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FROM CULTURAL DECLINE TO DIGITAL SUSTAINABILITY: A USER-CENTERED MOBILE LEARNING APPROACH FOR ENGAGING MILLENNIALS IN INTANGIBLE HERITAGE

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Abstract:

Against the backdrop of rapid digital modernization and generational disengagement, the preservation and transmission of cultural heritage face increasingly severe challenges. The growing disconnection between Mianzhu Wood Block New Year Paintings and the experiences of millennials raises urgent concerns about sustainable preservation and transmission. This study explores how user-centered mobile learning approaches can address cultural disengagement and promote long-term learner engagement with cultural heritage. A sequential mixed-methods approach was employed in this research including a systematic literature review (SLR) using CiteSpace, semi-structured interviews with cultural heritage experts, perceptual analysis of millennial users based on the Kano model, and usability testing of a WeChat Mini Program prototype based on PACMAD metrics. Findings indicate that digitization enhances cultural engagement when design moves beyond visual presentation to interpretive storytelling, multimodal interaction, and contextual learning. Kano model analysis shows that cultural explanation and intuitive navigation are Must-be requirements, while community participation, task-based exploration and symbolic comparison are important performance drivers. Attractive features such as gamification and audio guidance improve user satisfaction and memorability. Usability evaluations further demonstrate that the mini program is highly learnable. These findings further confirm the Wechat Mini Program's significant potential for wider adoption. The

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results also highlight the importance of millennials as a pivotal group for cultural heritage sustainable development. Their digital fluency enables them to drive cultural regeneration.

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Keyword:

Intangible Cultural Heritage (ICH), Mobile Learning, User-Centered Design (UCD)

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Introduction

In last decades, the protection and inheritance of traditional cultural heritage has become a core issue in discussions on cultural self-confidence and sustainable development in China and even worldwide. The report of the 20th National Congress of China emphasized that building a modern country requires following a path of cultural development with Chinese characteristics and enhancing cultural self-confidence at the same time. It serves as the foundation for building a cultural power (Xi, 2022). Cultural self-confidence refers to a firm belief in one's own cultural values and ideals (Liu, 2023). It is not only related to national identity but also a prerequisite for the long-term sustainable development for traditional cultural practices. Therefore, China's policy discourse emphasizes the role of excellent traditional culture in contemporary society, citizenship education, and soft-power strategies (Liu, 2023; Zhang, 2023).

Traditional cultural heritage (TCH) comprises both tangible and intangible expressions, including artefacts, sites, performing arts, crafts, and associated knowledge systems (ISPRS et al., 2018; Hou et al., 2022). After the release of the UNESCO Convention for the Safeguarding of Intangible Cultural Heritage in 2003, the digital preservation of ICH has gained global attention as a vital cure to secure cultural resources for both present and future generations (UNESCO, 2003; Hou et al., 2022). Digital technologies can document, visualize, and distribute heritage at a large scale. However, sustainable digital preservation remains challenging because it requires unceasing investment, specialized skills, and proper technological infrastructures (Perera, 2023). Meanwhile, the diverse cultural life in the digital age creates new expectations among receptionists. Therefore, it is imperative that preservation and transmission strategies of TCH keep pace with changing media ecology and people's behaviour.

Mianzhu Woodblock New Year Paintings is a typical case within this broader context. It originated from Mianzhu City, Sichuan Province, which is historically known as the birthplace of bamboo paper. These paintings are among China's four major traditions of New Year paintings and are widely distributed in Deyang and southwestern China regions (Ting et al., 2023). In 2006, Mianzhu Woodblock New Year Paintings were listed in the first batch of the National Intangible Cultural Heritage List (heritage number VII-11). Thereafter, their core value lies not only in physical artefacts such as woodblocks, pigments, and paper, but also in

the techniques, aesthetic conventions, and narrative traditions (China Intangible Cultural Heritage Network, 2006; Ting et al., 2023). However, Mianzhu Woodblock New Year Paintings are now facing a serious trend of decline and even invisibility. There is an increasing tendency that woodblock New Year paintings is shifting from everyday necessities in every household in the past to collections of connoisseurs and researchers (Feng, 2005; Song, 2010). Many Scholars predict that Mianzhu New Year paintings have moved from prosperity toward marginalization, or eventual extinction (Zhou, 2006; Lei, 2014). The demand for Mianzhu New Year paintings is relatively weak when comparing it to other art forms such as traditional Chinese painting, oil painting, watercolour, and lacquer art (Hu & Deng, 2024). With the development of civilization, people's living standards rise. Many consumers favour high-end, fashionable, or minimalist artworks, perceiving traditional New Year paintings as outdated or stylistically incompatible with contemporary interiors (Hu & Deng, 2024; Ting et al., 2023). This mismatch between the medium and aesthetics has become increasingly severe due to the departure of the older generation of artisans and the decline in the willingness of the younger generation to learn and pass on traditional skills (Xie, 2021).

The rapid expansion of China's mobile internet ecosystem has brought both challenges and opportunities for addressing these issues. By December 2023, the number of Chinese internet users had reached 1.092 billion, including 326 million rural internet users. At the same time, the penetration rate and usage duration of mobile internet were also steadily increasing (China Internet Network Information Center, 2024). In 2023, the number of monthly active mobile internet users exceeded 122.4 million, and the average monthly usage duration was close to 160 hours (QuestMobile, 2023). In this environment, WeChat has become a core "super application". By the end of 2023, the total number of monthly active users of WeChat and its related services reached 1.343 billion, which has driven the rapid growth of video accounts, mini-programs, mini-games, and search services (Tencent, 2024).

