



Research on Technological Adaptation and Cultural Translation in the Digital Inheritance of Traditional Pattern Intangible Cultural Heritage

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Abstract: Traditional patterns are intangible cultural heritage that carries the cultural genes and aesthetic wisdom of ethnic groups. However, they also face dilemmas such as aging carriers, limited dissemination, and audience discontinuity. Digital technology has opened new avenues for the inheritance of traditional pattern ICH, making technological adaptation and cultural translation key issues for effective transmission. Starting from the cultural characteristics and current state of inheritance of traditional patterns, this paper explores the pathways of digital inheritance from the perspectives of the principles and methods of technological adaptation, and the methods and strategies of cultural translation. The aim is to achieve the accurate communication and continuation of traditional pattern culture, and to provide theoretical reference and practical guidance for the digital inheritance of ICH.

Keywords: digitalization of traditional pattern ICH, inheritance technology adaptation, cultural translation

1. Introduction

Traditional patterns, accumulated over thousands of years and manifested in bronze ware decorations, silk embroidery patterns, ceramic paintings, architectural carvings, etc., condense the life philosophy, aesthetic taste, and cultural spirit of the Chinese nation, representing one of the most vibrant components of the intangible cultural heritage treasury. However, under the impact of modern civilization, traditional methods of pattern inheritance have gradually become outdated. The mode of oral transmission and mental comprehension can no longer keep pace with the fast-paced modern life, and their cultural value and artistic charm have not been fully recognized. Digital technology, with its advantages of interactivity, disseminability, and storage, has injected new vitality into the inheritance of traditional pattern ICH. Yet, it also brings problems such as technological misuse and cultural distortion. Therefore, researching how to achieve a precise match between technology and inheritance needs, and an effective translation between cultural connotation and modern expression, holds significant practical importance for promoting the living inheritance of traditional pattern ICH and enhancing cultural confidence.

2. The Core Connotation and Development Status of Digital Inheritance for Traditional Pattern ICH

2.1 Cultural Traits and Inheritance Dilemmas of Traditional Pattern ICH

Traditional patterns are not merely decorative motifs; they are aggregates of cultural symbols. Their forms, colors, and compositions embody philosophical thoughts like “harmony between man and nature”, value orientations such as “auspicious meanings”, and aesthetic concepts like “harmony in diversity.” For instance, dragon and phoenix patterns symbolize imperial power, peonies represent wealth and honor, fret patterns signify continuity, and cloud patterns denote freedom and ease — each pattern carries its specific cultural meaning. However, the current inheritance faces numerous challenges: the carriers are singular, mostly relying on ancient books, artifacts, and other physical objects that are prone to damage and have limited reach; there is a discontinuity in inheritors, with the younger generation lacking sufficient understanding and a shortage of professional inheritors; and the forms of expression lag behind, as traditional display methods fail to align with contemporary aesthetic preferences and reception habits, leading to a gradual decline in cultural appeal [1].

2.2 Development Trends of Digital Technology Intervention in ICH Inheritance

The rapid development of digital technology has opened a new path for the inheritance of traditional pattern ICH. In recent years, technologies such as digital acquisition, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI), and big data have gradually permeated the practice of traditional pattern inheritance. High-precision scanning enables the digital preservation of patterns and the establishment of ICH pattern databases. VR/AR technologies create immersive experiential environments, allowing people to “enter” the creative context of traditional patterns. AI technology facilitates the intelligent generation, transformation, and innovative design of patterns. Digital inheritance breaks the constraints of

time and space, enhancing the dissemination and interactivity of traditional patterns. However, issues such as blind technology selection, superficial interpretation of cultural connotations, and rigid translation forms also exist in practice, preventing the full realization of the inheritance value of digital technology.

