Innovative Practices and Development Trends of Mutual Empowerment Between Intangible Cultural Heritage and Campus Education in the Digital Context

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Abstract:**In the digital age, the protection and inheritance of intangible cultural heritage (ICH) are confronted with new opportunities and challenges. As a crucial base for talent cultivation and cultural inheritance,education's combination with ICH holds significant meaning. This paper explores the innovative practices of the mutual empowerment between ICH and campus education in the digital context, analyzes its development trends, aiming to provide valuable references for the inheritance of ICH and the innovation of campus education.**

Keywords: Digital Background; Intangible Cultural Heritage (ICH); Campus Education; Mutual Empowerment

1. Introduction

Intangible cultural heritage (hereinafter referred to as “ICH”) stands as a vital symbol of a nation's historical and cultural achievements and constitutes an essential component of its outstanding traditional culture. However, with the passage of time, many ICH projects face challenges in their transmission. Campus education, as a crucial channel for cultural inheritance, possesses characteristics such as systematicness, accessibility, and sustainability. In the digital era, integrating ICH into campus education to achieve mutual empowerment between ICH and campus education holds significant importance for both the transmission of ICH and the innovative development of campus education.

2. Theoretical Foundations for the Mutual Empowerment of Intangible Cultural Heritage and Campus Education in the Digital Context

The mutual empowerment between intangible cultural heritage (ICH) and campus education is not a fortuitous practical exploration, but rather one rooted in profound theoretical foundations. In an era where digital technologies are reshaping cultural dissemination and educational paradigms, three theoretical pillars collectively underpin this practice: cultural inheritance theory, educational innovation theory, and collaborative development theory. The following systematically elucidates the intrinsic connections between these three theories and digital ICH education through four dimensions: core concepts, academic foundations, practical case studies, and application pathways.

2.1 Cultural Transmission Theory: Activating Cultural Genes from “Intergenerational Transmission” to “Digital Continuity”

The theory of cultural transmission focuses on how human culture achieves intergenerational transmission and social continuity through carriers such as symbols, behaviors, and institutions. At its core, it involves the replication and innovation of cultural genes. As living cultural heritage, intangible cultural heritage (ICH) is not only a collection of skills and knowledge but also a repository of cultural genes that embodies national values, aesthetic sensibilities, and collective memory. Campus education, as the core institutional domain for transmission, achieves intergenerational transfer of cultural genes through systematic knowledge impartation and experiential practice. In the digital era, cultural transmission theory has expanded into “digital continuity”—leveraging digital technology to transcend temporal and spatial constraints, enabling the cross-temporal dissemination, immersive experiences, and creative transformation of intangible cultural heritage.

2.2 Academic Basis

The academic foundations of cultural inheritance theory trace back to seminal research in cultural anthropology and sociology: Bourdieu's "Theory of Cultural Capital," proposed by French sociologist Pierre Bourdieu, posits that cultural capital exists in three forms: embodied, objective, and institutional. As embodied cultural capital, intangible cultural heritage can be transformed into students' cultural capital through institutionalized conversion in campus education—such as through course accreditation and credit systems—thereby enhancing their cultural identity and social competitiveness. Digital technology expands the reach and accessibility of cultural capital by converting intangible cultural heritage into digital resources.

Paul Conant's "Mechanisms of Transmission Theory," presented in How Society Remembers, posits that cultural transmission relies on the dual functions of embodied practices and inscribed practices. Digital technology not only deepens inscribed practices—such as 3D scanning and virtual archiving—but also innovates the forms of embodied practices. This enables the transmission of intangible cultural heritage to evolve from an experiential model of oral and heart-to-heart teaching to a digitally empowered, precision-driven model.

2.3 Related Cases

The Palace Museum's "Digital Cultural Heritage Repository" Integrates with Primary and Secondary School Intangible Cultural Heritage Curricula. Developed jointly by the Palace Museum and the Ministry of Education, the "Digital Cultural Heritage Repository" project exemplifies the application of cultural heritage preservation theory in digital intangible cultural heritage education. The platform houses high-definition digital images of 1.86 million cultural artifacts, including process videos for multiple intangible cultural heritage projects such as ancient clock restoration techniques and traditional painting and calligraphy mounting skills.

Digital resources empower classrooms by enabling students to examine the layered analysis of the Thousand Miles of Rivers and Mountains scroll through the platform. They can compare traditional pigment-making techniques (intangible cultural heritage) with modern chemical pigments, understanding the value of intangible cultural heritage skills in preserving cultural heritage.