Especially, the WeChat Mini Programs offer a lightweight and install-free environment that has deeply integrated into users' daily communication activities. They enable instant access, low memory consumption, and can seamlessly integrate with social functions such as sharing, commenting, and group interaction (Lu & Qu, 2024).

As for traditional arts like Mianzhu New Year paintings, mini-programs offer a potentially powerful tool for both promoting educational engagement and disseminating culture (Cai & Yahaya, 2023) Mini-programs carry many functions, including high-definition images, multi-layered narratives, interactive visualizations, mini-games, e-commerce functions, and links to offline experiences. However, their effectiveness as educational technology tools for promoting sustainable cultural development depends on how well they align with user needs, the learning process, and cultural expectations.

Millennials (Generation Y) are a particularly crucial user group. Chinese Millennials possess exceptionally high digital literacy. They are deeply immersed in social media and mobile communications, and their influence is growing as consumers, cultural disseminators as well as the parents of the next generation (Jun 2020). Meanwhile, they are also the generation that is most vulnerable to the impact of globalized aesthetics, accelerated urbanization, and changing lifestyles that are gradually distancing them from traditional rural cultural customs. Therefore, Millennials face the risk of cultural disconnect while simultaneously being entrusted with a key role in intergenerational cultural transmission. Based on this context, designing

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effective digital interventions for this group requires not only technological innovation but also a deep understanding of their cognition, motivations, and learning preferences.

Despite increasing research on Mianzhu woodblock prints for the New Year, there are also several gaps, hindering the development of sustainable and educational digital strategies. First, while there is existing research in art history and stylistic analysis (Don, 2009; Deng & Hao, 2024; Huang, 2023; Ren, 2020). Relatively few studies systematically examine how contemporary users (especially millennials) perceive the authenticity, cultural value, and relevance of this cultural heritage. Second, empirical research is lacking on the specific needs and preferences of millennials regarding the digital presentation of cultural heritages, including expectations for content depth, interaction modes, interface design, and visual style (Shan& Wardi, 2025), especially Mianzhu woodblock prints as a typical case. Third, research on the application of WeChat mini-programs in the field of cultural heritage often focuses on conceptual design or promotional effects, lacking user-centered assessments of usability, learning experience, and cultural impact (Song, 2023). Finally, existing digital initiatives often emphasize aesthetic modernization and product innovation, while paying insufficient attention to whether digital engagement truly enhances users' cultural understanding, emotional attachment, and willingness to participate in heritage transmission (Zhang et al., 2025).

Against the research backdrop mentioned above, this study explores how to employ a WeChat mini-program designed based on User-Centered Design (UCD) principles to support millennial users in the sustainable preservation and transmission of Mianzhu New Year paintings. This study employs a mix-method sequentially design containing both qualitative and quantitative reseach method to (1) explore users' perception and understanding of the preservation and transmission of Mianzhu New Year paintings; (2) identify millennial users' needs and preferences for the digital presentation of this cultural heritage; (3) to design a WeChat mini-program prototype in supporting cultural learning and engagement.

This study combines theoretical insights from User-Centered Design (UCD) and User Experience (UX) research with empirical data on millennial learners, contributing to the fields of educational technology and global sustainable development in three ways. First of all, theoretically, it regards mobile heritage applications as learner-centered interventions, which is capable of transforming cultural alienation into sustained cultural engagement. Secondly, seen from the methodology, it presents a user-centered process that integrates qualitative inquiry, quantitative needs analysis model to inform the design of digital heritage tools. Thirdly, it also provides evidence-based design guidelines for cultural institutions, educators, and developers looking to leverage WeChat Mini Programs and similar platforms to engage younger generations with cultural heritage, thus supporting the long-term vitality of traditional culture in a rapidly changing digital society.

Literature Review

Cultural Decline and Intangible Heritage Sustainability

The accelerating pace of modernization and globalization has exacerbated the decline of traditional cultural practices, particularly intangible heritage forms that rely on transmission rather than material preservation from generation to generation. Present discussions emphasize that digital preservation is not merely a technical endeavor. Instead, it is closely linked to cultural confidence, institutional and policy support, and the sustainable development needs

and awareness of future generations (Hou et al., 2022; Xi, 2022; Liu, 2023; Zhang, 2023). Scholars further point out that despite increasing awareness, digital heritage projects still face numerous challenges, particularly in terms of funding, technical expertise, and personnel shortages (Perera, 2023). Recent research indicates that sustainable preservation requires not only technological strategies but also a systematic shift towards community involvement and the establishment of long-term evaluation mechanisms to ensure the intergenerational transmission of cultural values (Ibrahim et al., 2025; Iliodromitis et al., 2025). These discussions suggest that cultural preservation is shifting from a static to a sustainable model, meaning that participation of generations is required, especially among millennials. They will determine whether traditional culture will remain socially relevant in the future.

Mianzhu Woodblock New Year Paintings

Originating in the Song Dynasty, Mianzhu New Year Paintings are widely recognized as one of the four major types of New Year prints in China. They embody centuries of artistic techniques and regional folk customs (Simon, 2025). Previous research has emphasized the cultural symbolism of Mianzhu New Year Paintings and their importance to regional identity and cultural economy (Ting, 2023; Liu, 2012). However, recent research indicates that the cultural influence of Mianzhu woodblock prints is declining sharply, gradually shifting from everyday ceremonial items to niche collectibles (Song, 2010; Hu & Deng, 2024). Evidence also suggests that young people's interest in Mianzhu New Year Paintings is declining, their aesthetic values are disconnected from traditional aesthetics, and the emotional connection between the younger generation and this tradition is weakening (Hu & Deng, 2024; Ting et al., 2023). Scholars also point out that existing literature mainly focuses on the artistic characteristics, color symbolism, and craftsmanship of Mianzhu woodblock prints (Don, 2009), while its deeper cultural connotations and identity mechanisms are rarely studied (Qian, 2023). Overall, these studies suggest that despite a great deal of historical and artistic analysis, little is known about millennials' cultural perceptions, emotional attitudes, or their learning process of this tradition.

