

Innovation in Experience Design Models for Digital Art and Cultural Heritage Inheritance

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Abstract. The iterative upgrade of digital technology has provided a new carrier for the living inheritance of excellent traditional Chinese culture. Digital art, with its interactive, immersive, and co-creative characteristics, has become a core bridge connecting the cultural core and the public experience. Currently, digital cultural products generally suffer from pain points such as a disconnect between content and technology, superficial experience levels, and broken inheritance links, making it difficult to achieve deep transmission and living continuation of cultural values. This paper takes user experience as the core and precise anchoring of the cultural core as a premise, constructing a four-dimensional full-link experience design innovation model of "cognition-empathy-participation-co-creation." It clarifies the design goals, digital art application forms, and implementation strategies at each level, and completes practical verification using traditional mortise and tenon joinery as an example. This model breaks the limitations of one-way dissemination of traditional culture, opening up a complete closed loop from cultural cognition to inheritance and co-creation, providing theoretical reference and practical paths for experience design in cultural heritage inheritance in the digital age.

Keywords: Digital art, cultural heritage, experience design, model innovation, living heritage.

1. Introduction

The report of the 20th National Congress of the Communist Party of China clearly put forward the core requirement of "adhering to creative transformation and innovative development, and inheriting the excellent traditional Chinese culture." Digitalization has become an inevitable trend in the inheritance and development of traditional culture. Digital art, as an emerging form integrating digital technology and artistic creation, breaks through the spatial and temporal limitations of traditional cultural dissemination, providing the public with multi-dimensional and multi-sensory channels for cultural contact. In recent years, the implementation of projects such as the Palace Museum's Digital Cultural Relics Database and the Dunhuang Digital Library Cave has confirmed the enormous potential of digital art in cultural dissemination [1]. Yet many digital cultural products still stop at polished presentation: technology reshapes the form, while the experience rarely carries the meaning beneath it. Scholarship shows a similar imbalance. Much of the literature discusses how digital art is applied or how cultural communication can be made more effective [2], whereas experience-design studies tend to examine isolated settings rather than the full course of living heritage. This gap defines the present study. Drawing on emotional design and living-heritage theory, it develops an experience model suited to digital art and to the practical problems identified above [3]. The model is then tested in a design case to assess whether it can offer a workable route for the digital inheritance of traditional culture.

2. Core Concepts and Theoretical Basis

2.1. Definition of Core Concepts

Digital Art: Refers to art forms that use digital technology as a creative medium, dissemination carrier, and presentation format, possessing aesthetic, interactive, and immersive qualities [4]. Includes various types including dynamic digital visuals, immersive light and shadow art, VR/AR interactive art, and AIGC generative art. The most prominent feature lies in its breaking out from the static display of traditional art and realizing a two-way interaction among the creator and audience.

This paper focus on the living heritage of excellent traditional Chinese culture and intangible cultural heritage [5], distinguished by the static preservation of cultural relics and documentary records; its essence lies in achieving the intergenerational transmission and innovative transformation of cultural connotations, technical essence, and spiritual values, so as to promote the transformation of the public from cultural audiences into cultural inheritors.

Experience design means a design method based on users' focus on their whole process of behavior and psychological changes through multi-dimensional touchpoint design for building a full experience which can be perceived, resonate with and engage people in order to achieve value delivery [6], whose core takes into consideration the user's sensory, behavioral, and emotional experiences.

2.2. Theoretical Basis

The research in this paper depends on two main theories: one is Donald Norman's three-tiered theory of emotional design, dividing user experience into the instinctive layer (sensory experience), the behavioral layer (interactive experience) and the reflective layer (emotional identification), which provides a theoretical foundation for the division of different experience levels along the whole chain; another is the theory of living heritage transmission, emphasizing that the core of cultural transmission lies in the participation of "people", not the static preservation of content, it also provides a core direction for transforming the experience design from "one-way communication" to "two-way co-creation". Participatory design theory, user journey mapping and so on are used as methods to implement and practically verify the model.

3. Current Status and Pain Points of Experience Design for Digital Art Empowering Cultural Heritage

In recent years, the application of digital art in the field of cultural heritage has reached a preliminary scale. From digital exhibitions in museums to digital content on intangible cultural heritage on short video platforms, from immersive light and shadow exhibitions to metaverse cultural spaces, digital art has permeated multiple scenarios of cultural dissemination [7]. Taken together, this spread of formats is substantial, but it also exposes four recurring design problems that weaken what users actually carry away from a cultural encounter.