Three-dimensional practice innovation involves replicating the Palace Museum's ridge animals using 3D modeling software. Combined with videos of traditional woodcarving techniques recorded by intangible cultural heritage inheritors, students complete the entire process from digital design to physical carving.

Cultural identity construction is achieved through digital exhibition creation. Students plan "My Intangible Cultural Heritage Museum" using PowerPoint and short videos, transforming personal experiences into cultural expressions to strengthen cultural agency.

2.4 Application Path

Regarding cultural heritage transmission theory, the practical approach to digital intangible cultural heritage education can be summarized as a four-dimensional activation strategy. First is digital resource activation: establishing digital gene banks for intangible cultural heritage, capturing traditional techniques through motion tracking (e.g., Kunqu opera postures, guqin finger techniques) and analyzing materials (e.g., porcelain ingredient ratios in Jingdezhen), creating searchable and reusable digital resources. Developing digital knowledge graphs for intangible cultural heritage projects uses knowledge graph technology to trace historical contexts, skill lineages, and cultural symbols, supporting teachers in delivering in-depth instruction. Second, institutionalizing curriculum activation by integrating ICH content into school-based curricula. Examples include Shanghai primary schools implementing ICH cultural credit systems, where students earn artistic literacy credits by completing online paper-cutting tutorials and community practice check-ins via digital platforms. Digital textbooks like the Digital ICH Inheritance Tutorial incorporate interactive modules such as AR-scannable skill demonstrations and virtual simulation operations. Third, experiential immersion activation involves establishing digital ICH experience centers that use VR technology to recreate authentic ICH contexts, enabling students to participate in the entire skill transmission process through virtual avatars. Digital ICH creation competitions encourage students to reimagine ICH narratives through digital painting, animated shorts, and other formats—such as pixel art adaptations of

shadow puppet plays like The Monkey King's Rebellion in Heaven. Fourth, diversified evaluation activation: Establishing cultural inheritance capability assessment indicators to evaluate students' transmission effectiveness across three dimensions—knowledge mastery, skill practice, and cultural dissemination. Introducing digital certification for intangible cultural heritage inheritors, where students can obtain graded certificates jointly issued by cultural authorities and their schools upon passing online skill assessments.

3. Innovative Practices in Integrating Intangible Cultural Heritage into Campus Education Through Digital Empowerment

3.1 Building a Digital Teaching Resource Repository to Enrich Campus Educational Content

Traditional intangible cultural heritage faces challenges such as the loss of skills and scattered documentation. Digital technology offers efficient means for collecting, organizing, and preserving these resources. Numerous schools and educational institutions actively collaborate with heritage bearers and cultural research organizations, employing high-definition photography, 3D scanning, and video recording to digitally document the craft processes, historical origins, and cultural significance of intangible heritage projects. This builds a rich repository of teaching resources. For instance, Wuhan Design Engineering College partnered with Alibaba Cloud to develop the Jingchu Pattern AI Design Platform, integrating over 300 intangible cultural heritage elements such as Ezhou paper-cutting, Yellow Crane Tower motifs, and Chu-style triple-cloud phoenix patterns. This platform provides convenient access to materials for teaching and creative work. These digital resources transcend temporal and spatial constraints, enabling students to gain in-depth insights into intangible cultural heritage projects nationwide without leaving campus, significantly enriching campus educational content.

3.2 Innovate Teaching Models to Enhance Intangible Cultural Heritage Education Outcomes

Leveraging internet platforms, the school presents intangible cultural heritage (ICH) courses through a blended online-offline approach. Online, students can learn ICH fundamentals and watch skill demonstration videos anytime, anywhere via web-based courses and virtual classrooms. Offline, ICH inheritors are invited to campus for face-to-face skill transmission and hands-on guidance, allowing students to experience the charm of ICH firsthand. For instance, Zhejiang Vocational College of Arts has established a digital opera resource database and developed the “Yue Opera Pronunciation Dictionary” app, enabling intelligent conversion of Chinese characters to Yue opera pronunciations. It has also created national-level online courses like “Chinese Yue Opera Vocal Styles,” providing a digital learning platform for learners nationwide. Simultaneously, the college collaborates with 23 performing arts troupes to offer customized training programs, pioneering five-year and six-year integrated training models. Students participate in the creation and production of theatrical works, seamlessly integrating theoretical learning with practical application. Immersive Teaching: Leveraging virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies, the school creates immersive intangible cultural heritage (ICH) teaching environments. This places students within the creative scenes of ICH traditions, enhancing learning engagement and interactivity. The Guizhou Intangible Heritage Virtualization Project Team developed the world's first Guizhou Intangible Heritage Virtual Reality (VR) Metaverse, encompassing master crafts such as Miao batik, Miao embroidery, silverware forging, and traditional Moutai liquor brewing. Through VR equipment, students can immerse themselves in the production processes of these intangible heritage crafts and gain a deeper understanding of their cultural significance. In paper-cutting art instruction, students use virtual reality equipment to virtually enter ancient craft workshops and personally experience each step of paper-cutting. This immersive teaching method helps students better understand complex craft processes and technical details.

