligence, and join hands to march into a better "digital future". In this context, how to combine China's musical intangible cultural heritage with digital technology has become an important trend in the protection and inheritance of intangible cultural heritage, and creates favorable conditions and provides a strong guarantee for us to further do a good job in the systematic protection and inheritance of "intangible" music. Therefore, this paper takes the digitization of guqin music, a representative of musical intangible cultural heritage, as an example to discuss how to inherit and protect guqin music under the background of digitization.

2. Overview of the current status of domestic and international research

Domestic and foreign research on digitization and has a history of several decades, a variety of disciplines related to the construction of the endless, the author with the word "digitization" in the Knowledge Network for subject search, a total of 374,700 articles searched for the total number of literature based on a very large number of research content, disciplines are mainly concentrated in the field of the major engineering disciplines. The author searched for the term "guqin" in the Knowledge Network, and found more than 5,300 articles, of which 69 were related to the direction of intangible cultural heritage.

2.1 Current status of research in the country

In terms of the current status of domestic research, based on the research perspective of the article, the author mainly synthesizes the two aspects of the digital inheritance and protection of non-heritage as well as the inheritance and protection of guqin music.

In terms of digital transmission and protection of intangible heritage, Lin Yufeng believes that for the digital develop-

ment of musical intangible cultural heritage, there are more or less certain limitations in the current domestic methods of recording, preservation, display and mass communication [1]. Based on the framework of cultural cycle, Huang Yijun et al. study the inheritance and protection of musical intangible cultural heritage from five dimensions: creation, production, dissemination, transmission and participation [2]. The study by Huang Yonglin et al. delves into the protection and utilization of intangible cultural heritage in the context of digitization. He proposed a set of strategies for preserving, protecting, inheriting as well as developing ICH music through digitalization technology [3]. Ma Xiaona et al. comprehensively and meticulously combed the development status of digitization of intangible cultural heritage. They pointed out that with the continuous progress of digital technology, such as the application of 3D scanning, Virtual Reality (VR), Augmented Reality (AR) and other technologies, the digitization of intangible cultural heritage provides richer means [4].

In terms of digital inheritance and protection of guqin music, Miao Jianhua introduced that the Central Conservatory of Music has fully utilized the role of its “non-legacy” center to carry out innovative protection and inheritance through the construction of the “China Guqin Music and Culture Database” and other measures combining non-legacy music and digitalization. Inheritance. The details can be found in the field of guqin music at [5]. Chen Weiting believes that digital media provides a broader space and more diverse forms for the dissemination of guqin music. Through the digital media platform, guqin music can cross the geographical limitations and realize global dissemination and communication [6]. By analyzing the history and current situation of guqin music, Peng Yan concludes that “the guqin needs to be protected as a ‘culture’ rather than a ‘cultural relic’, and as an intangible cultural heritage, the guqin needs to be protected not only as a common musical instrument, but also as a material heritage. As an intangible cultural heritage, what needs to be preserved is not only the material heritage as a common musical instrument, but also the cultural and spiritual connotations. [7]”.

2.2 Current status of foreign research

In terms of the current status of foreign research, since there is less literature related to the digitization of NRM in foreign countries, the author carries out a general overview of the digitization of NRM.

Among them, Iris Kico et al. argue that the digitization and visualization of ICH is an increasingly active research field in computer science, and its digitization and visualization will become possible [8]. Codrina Csesznek et al. argue in their study that intangible cultural heritage (ICH) strengthens community identity and is a resource for sustainable development of communities. They point out that the current widespread access to the Internet facilitates the digitization of communication, including ICH [9]. In her study on the digitization of historical documents of the Chinese “Kunqu”, Gen-Fang Chen discusses the theoretical and practical significance of digitization for the preservation and transmission of important cultural heritage [10].

To sum up, most of the studies in the academic world are analytical studies on the extensive use of digitization in the fields of art, science and technology, while there are relatively few in-depth explorations on the combination of “traditional culture”, “Chinese guqin” and digital media, and there are no articles on digitalization of guqin music in the Internet. There are even no articles on digitalization of guqin music in the Internet, and the research on the innovation of the expression form of traditional Chinese music culture and the change of the dissemination mode and the direction of using digital media is still a bit insufficient. Therefore, how to make use of digitalization so that the guqin culture can be inherited and protected in the current context is also the research direction of this paper, which has certain research value.

3. Problems in the digital heritage and protection of guqin music

Guqin music, as a cultural treasure of the Chinese nation, its inheritance and protection are facing many challenges and dilemmas in the digital era. Although digital means provide new possibilities for the inheritance and protection of guqin music, in practice, there are still many problems that need to be solved.