The first weakness appears at the level of experience. A large share of digital cultural products converts traditional material into attractive images or short animations and asks little of the audience beyond looking. What is missing is sustained interaction at the behavioral level and a reason for reflection afterwards. A user may remember the visual surface yet leave without understanding the history or values that give it meaning. The result is exposure without durable cultural learning—a product that is viewed once and soon forgotten.

The second weakness is the fit between content and technology. In some projects, VR, AR, holographic projection, or other devices are selected before the cultural material has been closely interpreted; spectacle then becomes the organizing principle [8]. Under this sequence, technical form and cultural meaning develop on separate tracks. Culture may be reduced to decoration, and entertainment-driven adjustments can even alter what the project claims to transmit.

A third problem is the missing connection between stages. Many projects end once cultural material has been displayed. They do not guide audiences from first recognition, through empathy and participation, toward making or sharing work themselves. Without that route, viewers have little opportunity to become active inheritors, and their willingness to take part in cultural transmission is never fully engaged.

The fourth issue is audience fit. The same content and interaction pattern are often offered to users of very different ages and levels of prior knowledge. Dense explanations can exclude younger or first-time visitors, while overly simplified treatments give committed culture enthusiasts too little to

explore [9]. When these differences are ignored, both reach and sustained engagement suffer. Effective experience design therefore needs several entry points rather than a single presumed user.

4. Construction of an Innovative Full-Link Experience Design Model for Digital Art and Cultural Heritage

These observations lead to a model organized around two commitments: the cultural core must be identified with precision, and design decisions must be made from the user's point of view. By aligning the three levels of emotional design with living-heritage theory, the study proposes a four-part sequence—cognition, empathy, participation, and co-creation. Figure 1 presents the resulting framework.

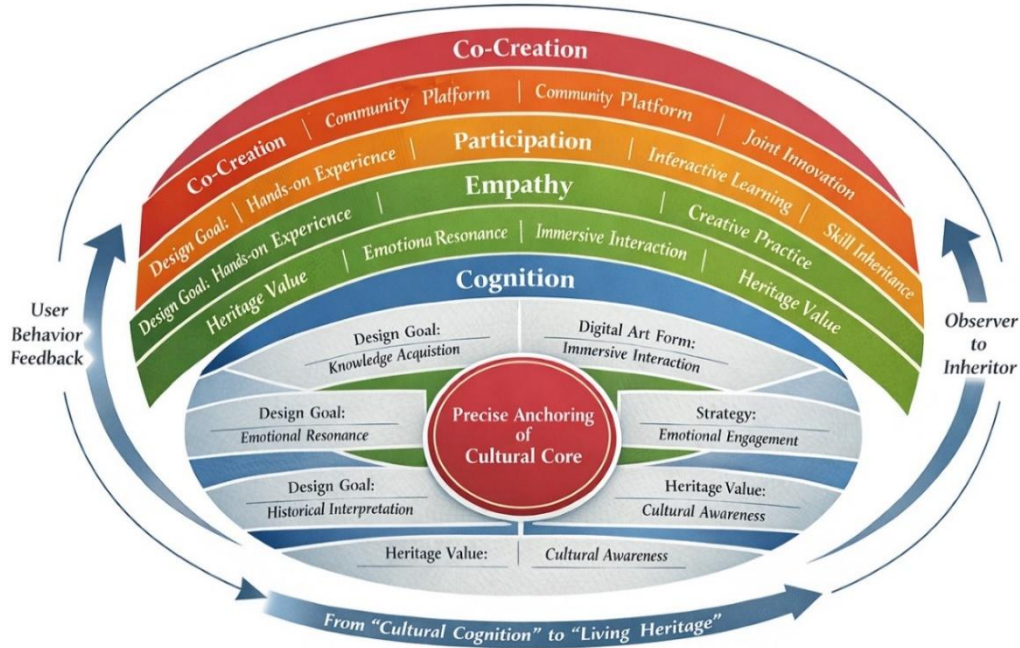


Figure 1. Framework Diagram of the Innovative Full-Link Experience Design Model for Digital Art and Cultural Heritage

Figure 1 places the precisely defined cultural core at the center and arranges cognition, empathy, participation, and co-creation as four successive forms of experience. For each stage, the diagram links a design aim with an appropriate digital-art form, an experience strategy, and the heritage value expected from that stage [10]. The arrows are important: feedback from users is meant to return to the design process instead of being collected after the project is finished. Progression through the four stages should therefore deepen rather than merely extend exposure. A person first encounters the culture, then finds an emotional point of entry, practices with the material, and eventually contributes to its reinterpretation. Keeping the cultural core constant across these shifts prevents the technology from becoming an independent spectacle. In this sense, the model describes a route from observer to inheritor and from initial cultural recognition to living transmission. The following subsections explain how each stage can be designed in practice.