3. The Core Significance of Technological Adaptation and Cultural Translation in the Digital Inheritance of Traditional Pattern ICH

3.1 Resolving Inheritance Technical Bottlenecks and Enhancing Inheritance Efficiency

Technological adaptation involves selecting and adjusting appropriate digital technologies according to the inheritance needs and cultural characteristics of traditional patterns, ensuring a match between technology and inheritance practice. In traditional pattern inheritance, digital acquisition technology can overcome the problems of physical objects being easily damaged and difficult to preserve, enabling the long-term preservation of cultural resources. VR and AR technologies break the limitations of traditional display, allowing audiences to gain immersive experiences and increasing the interest/fun of inheritance. AI technology can assist in pattern creation and innovation, reducing the difficulty of inheritance. Technological adaptation prevents the formalism of “digitization for digitization’s sake.” By leveraging technological empowerment, it improves the efficiency and quality of traditional pattern inheritance, adding sustainable technical energy to the process.

3.2 Adhering to the Cultural Core and Enhancing Communication Vitality

Cultural translation involves converting the cultural connotations and aesthetic concepts contained within traditional patterns into modern forms of expression using contemporary digital language, thereby achieving communication between tradition and modernity. The cultural connotations of traditional patterns are highly historical and abstract, making them difficult for contemporary audiences to grasp directly. Cultural translation is not a simplification or distortion of cultural meaning but rather adheres to the cultural core, interpreting it through digital forms acceptable to the audience—for example, transforming the implied meaning of auspicious patterns into animated stories, integrating traditional compositional principles into digital game design, or applying pattern color aesthetics to the development of digital cultural and creative products. Cultural translation enables contemporary people to perceive, identify with, and appreciate traditional patterns, enhancing their communicative vitality and achieving the living inheritance of cultural connotations [2].

4. Implementation Strategies for Technological Adaptation and Cultural Translation in the Digital Inheritance of Traditional Pattern ICH

4.1 Technology Adaptation: Build a precise matching system of “scene - demand - technology”

The key to technology adaptation lies in “demand orientation, scenario segmentation, and standard support”, avoiding the blindness of technology selection.

① Scenario-based technical adaptation solutions.

Combining the core scenarios of traditional pattern inheritance, a technical adaptation system is constructed, as shown in the following table.

Table 1. Traditional Pattern Adaptation System

Inheritance scene	Core requirements	Adaptation technology	Direction of technological improvement	Typical application cases
Digital preservation	High-precision, non-destructive and permanent preservation	Three-dimensional laser scanning, multispectral imaging	Optimize the color restoration algorithm to lower the operational threshold of the equipment	The Digital collection project of Bronze ware Patterns of the Palace Museum
Display and dissemination	Immersive, interactive and widely covered	VR/AR, metaverse, short videos	Simplify the operation of VR devices and develop lightweight AR mini-programs	Suzhou Embroidery Pattern AR Experience mini-Program “Xiu Jing You Mo”
Educational inheritance	Low threshold, practical operation, and strong feedback	Virtual simulation training, AI teaching assistant	Build standardized training scenarios and add real-time error correction functions	Virtual simulation training platform for “Digital Intangible Cultural Heritage Design” in colleges and universities
Innovative creation	Style continuity, rapid iteration, and personalization	AI-style transfer, parametric design	Train exclusive models for traditional patterns to optimize the interactive experience	A certain AI pattern design platform called “Traditional Pattern Innovation Workshop

② Standardization system construction.

Technical specifications were formulated: The “Technical Specifications for Digital Acquisition of Traditional Patterns” manual was published, which specifically stipulated that the resolution of 2D acquisition should reach over 600dpi, the accuracy of 3D scanning should be less than 0.1mm, and the color restoration degree should reach or approach 95%. Establish an evaluation system: Starting from four dimensions of “cultural completeness, penetration, interaction depth, and innovation height”, more than twenty qualitative analysis indicators have been formulated to regularly assess the applicability of the technology. Build a shared platform: By integrating lightweight digital collection devices, open AI models, and a unified and standardized training resource library, provide free technical support for small and medium-sized inheritance institutions and individuals, and reduce the cost of technology usage [3].

4.2 Cultural translation: Achieving a closed loop of “connotation decoding — form innovation — value recognition”

In this article’s view, the essence of cultural translation and introduction lies in “accurately restoring the essence of culture, developing new digital art languages, and gaining recognition from contemporary aesthetic standards”.