Digital Preservation and the WeChat Mini-Program Ecosystem

In recent years, digital preservation has become an important academic and policy directio. It receives significant support from interdisciplinary collaborations and national research funding (Xu et al., 2022; Xu, 2021). Digital innovative tools such as virtual reality (VR), augmented reality (AR), immersive visualization (IV), and web geography information system (Web-GIS) platforms have been widely adopted to improve the accuracy, accessibility, and participation of digital preservation (Yu, 2025; Iliodromitis et al., 2025). In China's mobile-first digital environment, WeChat mini-programs have become an important medium for cultural dissemination. It offers significant advantages, including low memory usage, rapid deployment, and a large user base (Yuan, 2023). Research further indicates that WeChat mini programs have obvious effects as mobile learning tools (Yang et al., 2019) and are closely related to lifelong education and intercultural learning (Wan et al., 2019; Cui, 2024). The lightweight access, social-network circulation, and integration of multimedia functionalities of the WeChat platform enable it to play a unique role in cultural revitalization within the "micro-era" of digital media cultural participation (Tang, 2020; Xie, 2021). However, despite these abundant application cases, existing research still present a lack of a sustained evaluation of WeChat's cultural impact, user experience effectiveness, and youth participation outcomes in the field of cultural heritage.

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User-Centered Design in Digital Cultural Contexts

User-centric design (UCD) offers a structured methodology based on iterative development, participatory interaction, and contextual assessment (Abras et al., 2004; ISO 9241-210, 2019). In the field of cultural heritage digitization, scholars emphasize that UCD not only enhances usability but also supports cultural values, identity, and sustainable transmission (Ciolfi & Bannon, 2020; Parry, 2021). Especially for digital platforms such as WeChat Mini Programs, UCD has proven effective in enhancing cross-device and cross-contact consistency, cultural immersion, and identity (Maldonado, 2023). However, recent literature points out that while design principles have been widely discussed, conceptual frameworks remain fragmented and lack sufficient empirical validation within cultural contexts. In this regard, it suggests a need to systematically integrate UCD into digital heritage interventions to bridge the gap between cultural meaning and digital usability.

User Experience, Mobile Learning and Generational Engagement

Mini-program-based learning experiences can support young users' education, cross-cultural engagement, and lifelong learning processes (Yang et al., 2019; Wan et al., 2019; Cui, 2024). Meaningful digital cultural engagement requires not only functional design but also mechanisms that activate cultural awareness, emotional connection, and community identity (Xie, 2021; Liu, 2023). However, while usability frameworks such as the Nelson-Norman principle provide guidance for interface efficiency, as recent research on mini-programs and heritage visualization frameworks points out, current research still lacks structured user experience evaluation models for heritage platforms. Therefore, current research highlights a critical gap between mobile learning functionality and cultural sustainability outcomes.

After a systematic literature review in terms of digital preservation and transmission of cultural heritage taking Mianzhu Woodblock New Year Paintings as an example and existing educations tools, three core gaps are identified. First, current research primarily focuses on the art history and cultural descriptions of Mianzhu Woodblock New Year Paintings. There is a noting insufficient attention to millennials' perceptions and cultural alienation. Second, research on digital heritage primarily utilizes technology-driven projects, while intervention studies based on user-centered design (UCD) methodology and users' needs and demands remain scarce. These gaps collectively indicate an urgent need for research that integrates millennial cultural perception and understanding, user-centered design-based intervention programs from the perspective of their actual needs and demands and empirically measured digital sustainability outcomes.

Research Methodology

This study employs a pragmatic philosophical stance and a sequential mixed-methods research design to explore how user-centered mobile learning interventions can promote the preservation and sustainable transmission of Mianzhu New Year Paintings among millennial learners. Pragmatism provides the most coherent epistemological foundation for this research. It integrates qualitative depth with quantitative generalization and links exploratory cultural insights with measurable learning and usability outcomes (Creswell & Plano Clark, 2018). It is noteworthy that while other philosophical stances such as interpretivism or positivism were considered, neither alone is sufficient to fully achieve these research objectives. Interpretivism lacks generalization, while positivism reduces complex cultural experiences to statistical

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variables. Therefore, pragmatism offers methodological flexibility and supports a user-centered, hybrid approach strategy as the most effective way to generate actionable knowledge on the sustainability of digital heritage.

This study follows sequential exploratory mixed-methods structure explicitly aligned with ISO 9241-210:2019 and Garrett's Five Planes of User Experience. It integrates qualitative contextual inquiry, quantitative needs identification, iterative prototype development, and usability evaluation. The research process is thus divided into four interrelated methodological modules.