3.3 Conduct Digital Practice Activities to Cultivate Students' Innovative Abilities.

Encourage students to utilize digital technologies in intangible cultural heritage (ICH) practices, such as digital creative design for ICH projects and new media dissemination.

Beijing Institute of Technology organized students to participate in projects involving digital restoration of cultural heritage, revitalization of intangible cultural heritage, and creative design of cultural heritage. Through digital means, students innovatively expressed ICH, creating a series of works that blend traditional charm with modern aesthetics. Students at Wuhan Institute of Design and Engineering utilized 3D printing technology to reconstruct the traditional lacquerware mold-making process, reducing production time by 77%. They further enhanced ICH dissemination through MR interactive technology: scanning a QR code on the artwork reveals its 3D rendering and production workflow, creating a closed-loop teaching system of "design-practice-application." These initiatives not only enhance students' hands-on skills and innovation capabilities but also pioneer new pathways for the inheritance and development of intangible cultural heritage.

4. Campus Education Boosts Digital Preservation and Development of Intangible Cultural Heritage

4.1 Campus Education Provides "Content Production and Technical Adaptation" Support for Digital Resource Development of Intangible Cultural Heritage

Campus education, leveraging disciplinary resources and the creativity of faculty and students, has become the core platform for developing digital intangible cultural heritage resources. This addresses the challenges of fragmented digital content and technologies that fail to meet the needs of heritage transmission.

Systematically excavate intangible cultural heritage content to build standardized digital resource repositories. Leveraging faculty and student teams from disciplines like history, literature, and art, we conduct systematic surveys of regional intangible cultural heritage. We trace the historical lineage of heritage projects—such as the evolution of Kunqu opera singing styles or the craftsmanship lineage of mortise-and-tenon joinery—while documenting cultural significance, including the auspicious symbolism of traditional patterns and the ritual meanings of folk activities. We also capture technical details, like the stitching steps of Shu embroidery or the firing parameters of pottery, compiling them into structured textual archives. Collaborating with faculty and students from computer science and digital media programs, the research findings are transformed into standardized digital resources: 4K high-definition cameras document the hands-on practices of intangible heritage bearers; motion capture technology (e.g., OptiTrack) records the postures and movements of traditional dance and opera; 3D scanning reconstructs the three-dimensional structures of intangible heritage artifacts. This culminates in the creation of a searchable, reusable, and updatable digital repository for intangible cultural heritage.

Suzhou University established a digital ICH research team that completed the digital collection of three Suzhou-based ICH traditions—Pingtan storytelling, Kesi silk weaving, and Xiangshan School carpentry—over two years. This effort produced a digital resource repository containing videos, high-resolution images, and 3D models, which has been integrated with the Suzhou ICH Protection Center as core material for local digital ICH transmission.

Developing customized digital tools tailored to transmission needs. Addressing practical challenges in intangible heritage transmission, digital tools were developed for educational contexts. Art faculty and students designed simulation software for intangible heritage techniques, while computer science faculty and students developed knowledge graph systems linking intangible heritage knowledge—such as connecting Suzhou embroidery patterns with Jiangnan culture or traditional Chinese acupuncture with meridian theory—ensuring tools align with the practical needs of both practitioners and learners.

Emphasizing lightweight and user-friendly tools. For elderly inheritors, simplified digital recording tools were created, such as voice-input systems for intangible heritage narratives and one-click craft video capture. For young learners, cartoon-themed digital learning tools were designed, including knowledge-based challenge apps and AR pattern design software, lowering the barrier to digital intangible heritage engagement.

Zhejiang Sci-Tech University developed a digital pottery-making assistance system for Longquan celadon. Using AR technology, it provides real-time annotations on the force and rotational speed parameters during wheel-throwing. Novices can quickly master basic

techniques through system feedback. The system also functions as a craftsmanship archive, allowing inheritors to save production data for different batches of ceramics with a single click, thereby creating digital craftsmanship records.

4.2 Campus Education Cultivates "Multi-Skilled Professionals" for the Digital Preservation of Intangible Cultural Heritage, Addressing the Issue of a "Talent Gap."