3.1 Loss of cultural connotation and aesthetic identity

In the practice of exploring the digital inheritance and preservation of guqin music, we are faced with an urgent and complicated task: how to effectively preserve the cultural core and unique aesthetic characteristics of guqin music in the process of digitization. By virtue of its efficient and convenient characteristics, digital technology has opened up an unprecedentedly wide world for the recording, preservation and dissemination of guqin music, and greatly broadened the scope of audience and dissemination channels of guqin art. However, we must also be aware that while digitalization has injected new vitality into guqin music, it also carries the risk of weakening its cultural connotations and aesthetic qualities, and may even lead to its distortion.

In fact, the lack of deep insight into and respect for the essence of traditional music culture in the process of digitalization, such as technical processing, data encoding, and dissemination strategies, will easily lead to the gradual loss of the

delicate emotional expression, colorful imagery construction, and unique rhythmic style of Guqin music in the process of digitalization. This loss not only weakens the original cultural depth and aesthetic value of guqin music, but also may cause it to lose its soul in the communication of the new era, and be reduced to an empty pile of notes.

In the digital preservation and inheritance of guqin music, the core problem we face is how to rely on the power of modern technology to promote the wider dissemination and in-depth popularization of guqin music, while ensuring that its unique cultural connotations and aesthetic qualities are completely preserved and truly expressed. In order to achieve this goal, the practice of digitization not only requires us to be proficient in the technical operation process, but also to deeply understand the cultural and aesthetic essence of guqin music, and to actively explore the best path for the integration of science and technology with culture. Only in this way can guqin music “fly high” and “fly far” on the digitization platform, truly realizing its cultural value and artistic style across time and space transmission and reproduction.

3.2 Lack of harmonized standards and norms in the field of digital technologies

Huang Yonglin puts forward that “there is a lack of a unified scientific and standardized resource database construction system and planning, and the intangible cultural heritage resource databases currently established in different places are doing their own thing, with fragmented information, resources that cannot be shared, and the phenomenon of duplicated construction is serious” [11]. In the in-depth exploration of digital inheritance and protection of guqin music, the standardization and normalization of digital technology, as a core issue, has become more and more important and cannot be ignored. At present, digital technology, with its unparalleled efficiency and convenience, has drawn a brand-new blueprint for the recording, organizing and dissemination of guqin music, opening up an unprecedented pathway. However, in this wave of digitization, a problem that cannot be ignored has gradually surfaced: the standardization system of digital recording and arrangement of guqin music has yet to be perfected, and there is a long way to go in standardization construction.

Due to the lack of unified and clear standards and norms, all kinds of digitization projects often show a great variety of processing methods and presentation effects due to the differences in the selection of technical paths, the setting of operational processes, and the standards of quality control in the core aspects of audio capture, data encoding, storage management, and dissemination strategies of guqin music. This lack of standardization and normalization not only seriously hinders the seamless docking and efficient circulation of guqin music resources among different platforms and systems, but also may lead to distortion, omission or misunderstanding of information in the process of transmission, thus posing potential threats and challenges to the originality, integrity and inheritance of guqin music culture.

Therefore, it is imperative to strengthen the construction of standardization and normalization of digital recording and arrangement of guqin music in order to promote its cultural inheritance and development. This is not only related to the accurate recording and extensive broadcasting of guqin music culture, but also to the clear presentation of its historical trajectory and the secure control of future trends. Only through the construction of a perfect standardization mechanism can we guarantee that guqin music can truly realize the continuity and reproduction of its cultural value and artistic charm across time and space in the field of digitization.

3.3 Lack of complex professionals

In the complex practice of digital inheritance and protection of guqin music, the lack of professional talents constitutes a major problem in the process of digital inheritance and protection of guqin music. Guqin art, as a treasure in Chinese traditional culture, contains profound cultural heritage and unique artistic charm. Since the Wei and Jin Dynasties, guqin music has been known as “literati music” and belongs to the category of “elegant music”, with extremely rich and complex playing skills, music theory and cultural connotations. Its playing techniques, music theory and cultural connotations are all extremely rich and complex. The lack of professional performers for the guqin was raised in a study by Qi Fei et al. [12]. Due to the special nature of the guqin art, coupled with the fact that most of the intangible culture has been passed down orally and by heart, there is a serious risk of a break in the generation, which has resulted in the following status quo: those who are proficient in the guqin are still rare, and those who are proficient in the guqin are especially scarce, and those who are proficient in the guqin performance techniques and digital technology are even more scarce. This has resulted in the following situation: people who are proficient in the guqin are still scarce, and those who are proficient in both guqin playing techniques and digital technology are especially scarce. This imbalance in talent structure directly leads to the difficulty of ensuring that the original flavor of guqin music is preserved and presented accurately to the general audience during the digitization of guqin music.