Module one: SLR and Semi-structure Interview

The first module focuses on understanding and clarifying the context of use. This module comprises two parts: a systematic literature review (SLR) and semi-structured interviews. To establish a fundamental understanding of the research field and clarify the challenges faced by Mianzhu woodblock prints in cultural preservation, the first part of Module 1 is a systematic literature review (SLR). This review follows a structured bibliometric screening process, combining quantitative evidence extraction with qualitative interpretive synthesis. Web of Science Core Collection (WOS) and CNKI (CSSCI-indexed) journals. The WOS search was performed using topic-level Boolean expressions — Cultural Heritage AND (digital OR preserve* OR user-centered OR user-centric) * — covering a 2016–2025-time span, which yielded 595 initial records, all of which met the CiteSpace import criteria and were retained as journal articles for analysis. To capture the Chinese discourse and policy-driven research context, the CNKI search used the terms 文化遗产（主题）+数字化+保护 (Cultural Heritage as Theme+digital+preserve) within the same time window, producing 374 results, of which 369 journal articles were qualified for CiteSpace clustering and co-occurrence analysis. ll records were imported into CiteSpace for knowledge mapping, including keyword co-occurrence, cluster generation, burst detection, and time-zone evolution visualisation. This quantitative mapping construction helps identify high-frequency themes and research frontiers in the field of intangible cultural heritage digitization, while subsequent manual coding and qualitative reading aid in the semantic interpretation of conceptual patterns. Therefore, the systematic literature review in Module 1 serves as both a quantitative knowledge structure mapping and a qualitative thematic foundation, forming the basis for the analysis. Subsequently, semi-structured interviews were conducted to examine the perspectives of experts.

Semi-structured expert interviews is adopted in this study to explore the perceptions of authenticity, cultural value, emotional attachment/cultural identity, and openness to digital preservation, following established qualitative inquiry methods (Corbin & Strauss, 2015). To ensure the depth and professionalism of the research, six cultural heritage experts were selected through purposive sampling. Subsequently, a thematic analysis was conducted to contextual background themes related to the cultural decline of Mianzhu Woodblock New Year Paintings and intergenerational disengagement, which served as the basis for subsequent design decisions.

Module 2 ：KANO Model Survey

Building on the qualitative and quantitative research findings from module 1, the second module employed quantitative methods to identify the audience's needs and expectations regarding the digital presentation ofMianzhu Woodblock New Year Paintings. This research

then conducted a questionnaire survey targeting Generation Y using established sampling procedures to ensure sample representativeness (Babbie, 2020). According to data from the National Bureau of Statistics of China, the population born between 1980 and 1994 was 330.49 million. The sample size table proposed by Krejcie and Morgan in their 1970 paper is a statistical tool used to determine the appropriate sample size for a specific population in surveys or other types of quantitative research (Krejcie & Morgan, 1970). Therefore, at least 385 samples were required. 400 questionnaires were distributed, and 392 valid responses were collected, indicating a response rate of 98%. Reliability and validity tests showed good consistency of the measurement results, with Cronbach's α values of 0.885 and 0.887, and KMO values of 0.949 and 0.946, respectively, indicating suitability for factor analysis. The questionnaire was designed using a KANO model to categorize classify must-be (M), one-dimensional (O), attractive (A), indifferent (I) and reverse (R) quality attributes in the context of digital heritage engagement. KANO evaluation and Better–Worse Coefficient analysis was conducted in SPSS to produce a prioritized UX features list aligned with Garrett's Five Planes.

Module 3: WeChat Mini Program Prototype

The third module involved creating a functional design scheme that conforms to ISO 9241-210 standards and Garrett's User Experience Plane. Based on prioritizing the needs and emotional expectations of millennial users, a WeChat mini-program prototype was designed that incorporates interactive, narrative, and participatory features that embody cultural authenticity. Following UCD best practices, five layers of Garrett's User Experience Plane including strategy, scope, structure, skeleton, and surface layers were iteratively refined. Ultimately, a structured digital intervention integrating artistic elements, pedagogical features, and intuitive navigational structures is formed.

Module 4: PACMAD Evaluation

The final stage employed a quantitative usability scale to evaluate the prototype, following an evaluation procedure consistent with the "evaluating against requirements" stage of the ISO 9241-210 standard. Thirty participants were recruited based on the natural context and representative user criteria emphasized in PACMAD mobile usability assessment (Harrison et al., 2013). Evaluation tools included measures for effectiveness, efficiency, satisfaction, learnability, memorability, errors, and cognitive load. Internal validity was enhanced through triangulation among the methods, tools, and participant groups, ensuring consistency of data sources and improving the robustness of the evaluation conclusions.

This study systematically progresses from the diagnosis of cultural issues to the empirical evaluation of interventions developed to address them. The combination of qualitative contextual inquiry, quantitative prioritization, iterative prototyping, and usability evaluation ensures that each methodological phase informs the next. In this way, this research established internal coherence and cumulative analytical depth. After clarifying user needs, designing digital interventions that match those needs, and empirically evaluating usability and cultural learning outcomes using standardized tools, the empirical results from Modules 1 through 4 is presented orderly. Therefore, the following sections report key findings from interviews, large-scale questionnaires, the design and implementation process, and usability and cultural sustainability assessments of the WeChat Mini Program. It comprehensively demonstrated how millennials engaged with the system and how this engagement shapes their understanding and perception of Mianzhu Woodblock New Year Paintings.

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Findings

The findings of this study are presented in four integrated analytical segments, each reflecting a distinct stage of the inquiry.

Findings of SLR

The WOS knowledge graph demonstrates that cultural heritage, digital heritage, virtual reality, augmented reality, 3D reconstruction, and photogrammetry are at the most central and frequently co-occurring positions. It reflects an international research landscape largely driven by high-fidelity digital preservation technologies. The results indicate a methodological shift from traditional archival digitization toward immersive simulation-based cultural revitalization as indicated in figure 1. Timeline evolution as shown in figure 2 suggests a progressive development from 3D scanning and photogrammetry (2016–2019) to VR/AR and virtual archaeology (2020–2022) and AI-based reconstruction, deep learning-enhanced restoration, and smart cultural heritage environments (2023–2025). These results indicate that global research prioritizes technological capability over experiential or pedagogical engagement. The results also reveals that relatively few scholarships to date examines user psychology, cultural identity, or generational learning mechanisms in cultural sustainability.