4.1. Cognitive Layer: Making the First Encounter Clear and Accessible

The cognitive layer is the audience's first contact with the experience. Its task is not to compress culture into a slogan, but to make an unfamiliar subject approachable without losing the point that matters. This responds to a familiar difficulty: many members of the public struggle to understand or retain traditional cultural knowledge [11]. In Norman's terms, the layer works mainly at the instinctive level. Concise explanations, legible visual cues, and a small element of interaction give users enough orientation to begin exploring, while leaving more demanding interpretation to the stages that follow.

At this entry stage, suitable formats are those that can be encountered quickly and shared easily: animated digital illustrations, visual explanations of cultural information, brief AI-assisted media, and interactive H5 pages. The design should break material into short, situation-based units, ask for only lightweight interaction, and use an inviting tone; specialist terminology and multi-step controls are best reserved for later stages. Users should be able to understand core cultural knowledge points within 10-30 seconds, while features such as QR code scanning and sharing facilitate viral content dissemination.

4.2. Empathy Layer: Immersive Narrative, Building Cultural and Emotional Connections

The heart of the whole experience. Core Design Goal - Scene Recreation; Emotional Connection Between Users & Culture; Pain Point for Public's "Lack of Feeling and Identification" with Traditional Culture [12]. It represents the transitional phase in emotional design between Behavioral and Reflective Layers. Core - To immerse users into the original scene of the culture's birth via immersive digital art narratives so that they can transition from "Knowing the culture", to "Understanding the culture", creating a deep emotional resonance.

For digital art applications: immersive light and shadow art; VR/AR panoramic narratives; digital human interactive storylines; 3D mapping spatial art. Experience Design Strategy: First person narrative perspective, with multi-sensory stimulation (visual, auditory, tactile), recreating the original cultural scene. Set lightweight interactive nodes so that users can have a feeling of participating in the narrative process, really understand the historical background, humanistic spirit and aesthetic value behind the culture, laying down an emotional foundation for further participation and co-creation.

4.3. Participation Layer: Interactive Practice, Deepening Cultural Skill Acquisition

Participation layer plays an important role throughout the whole experience chain. The main design idea for this layer is hands-on practice so that users can master core cultural skills, solving the pain point of the public finding traditional culture "difficult to learn and master". It represents the behavioral layer of emotional design focusing on turning users from "observers" into "participants", using low-threshold, tiered interactive design to deepen their understanding of the cultural essence by practicing.

This mainly uses haptic interactive art, virtual simulation systems, AI-assisted interactive tools, and touchscreen interactive devices in digital art applications. Experience design strategy sets up practical tasks that range from "beginner to intermediate to professional" with real-time operational feedback and AI guidance which greatly reduces the learning threshold of traditional cultural skills. Technique and interpretation grow together as they progress on these tasks; they learn not only how to perform an operation, but why the operations' procedures, materials, and craft conventions are important. Practice carries the cultural logic of a skill instead of just being about gestures.

4.4. Co-creation Layer: Open Empowerment, Activating the Intrinsic Motivation for Living Heritage

Co-creation is the point at which the experience opens outward. The aim is to give participants enough freedom, resources, and visibility to assume some responsibility for how the culture is reinterpreted and circulated. This directly addresses a recurrent difficulty in traditional-culture projects: an audience may participate once but has no route to continue. Located at the reflective level of emotional design, the co-creation stage lets users make, revise, publish, and discuss work through accessible digital tools and shared platforms. The inheritance process is thus maintained through a practical cycle of receiving cultural material, creating with it, sharing the result, and returning feedback.

Useful infrastructure at this stage includes generative-art tools, open digital-making platforms, channels for issuing digital collections, and communities that host user-created content. Access should be simple, but the support should extend beyond the first act of making. Users need well-

prepared cultural source material, adjustable AI-assisted tools, and clear guidance on responsible reuse. They also need a visible route from creation to review, exhibition, production, and sharing. When these links are present, a participant's work can enter a real circulation network rather than remain an isolated exercise, giving continued cultural involvement a concrete incentive.