In short, the lack of participation of professionals may make the audio quality damaged in the process of digitization collection, or technical errors in data encoding, storage, dissemination, etc., thus affecting the authenticity and integrity of the digitized results of guqin music. Therefore, the cultivation and introduction of composite talents who both know the art

of guqin and are good at digitization technology has become a key issue to be solved in the current digitization inheritance and protection of guqin music.

4. Countermeasure Suggestions for Digital Inheritance and Protection of Guqin Music

With the rapid development of science and technology, the digitization of guqin music has become a new way to inherit and promote this intangible cultural heritage. In the face of the above problems, the author combines the relevant domestic excellent cases and puts forward the countermeasure suggestions for the digitalization inheritance and protection of guqin music, with a view to contributing wisdom and strength to the inheritance and development of the art of guqin.

4.1 Focusing on the preservation of cultural connotations and aesthetic characteristics

In the deep exploration and practice of digitization of guqin music, it is particularly important to build a comprehensive guarantee system that integrates the strengthening of cultural cognition, the use of advanced technology protection and the establishment of a comprehensive evaluation system.

First, strengthening cultural awareness is established as the core guiding principle of the digitization process, emphasizing that the cultural essence and aesthetic uniqueness of guqin music must be respected and maintained during the digitization process. Through the formation of a team of consultants including cultural researchers, guqin virtuosos and other experts, the digitization project is deeply involved to ensure that the deeper meaning of guqin music is accurately conveyed so as to realize the continuation and promotion of its cultural value.

Secondly, the use of advanced technical means for protection is the key to ensuring the security of digitized results. With the help of digital watermarking technology, encryption algorithms and other modern technologies, the intellectual property rights of the digitized results of guqin music are effectively safeguarded to prevent illegal copying and circulation. At the same time, cutting-edge technologies such as high-fidelity recording and high-definition image capture are used to capture the subtle emotions and unique style of guqin music, providing solid technical support for the high-quality presentation of the digitized content.

Furthermore, building a scientific evaluation system is an important step in testing the quality of digitization results. By organizing experts, scholars, listeners and other representatives to participate in the evaluation, the degree of preservation of cultural connotations and aesthetic characteristics, the innovativeness and practicality of the digitized results and other perspectives are comprehensively considered to ensure that the digitization of guqin music can be steadily advanced, and vitality can be injected into the inheritance and innovation of traditional culture.

Tencent Games implemented the project of “Digital Conservation of Traditional Chinese Instrumental Music”, for example, under the guidance of a team of experts, the project carried out high-precision sound sampling of the Ming Dynasty guqin “Qiu Lai”, and combined with technological means and algorithmic processing, successfully restored the sound and playing skills of the guqin, and finally generated 10892 sound samples. Under the guidance of the project, the project has successfully recovered the timbre and playing skills of the guqin by combining high-precision sound sampling with technological means and algorithmic processing, and finally generated 10,892 sound samples. These results have been widely used in the fields of music creation, game development and cultural communication, enabling the public to appreciate the unique charm of the guqin through digital means. The project not only strongly promotes the inheritance and development of guqin culture, but also demonstrates the innovative path of integrating science and technology with culture, realizing the successful transformation of non-heritage music into digital symbols, and further enhancing cultural self-confidence and international exchanges.

4.2 Promoting the standardization and normalization of digital technologies

In the process of digitization of guqin music, the formulation of industry standards, the establishment of a unified platform and the strengthening of technological research and development and application are three crucial links.

First, organize professional teams to conduct in-depth research. Through in-depth research by professionals to formulate industry standards for guqin music in digital recording, encoding, storage and dissemination, to ensure that these standards are not only currently operable, but also adaptable to the future development trend of technology, with good scalability and compatibility. This step is the foundation of digital standardization of guqin music.

Second, to build a comprehensive digital resource management platform for guqin music. The platform should be able to unify the storage and management of audio, video, text and other forms of multimedia resources, and at the same time support the conversion of a variety of data formats, in order to promote the efficient sharing and exchange of resources between different systems, so as to break the information silo and realize the maximum utilization of resources.

Third, technology development and application. This is the key driving force to promote the digitization process of guqin music. Research institutes and enterprises should be encouraged to actively develop digitization technologies applicable to guqin music, such as high-definition recording technology, intelligent recognition and analysis technology, etc., and to promote the wide application of these technologies in the field of digitization of guqin music, so as to significantly improve the quality and efficiency of digitization and inject new vitality into the inheritance and development of guqin music.