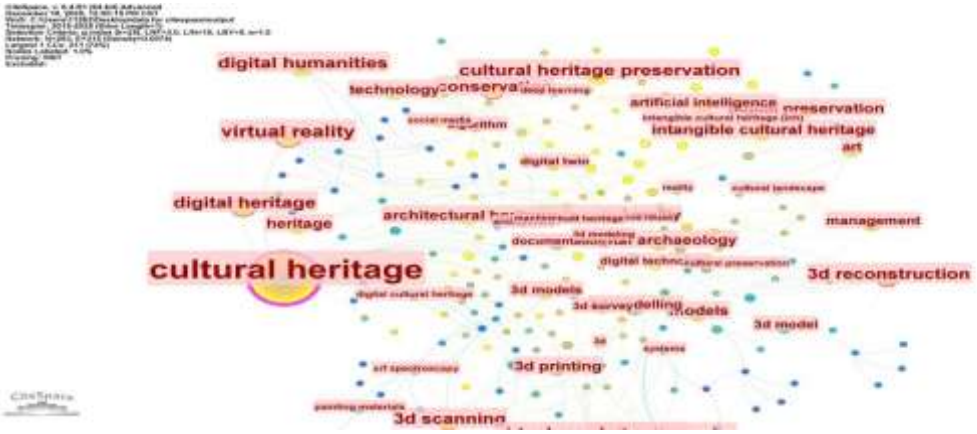

Figure1： Key Words Co-occurrence Mapping of WOS by Citespace

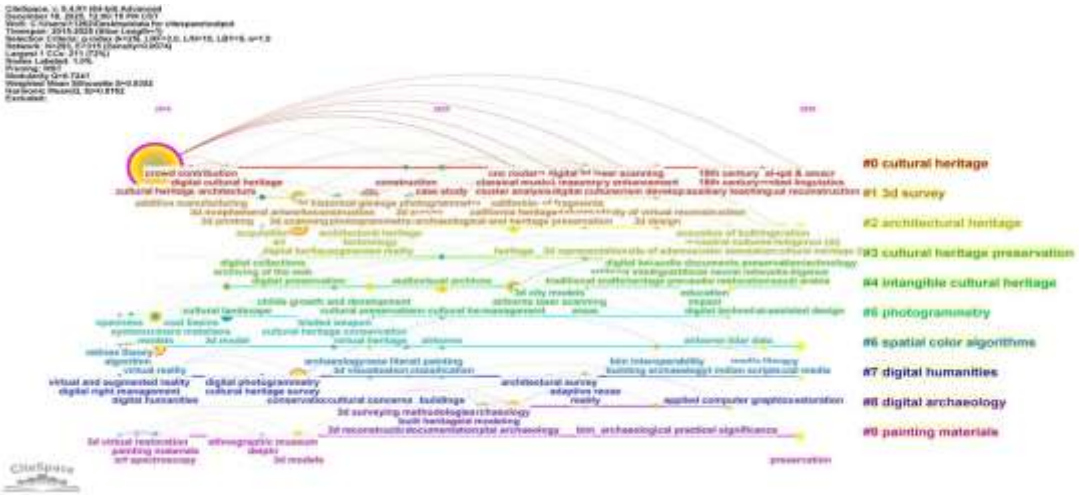

Figure 2： Key Words Cluster Timeline of WOS by Citescpace

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Meanwhile, the CNKI visualization shows a distinct culture-ecological knowledge structure. Keywords such as 文化遗产 (cultural heritage), 数字化 (digitization), 数字人文 (digital humanities), 古籍保护 (ancient preservation), 图书馆/博物馆 (libraries/museums) form the densest clusters—revealing a national orientation toward protection framework construction, resource archiving, and cultural safeguarding policy as indicated in figure 3. The timeline of figure 4 shows an evolution from digital resource repositories and documentation toward cultural revitalization, rural heritage, ethnic culture transmission, and education-integrated preservation. Comparing the results with what have been found from WOS database, research in China places stronger emphasis on heritage as a social and cultural system. This system particularly involves communities and traditional settlements. However, similar to the global pattern, Chinese literature analysis shows limited exploration of millennial learners' perception, emotional connection, or identity formation. It verified the necessity of this study by indicating a clear unaddressed gap.

Figure 3：Key Words Co-occurrence Mapping of CNKI by Citespace

Figure 4：Key Words Cluster Timeline of CNKI by Citescpace

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Comparing global and Chinese discourse reveals two complementary academic frames. Firstly, the international field largely advances technical-instrumental digital preservation, while China foregrounds policy-based cultural inheritance and institutional safeguarding. Despite different emphases, both knowledge systems share one common absence, which is the user side of heritage sustainability, particularly how younger generations perceive, value, or emotionally engage with intangible cultural heritage. Neither provides sufficient insight into how digital education, mobile interaction, or user-centered experience may reconnect fading cultural forms with millennial learners. Thus, the CiteSpace-based SLR confirms the necessity of this study to foreground perception, meaning-making, and digital learning mechanisms as drivers of long-term cultural sustainability for Mianzhu Woodblock New Year Paintings.