5. Practical Application of the Innovative Model – Taking Traditional Mortise and Tenon Joint Craftsmanship as an Example

To verify the feasibility and effectiveness of the above-mentioned end-to-end experience design model, this paper takes the traditional Chinese mortise and tenon joint craftsmanship, a national intangible cultural heritage, as its core object and conducts a complete experience design practice. Mortise and tenon joint craftsmanship is a core representative of traditional Chinese craftsmanship, embodying profound Chinese philosophy and craftsmanship spirit. However, it faces challenges in inheritance, such as high cognitive barriers, difficulty in learning, and low attention from younger generations. This makes it highly compatible with the model proposed in this paper. The complete user journey design for this practice is shown in Figure 2.

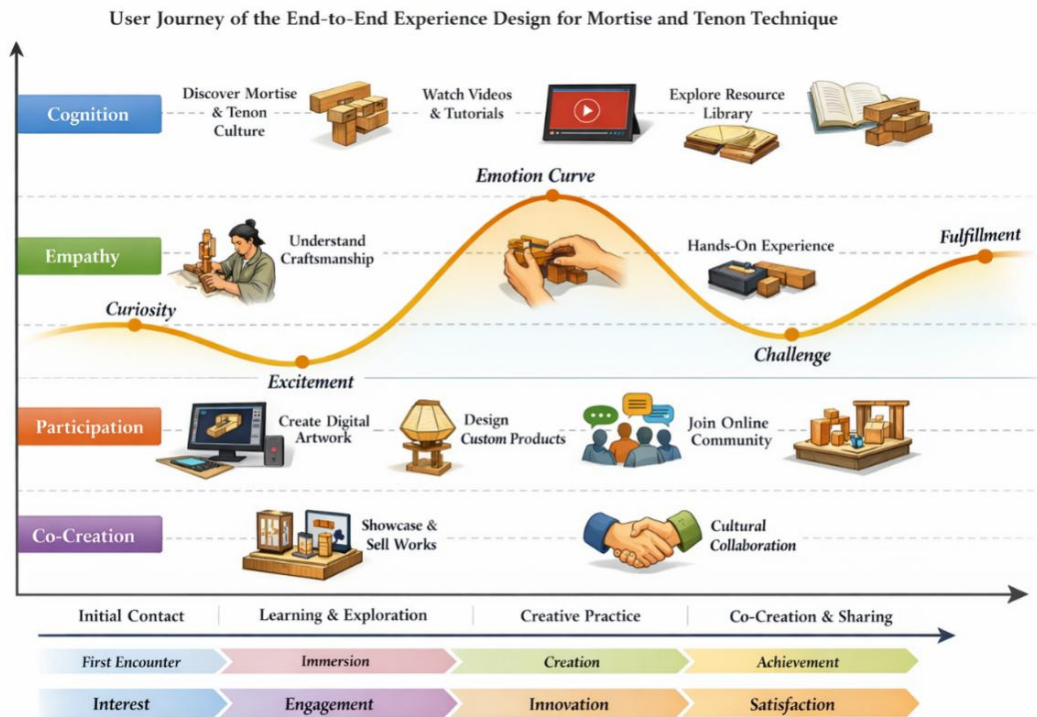


Figure 2. User Journey Diagram of the Full-Link Experience Design for Mortise and Tenon Joint Craftsmanship

Figure 2 uses the user timeline as the horizontal axis and the user emotion curve as the vertical axis, fully presenting the user's journey from initial contact with mortise and tenon culture to co-creation and dissemination. It corresponds to four experience levels: "cognition, empathy, participation, and co-creation," marking user behavior, digital art touchpoints, core experience design actions, and emotional changes at each journey node, clearly demonstrating the implementation path of the innovative model.

This practice strictly follows the four-dimensional full-link model proposed in this paper. The implementation content at each level is as follows:

At the cognition level, the dynamic information visualization digital art series "Chinese Wisdom in Mortise and Tenon Joints" was designed. 36 classic mortise and tenon structures were broken down into 15-30 second dynamic disassembly animations, clearly demonstrating the splicing logic and structural principles of mortise and tenon joints, while also providing concise text explanations of their historical background and application scenarios. Distribution was deliberately split between on-

site and everyday settings. Visitors encountered the series on museum touchscreens, while the same material circulated as short videos on social platforms. The most-watched video received more than five million views, suggesting that the format substantially lowered the entry barrier to mortise-and-tenon culture and carried the project beyond the exhibition site.