① In-depth Analysis: Constructing a “Three-Dimensional Perspective Anatomical Diagram” system.

Form a cross-border team of “intangible cultural heritage inheritors + cultural scholars + aesthetic experts + digital artists”, and establish a ternary interpretation model of “pattern - cultural connotation - modern significance”. The following table is an example:

Table 2. Ternary Interpretation Mode

Traditional patterns	Styling features	Cultural connotation	Contemporary value alignment
Loop	The beginning and the end are connected, and the cycle repeats itself	Continuous and ever-lasting	Sustainable development, life continuation
Cloud pattern	Elegant and dynamic, with the interplay of reality and illusion	Be free and easy, and follow the natural course	Freedom and inclusiveness, ecological harmony
Peony pattern	Elegant and full, with bright and vivid colors	Wealth, good fortune, prosperity and flourishing	A good life and career development

② Formal innovation strategy.

For digital creative incubation: We apply the refined data cultural content to the design of digital collectibles, IP character images and emoticons. For instance, the “Loop Digital Collectible” takes “life cycle” as its theme concept and transforms it into a dynamic digital graphic capable of self-regeneration. Its sales exceeded 10,000 units within three days. For instance, regarding the understanding of “short video story-driven”, take the Douyin account “China in Patterns” for example. It uses the background music mode presented in the form of a costume drama to spread the cultural evolution of peony patterns from the imperial court to the common people. The view count of a single video has exceeded 5 million. Integrating innovative applications, the translated pattern elements are applied to digital entertainment, films, and design products. For instance, in the mobile game “Genshin Impact”, the “cloud pattern graphic” is used as a decorative element for the characters’ clothes. This not only reflects traditional aesthetics but also conveys the profound meaning of “unrestrained freedom” through the game’s story[4].

4.3 Ecological construction: Build a dynamic inheritance system featuring multi-party collaboration

① Multi-party collaborative mechanism.

Form a four-in-one cooperation model of “functional departments - higher education institutions - inheritors - enterprises” : formulate policy assistance, establish a special fund for the digital inheritance of traditional patterns, and include it in the assessment of intangible cultural heritage inheritance. Higher education institutions should establish specialized courses on “Digital Heritage Art Design” to cultivate talents with dual qualities of pattern culture and technological skills. The bearer should cooperate with in-depth interpretation and core control to ensure that the digital information does not deviate. By adopting and applying digital technologies in product operation, enterprises can launch products that meet market demands and achieve a win-win situation of “cultural artistry and business economy”[5].

② Feedback and guarantee system.

Establish a public feedback mechanism, and use online questionnaires, interviews and big data processing methods to obtain the public’s perception of technology and cultural understanding, and improve the corresponding matching and

translation plans in the quarterly feedback. Strengthen copyright protection. Register and file the Copyrights of digital image resources, determine the rights of the inheritors or developers, and prevent piracy and plagiarism. Cultivate a group of young viewers to jointly launch “Digital Pattern Art Education” : Through new technologies such as VR and AI, foster young people’s recognition and appreciation of traditional cultural patterns[6].

5. Conclusion

In conclusion, the digital inheritance of traditional pattern intangible cultural heritage is a process of mutual pursuit between technology and culture. Technical adaptation and cultural translation are the two key points of inheritance. Technical adaptation provides efficient means for the inheritance of traditional patterns, solving the problem of “how to pass them on”. Cultural translation brings traditional patterns closer to contemporary life and resolves the issues of “what to pass on” and “to whom to pass on”. Only by achieving a deep integration of technology and culture can the problem of inheriting traditional patterns be solved, and ancient patterns can be rejuvenated in the digital age. The digital inheritance of traditional pattern intangible cultural heritage in the future should constantly seek new ways of technological adaptation and new methods of cultural translation, adhere to the cultural core, keep up with the trend of The Times, and ensure that the national cultural genes contained in traditional patterns are passed down from generation to generation, so as to enhance cultural confidence.

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