Findings of Semi-structured Interview

Based on Wilson's (2013) user-centered design interview techniques guidelines, following the establishment of clear inclusion and exclusion criteria and the development, six domain experts were selected for qualitative inquiry, including two intangible cultural heritage inheritors, two art/printmaking educators, one tourism-college lecturer, and one design professional. Each participant contributed professional knowledge, actual experience with Mianzhu Woodblock New Year Paintings. All respondents informed perspectives on the role of digital technology in cultural sustainability. Responses were transcribed, coded and analysed thematically. Findings reveal four major themes including authenticity perception, cultural value understanding, emotional attachment and identity formation, and acceptance of digital means for transmission. As for the perceived authenticity in digital transmission, all respondents acknowledged that digital platforms offer new visibility for Mianzhu Woodblock New Year Paintings. However, authenticity emerges as the core evaluative criterion. Heritage inheritors particularly stressed the risk of style distortion and craftsmanship dilution. They argue that digitalization should document original brushstrokes, textures, carving patterns, and pigment characteristics to retain the integrity of the artwork. Educators and designers also noted that interaction and gamification could increase youth engagement only if handled carefully. Excessive modification may cause audiences to perceive the art as "modernized" rather than "traditionally grounded." Thus, digital transmission is not rejected but must be implemented as preservation-oriented rather than entertainment-oriented.

As for the aspect of cultural value recognition and educational transmission, five out of six interviewees emphasized that digital heritage platforms must not only display images but also translate cultural context into accessible learning experiences. Participants also stated that historical narratives, festival symbolism, and regional folk beliefs must be embedded through multimedia storytelling, curated annotation, and contextual explanations.Instead of focusing only on visual reproduction, experts believed that digital artifacts should function as intellectual gateways which can help users understand values such as auspicious symbolism, community identity, seasonal rituals, and craft lineage. Therefore, the interview findings indicate that cultural education is equally important as digital preservation and may even determine long-term sustainability outcomes.

Seen from the aspect of emotional attachment and cultural identity formation, all interviews, emotional connection was identified as a necessary driver for future transmission. Participants described digital tools as capable of recreating cultural intimacy through zoom-in detail exploration, oral-history video, workshop simulation, and story-based interaction. Several experts also noted that younger generations do not only lack knowledge. They lack a sense of

belonging and affective resonance. Digital immersion may therefore act as a bridge to help millennials internalize heritage values rather than passively observe them. However, experts also acknowledged the irreplaceability of material tactility, which indicates that emotion is enhanced digitally but fully completed only through physical–digital integration.

As for young generations' acceptance of digital means across generations, all participants expressed cautious optimism regarding mobile-based cultural transmission. The level of acceptance depends on multiple variables such as interface intuitiveness, aesthetic quality, information accuracy, interaction depth, and user technical familiarity. Younger audiences were perceived as more receptive to digital platforms especially when features such as social sharing, gamified learning, and visually engaging navigation are included. In contrast, traditional inheritors and elder users emphasised the need for simplified access paths, culturally respectful UI, and guidance-based learning flows. Experts therefore suggest that platform adoption is not only a technological issue but also a matter of intergenerational usability equity.

The interviews reveal an underlying consensus. Digital platforms hold strong potential to support the sustainable transmission of Mianzhu Woodblock New Year Paintings. Meanwhile, effectiveness also depends on authentic representation, cultural-educational depth, and emotion-identity resonance instead of merely digital availability. Heritage sustainability for millennials is therefore less about displaying art and more about designing meaningful cultural learning. This allows digital technology to function as a bridge rather than a replacement for lived cultural experience.

Findings of Kano-model Questionnaire

To further and deeply identify millennial user needs and preferences for the digital representation of Mianzhu Woodblock New Year Paintings, Kano analysis was conducted in this research by mapping satisfaction responses to functional quality attributes. Each design feature was evaluated across the five Kano response dimensions including Attractive (A), One-dimensional (O), Must-be (M), Indifferent (I), and Reverse (R). It makes classification of functional requirements by their influence on user satisfaction. Better-Worse coefficients were subsequently calculated based on the Kano model survey results to quantify attribute sensitivity that enables prioritization for interface development.

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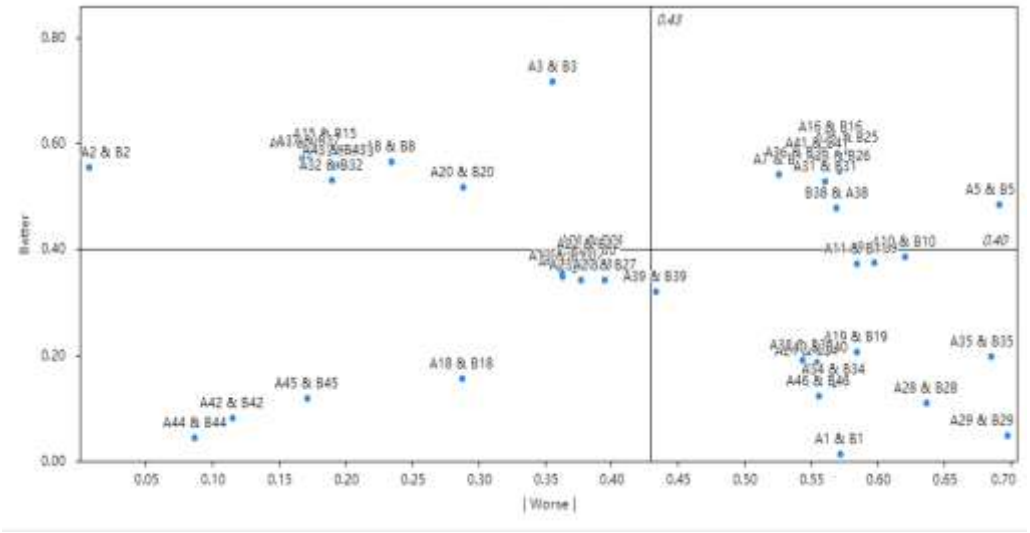