For the empathy stage, the project developed an immersive light-and-shadow exhibition titled "Tenon and Mortise Building China." A panoramic soundscape and 3D mapping rebuild, at full scale, construction scenes associated with the Yingxian Wooden Pagoda and the Hall of Supreme Harmony. The intention is to let visitors sense how an interlocking wooden structure bears weight and why that achievement has endured in Chinese architecture, rather than merely showing them a finished building. AR stations extend the scene: after scanning a model with a phone, visitors can expose the concealed joints and examine how the parts meet. Moving between the full-scale atmosphere and the close-up structural view connects technical ingenuity with Chinese ideas of proportion, order, and making, which gives the encounter its emotional force.

Participation was organized around a virtual assembly system for mortise-and-tenon work. On touchscreens or motion-sensing stations, users manipulate components and test how different joints fit before moving to a harder assembly. The system features a tiered task system. Beginners start with the simplest dovetail tenon and flat-shoulder tenon, with the system providing real-time AI guidance. Upon completion, users unlock corresponding cultural knowledge points. Advanced levels can challenge more complex structures such as dovetail tenons and through-tenon joints, and even complete the assembly of small furniture pieces. This system has not only been implemented in museums and intangible cultural heritage experience centers, but also launched a mobile version, allowing users to participate in the practice of mortise and tenon joinery anytime, anywhere, deepening their understanding of the craft through hands-on experience.

The platform offers an open-source library of mortise and tenon structures and traditional patterns, along with AI-generated models. Users do not need professional design backgrounds to create digital artworks, furniture designs, and cultural and creative products based on traditional mortise and tenon elements. The platform also features a showcase area for outstanding works, a digital collection distribution channel, and connects cultural and creative manufacturers with intangible cultural heritage inheritors, providing channels for the production of users' excellent works. To date, the platform has received over 20,000 user-created works, and many user-designed mortise and tenon element cultural and creative products have been sold, truly realizing the transformation of users from participants to inheritors, forming a complete closed loop for living inheritance.

6. Core Value and Application Boundaries of the Innovative Model

6.1. Core Innovative Value of the Model

The full-link experience design model constructed in this paper has three core innovative points compared with existing research and practice:

First, theoretical innovation: It breaks through the limitation of existing research that "emphasizes technology application and neglects system design," and for the first time deeply integrates cultural core anchoring, full-link user experience, and the goal of living heritage, constructing a systematic experience design theoretical framework and improving the design theoretical system of digital art empowering cultural heritage.

Second, practical innovation: Realizes the transformation from "static display" to "dynamic experience", from "one-way communication" to "two-way co-creation", creating a full link between cultural cognition to inheritance co-creation, solving the core pain points of superficial experience and broken inheritance link for traditional digital cultural products with strong practicality and replicability.

Third, value innovation: Achieving the unity of cultural value, aesthetic value, and commercial value by using an experience design as a bridge. Ensuring the correct transmission of cultural core without excessively entertaining traditional culture; enhancing user experience and engagement with

digital art; achieving innovative cultural transformation via a co-creation mechanism provides a sustainable development path for the living inheritance of traditional culture.

6.2. Application Boundaries of the Model

This model has two main principles for its application; first is to accurately anchor the cultural core. Every aspect of experience design serves the transmission of cultural values, without deviation from the essence of culture in order to achieve an effect through experiences, which avoids distorting and entertaining traditional culture. Secondly, it adheres to the user-centered design principle, flexibly adjust the design focus and technology selection at each level according to various cultural types and user groups, balance the richness of the experience with the accessibility of the technology, and avoid over-pursuit of high-end technology increasing the barrier to user participation.

7. Conclusion

The core of cultural inheritance in the digital age lies in achieving a deep connection between people and culture, and experience design is the key bridge to bridging this connection. This paper constructs a four-dimensional, full-link experience design innovation model—"cognition-empathy-participation-co-creation"—with cultural core as its foundation and user experience as its focus. Through a progressive experience hierarchy design, it gradually deepens users' understanding, resonance, and identification with traditional culture, ultimately transforming users from cultural audiences to inheritors, thus creating a complete closed loop for the living transmission of traditional culture. With the continuous iteration of digital technologies such as AIGC and the metaverse, the forms and boundaries of digital art will continue to expand. In the future, the technical adaptability and user segmentation design of this model can be further optimized to form more targeted experience design solutions for different types of traditional culture and intangible cultural heritage projects, allowing excellent Chinese traditional culture to truly "come alive and be passed down" in the digital age.

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