In terms of promoting the standardization of digital technology and normative construction, take the Shanghai Music Publishing House as an example. The Shanghai Music Publishing House, in cooperation with the Shanghai Institute of Printing Technology, has designed a standard for “commonly used Guqin italic character forms” and created a standardized minuscule score database. At the same time, the project developed a professional input method for Guqin minus-character scores, which is convenient for Guqin professionals and enthusiasts to use by supporting multiple search methods. These achievements not only promote the standardization and normalization of guqin digital technology, but also provide strong support for the inheritance and development of guqin culture, showing the charm of combining traditional culture with modern technology.

4.3 Strengthening the training and introduction of specialized personnel

In the process of digitization of guqin music, in order to comprehensively strengthen the construction of professional talent team for digitization inheritance and protection of guqin music, we should adopt a multi-dimensional strategy.

First, establish a special digital training program for the guqin. This program should deeply integrate guqin performance techniques with modern digital technology, and through systematic teaching, cultivate composite talents who are both proficient in guqin art and familiar with digital means. At the same time, guqin performers, digital technology experts and cultural scholars should be widely invited to serve as lecturers. This will not only impart professional knowledge, but also integrate rich practical experience into the teaching, ensuring that students can obtain comprehensive training that combines theory and practice.

Secondly, deepening school-enterprise cooperation should actively establish close partnerships with music colleges, art colleges and polytechnic colleges and universities to jointly offer professional courses on guqin digitization, which should cover a wide range of aspects such as guqin performance, music theory, digital audio processing, data encoding and storage, etc., with the aim of fostering interdisciplinary and comprehensive talents. In order to motivate more students to devote themselves to this field, universities should set up relevant scholarships to provide financial support and academic recognition, so as to attract and retain outstanding students who are interested in digitizing guqin music.

Thirdly, formulate attractive talent introduction policies to attract top talents in the field of guqin digitization from home and abroad to work or cooperate in China by providing generous treatment and a broad development platform. In order to better manage and utilize these talent resources, it is recommended that a talent pool in the field of guqin digitization be established to register and manage outstanding talents, which will not only help in subsequent cooperation and exchanges, but also lay a solid talent foundation for the sustainable development of the industry. Through this series of initiatives, we will be able to build up a high-quality and professional team of digitized talents in guqin music, injecting new vitality into the inheritance and development of guqin culture.

In terms of strengthening the cultivation and introduction of professional talents, the Central Conservatory of Music, as the highest institution of professional music education in China, plays an important role in the protection and inheritance of “non-legacy” music. According to Yuan Jingfang’s article, the Central Conservatory of Music launched the “Chinese Guqin Music and Culture Database” at the beginning of the 21st century, which aims to comprehensively, systematically, and thoroughly record and organize the resources of Guqin music through advanced digital means and a large number of specialists and professors [13]. This initiative not only effectively preserves the precious information of non-heritage music and provides valuable resources for the research and inheritance of future generations, but also makes a significant contribution to the cultivation of specialized talents.

5. Conclusion

In the wave of scientific and technological progress, digital technology, with its significant advantages, has opened up a new way of protection and inheritance for the guqin music, a treasure of Chinese culture. This paper comprehensively examines the current situation of digital inheritance and protection of guqin music, deeply analyzes the challenges and dilemmas faced, and proposes corresponding solutions. We deeply understand that the inheritance and development of guqin music is not only the key to the passing on of the musical art, but also an important cornerstone for shaping the national cultural self-confidence and promoting the national spirit.

In the tide of the digital era, we must grasp the opportunities and face the challenges head on. The first and foremost

task is to cultivate professionals and form a team of composite talents who are both proficient in guqin music and familiar with digitization technology. At the same time, the formulation of technical standards and standardization process should be accelerated to ensure the authenticity and integrity of guqin music in digital conversion, and to avoid the risk of cultural distortion caused by technological disorder. More critically, in the process of digitization, we must adhere to the cultural roots and unique aesthetics of guqin music, and use advanced technologies such as high-precision recording and algorithmic simulation to inject new-age vitality and innovation into this ancient art on the basis of preserving its original characteristics.

Looking ahead, the digital inheritance and protection of guqin music is undoubtedly a long-term and complex mission. We sincerely call on more experts, scholars, technicians and all walks of life who love and are committed to the inheritance and development of the excellent traditional Chinese culture to join in this noble and sacred cause, to make suggestions and contributions to the digital inheritance and development of the guqin music, and to join hands to create a brilliant future for this ancient art in the new era. The research results of this paper aim to provide a reference with far-reaching influence and important value for the digital inheritance and protection of guqin music, and to help this ancient art bloom more brilliantly in the new era.

Acknowledgments

Fund Project: Research Project of Science and Technology Innovation Think Tank of Fujian Association for Science and Technology (FJKY-A2119).

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