Figure 5 : Better-Worse Coefficient Diagram

As shown in figure 5, Must-be(M) attributes represent functions users take for granted. Absence of these features generates strong dissatisfaction even if their presence does not significantly elevate satisfaction. The dataset indicates that millennials regard narrative cultural interpretation, intuitive interface interaction, and content clarity as fundamental expectations. One-dimensional(O) attributes demonstrate a linear positive relationship between implementation quality and user satisfaction. These features are not merely expected but performance-elevating including community interaction, layered content architecture, dynamic visual feedback, and search optimization. These attributes represent core leverage points to improve platform performance, indicating that users do not want a passive museum-like interface. They expect interactive communication, efficient access, and real-time response feedback, which is aligned with millennial digital engagement habits. Attractive attributes are not expected but significantly enhance satisfaction when present. These represent innovation space and emotional engagement mechanisms. These results clearly indicate that while heritage content must first be understandable and navigable. Millennials are particularly motivated by playful, emotional, and immersive interaction formats. Gamification, audio-guided learning and visual dynamism may therefore activate cultural curiosity, strengthening engagement and memory retention, which is an essential mechanism for long-term sustainability. Certain features were classified as Indifferent (I), meaning their presence or absence exerts minimal influence on user satisfaction. This indicates that platform success depends on first securing comprehension and usability (M), then strengthening interactive delivery (O), and finally amplifying cultural immersion through gamification and audio-visual storytelling (A). Traditional culture cannot be sustained through preservation alone. It requires emotionally resonant digital experiences that speak in the cognitive language of millennial learners.

The Findings of PACMAD

To measure the usability of the WeChat Mini Program from a mobile interaction perspective, the PACMAD framework was applied across seven dimensions including effectiveness, efficiency, satisfaction, learnability, memorability, error rate, and cognitive load. The evaluation sample consisted of 30 users, and reliability measures confirmed strong internal consistency across indicators. Findings demonstrate a generally high level of usability, with an overall PACMAD mean score of 6.3/7 and a Net Promoter Score (NPS) of 87%, indicating that 26 of 30 participants would recommend the application to others.

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Table 1 : PACMAD Evaluation Scores of the Prototype

Dimension	Mean Score (1–7)	Standard Deviation	Cronbach's α	Composite Reliability (CR)	Top-2 Box %
Effectiveness	6.4	0.6	0.84	0.87	73 %
Efficiency	6.2	0.7	0.82	0.85	70 %
Satisfaction	6.5	0.5	0.88	0.90	77 %
Learnability	6.6	0.4	0.85	0.88	80 %
Memorability	6.3	0.6	0.83	0.86	70 %
Errors	6.1	0.8	0.80	0.84	67 %
Cognitive Load	2.1	0.9	0.79	0.83	7 %

Statistically, the PACMAD dimensions indicate that the system is highly learnable, satisfying, and effective, supported by strong reliability and favorable Top 2 Box scores (67–80%). Memorability and satisfaction performed particularly well, suggesting that the platform does more than facilitate task completion—it retains user interest and encourages cultural revisitation, a critical factor in intangible heritage sustainability.

The low cognitive load score (2.1) is especially meaningful. It indicates that users did not experience fatigue or overwhelm when navigating cultural content, which is an essential requirement for millennial engagement. At the same time, high learnability and effectiveness scores reveal that the Mini Program successfully supports skill acquisition, allowing users to explore, compare, and interpret New Year paintings with confidence. With an NPS of 87%, the platform demonstrates not only usability success but also viral potential, meaning users are intrinsically motivated to share and recommend the heritage content. Therefore, PACMAD results confirm that the Mini Program design aligns effectively with mobile learning usability standards and supports sustained cultural participation, validating its potential as a scalable digital solution for intangible heritage preservation.

Conclusion

This study demonstrates that digital technology guided by user-centred design principles can effectively reduce cultural distancing and stimulate renewed engagement with intangible heritage among millennial learners. Extensive literature acknowledges that traditional art forms decline primarily because cultural knowledge transmission is no longer embedded in everyday life (Smith 2006; Blake 2017). Modernization, migration and lifestyle changes have weakened

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intergenerational continuity. This change produces what scholars describe as a growing "heritage disconnection gap" (Kurin 2004; Harrison 2013). The interview phase of this study confirms this pattern, which is, cultural inheritors expressed concern that younger generation's view Mianzhu Woodblock New Year Paintings as visually appealing instead of contextually remote. However, findings from the Mini-Program evaluation indicate that digital environments can narrow this gap if designs not only to display but also to interpret cultural meaning. High usability scores across PACMAD show that digital tools can reconstruct cultural proximity by enabling users to explore symbolism, compare versions, and examine artisan techniques.It also allows users to revisit detailed information with minimal learning effort. This aligns with recent work arguing that digital media does not inherently dilute heritage but also can serve as a cognitive and emotional bridge when thoughtfully mediated (Giaccardi & Fogli 2019; Kenderdine 2021).

Educational technology further amplifies this shift by transforming cultural artefacts from static visual objects into dynamic learning experiences. Prior research emphasises that cultural sustainability depends not only on preservation but also on participatory cultural learning. In this way, users construct meaning rather than merely observe (UNESCO 2015; Hooper-Greenhill 2020). The results of the Kano-model analysis strongly align with this theoretical position. Must-be attributes identified by users primarily concerned cultural comprehension such as story annotation, production-process demonstration and symbol interpretation. This finding indicates that knowledge clarity is a prerequisite for cultural value formation. Once understanding is achieved, users expressed desire for deeper engagement through interactive elements, social sharing, and task-oriented exploration. It further confirmed that participation follows cognitive access. This mirrors findings by Parry (2019) and Liu et al. (2022), who note that digital platforms function most effectively when they enable meaning-making and social circulation rather than passive viewing. Therefore, digital learning environments designed for heritage transmission must balance accuracy and accessibility while structuring interaction as a pathway toward sustained cultural investment.

This study confirms that digitalisation alone cannot save culture, while digitally mediated learning can. When intangible cultural heritage is transformed into an interface that invites exploration, interpretation and emotional connection, it gains the capacity to move forward as memory, as identity, and as shared future. Sustainable heritage is not preserved by storage, but by participation, and not by observation, but by experience. As global societies accelerate toward digital modernity, designing for cultural sustainability becomes not only a technical ambition but a civilisational responsibility.

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References

Cai, Y., & Yahaya, W. (2023). Research on the application of interaction design with aesthetic experience in folk art: Take the craftsmanship of New Year's picture of Mianzhu of China as an example. International Journal of Academic Research in Accounting, Finance and Management Sciences, 13(2). https://doi.org/10.6007/ijarafms/v13-i2/18195

China Intangible Cultural Heritage Network. (2006). Mianzhu woodblock New Year paintings: National intangible cultural heritage list. https://www.ihchina.cn/Article/Index/detail?id=13910

Deng, Y., & Hao, M. (2024). Research on the inheritance and development path of Mianzhu New Year paintings from the perspective of intangible cultural heritage. Xin Meiyu, (06), 73–75.

Don, W. (2009). Discusses the development and the art features of Sichuan Mianzhu wood-block New-Year prints. Art and Design. https://consensus.app/papers/discusses-development-features-sichuan-mianzhu-don/bf45c8d02aff5509bd488d2119cf1ed0/

Garrett, J. J. (2011). The elements of user experience: User-centered design for the web and beyond (2nd ed.). New Riders.

Harrison, R., Flood, D., & Duce, D. (2013). Usability of mobile applications: Literature review and rationale for a new usability model. Journal of Interaction Science, 1(1), 1. https://doi.org/10.1186/2194-0827-1-1

Hu, G., & Deng, Y. (2024). Research on the strategies for the inheritance and innovative development of intangible cultural heritage in the digital context: A case study of Mianzhu woodblock New Year paintings. Art Education Research, (11), 42–44.

Huang, F. (2023). A brief discussion on the evolution, connotations, and impact of New Year culture on Mianzhu culture. Journal of Sichuan Provincial Academy of Socialism, (03), 84–96.

Liu, S. (2023). Analysis of Chinese excellent traditional culture from the perspective of cultural self-confidence. Journal of Humanities, Arts and Social Science, 7(5), 974–977. https://doi.org/10.26855/jhass.2023.05.018

Lu, G., & Qu, S. (2024). Enhancing user experience of WeChat mini-programs on mobile devices: A comprehensive analysis. In Proceedings (pp. 258–277). https://doi.org/10.1007/978-3-031-60487-4_20

Maldonado, T. (2023). User centered user interface design: Best practices and trends. Revista VICTEC. https://doi.org/10.61395/victec.v4i7.128

Miao, Y. (2022). The logic of cultural self-confidence in the perspective of national rejuvenation: Exploring the responsibility of traditional Chinese culture in the journey of rejuvenation. Frontiers in Art Research, 4(1). https://doi.org/10.25236/FAR.2022.040113

Norman, D. A. (1986). User-centered system design: New perspectives on human–computer interaction. Lawrence Erlbaum Associates.

Perera, K. (2023). Heritage at risk: Digital preservation of traditional cultural heritage (TCH) in Sri Lanka. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 48, 1197–1207.

Qian, J. (2023). Constructing semiotic system: A study of traditional Chinese woodblock New Year pictures. https://www.diva-portal.org/smash/record.jsf?pid=diva2:1774329

Ren, J. (2020). The depiction of female door gods in Mianzhu woodblock New Year paintings: A case study of Liang Hongyu and Mu Guiying. Western Leather, (17), 76–77.

Song, Z. (2023). Gaining instead of losing: The image of Dunhuang as a religious heritage in a WeChat mini-programme. Religions, 14(5), 634. https://doi.org/10.3390/rel14050634

Ting, H. T. T., Abdullah, M. F. W. B., & Zalay, A. A. B. (2023). Innovative redesign of Mianzhu New Year picture products: A path to integrate culture and tourism. Global Journal of Arts, Humanities and Social Sciences, 11(8), 33–41. https://doi.org/10.37745/gjahss.2013/vol11n83341

Xi, J. (2022). Hold high the great banner of socialism with Chinese characteristics and strive in unity to build a modern socialist country in all respects (Report of the 20th National Congress of the Communist Party of China). Government of the PRC.

Xie, C. (2021). The communication practices and cultural space reconstruction of intangible cultural heritage inheritors: A case study of Mianzhu New Year paintings. Modern Communication (Journal of Communication University of China), (09), 98–103.

Zhang, A., Gong, Y., Chen, Q., Jin, X., Mu, Y., & Lu, Y. (2025). Driving innovation and sustainable development in cultural heritage education through digital transformation: The role of interactive technologies. Sustainability, 17(1), 314. https://doi.org/10.3390/su17010314