The digital preservation of intangible cultural heritage requires multidisciplinary professionals who understand intangible cultural heritage, master digital technologies, and excel in heritage promotion. Campus education builds a closed-loop talent development system through curriculum frameworks and practical projects.

Establish interdisciplinary curricula to solidify foundational knowledge. Develop a cross-disciplinary framework integrating intangible cultural heritage and digital technology. Core courses include Introduction to Intangible Cultural Heritage, Digital Media Technology, Digital Preservation of Intangible Cultural Heritage, and Big Data Analysis for Cultural Heritage. Electives cover VR Applications for Intangible Cultural Heritage, Digital Design for Cultural Heritage Creatives, and Short Video Dissemination of Intangible Cultural Heritage, ensuring students master both cultural essence and digital competencies.

Adopting a "dual-instructor teaching model," inviting ICH inheritors to teach traditional skills and cultural knowledge, including the logic behind traditional pattern design; while digital technology instructors teach technical applications, such as creating ICH 3D models using Blender, achieving deep integration of culture and technology in teaching. Practical projects hone students' real-world skills. Through intangible cultural heritage digitization initiatives, student teams engage in hands-on work. Examples include: - Building digital museums for intangible cultural heritage, where teams handle content planning, interface design, and technical development; - Creating short videos on intangible cultural heritage, involving fieldwork in workshops to film inheritors' stories and skill demonstrations; - Designing digital cultural and creative products, integrating traditional elements into modern designs and producing digital renderings.

Addressing the practical needs of governments, enterprises, and intangible cultural heritage protection agencies ensures student projects yield tangible outcomes. Examples include undertaking digital publicity tasks for local intangible cultural heritage protection centers and developing online skill demonstration platforms for intangible cultural heritage enterprises. Students enhance their problem-solving abilities through hands-on experience while providing human resources support for intangible cultural heritage digitization.

Cultivating digital ICH inheritors positions campuses as vital training grounds, shouldering the responsibility of nurturing new generations for ICH preservation. Through specialized ICH-related courses, thematic lectures, and training workshops, students develop passion for ICH while mastering both traditional skills and digital technologies, becoming versatile professionals proficient in both domains. Suzhou City University's School of Design and Art has launched an experimental class for cultivating innovative talent in the integration of intangible cultural heritage and digital technology. This initiative will introduce courses on the aesthetics and culture of intangible cultural heritage, assembling a teaching team comprising intangible cultural heritage inheritors and digital technology experts. The program focuses on developing versatile professionals proficient in intangible cultural heritage preservation, digital technology application, and cultural and creative industry operations. Zhejiang Vocational College of Arts has adopted the "Virtue, Skill, and Path" framework as its guiding principle for cultivating ICH inheritors. Through dual-mentorship systems and customized training programs, it has produced numerous ICH professionals who have taken root in grassroots performing arts troupes, alleviating the crisis of generational succession in talent.

Advancing Digital Research and Innovation in Intangible Cultural Heritage. Universities possess abundant academic resources and research capabilities to support digital research and innovation in intangible cultural heritage. Academic research teams explore new applications and models for digital technology in the preservation, transmission, and development of intangible cultural heritage through in-depth studies of heritage projects. Some universities are pioneering the use of

digital technology to enhance ancient architectural conservation. Through digital platforms, they are strengthening the historical and cultural heritage protection system for Huizhou villages. This encompasses surveying individual structures, mapping the overall layout of ancient villages, and constructing 3D models. These efforts generate detailed data, survey drawings, 3D virtual simulation models, animated videos, and a comprehensive suite of resource information. Concurrently, institutions encourage faculty and students to engage in innovative digital practices for intangible cultural heritage, integrating traditional elements with modern technology and design concepts to develop creative cultural products and projects.

Campus education attracts public attention through diverse ICH activities—including cultural festivals, thematic exhibitions, and public lectures—building platforms for ICH dissemination. Zhejiang Vocational College of Arts developed the “Palm-sized ICH” app, innovating ICH and new media communication models. It hosts 50 annual ICH public lectures, reaching over one million participants. Multiple schools jointly organized shadow puppet theater-themed events, allowing teachers and students to fully appreciate the charm of intangible cultural heritage and sparking interest and discussion about this cultural heritage. Furthermore, students participated in new media dissemination practices for intangible cultural heritage projects, such as producing short videos and managing social media accounts, thereby spreading intangible cultural heritage to a wider audience and enhancing its social influence.

5. Conclusions and Outlook

In the digital era, the mutual empowerment of intangible cultural heritage (ICH) and campus education represents an inevitable choice for preserving traditional culture and innovating modern education. Through innovative practices such as building digital teaching resource repositories, pioneering teaching models, and conducting digital practical activities, ICH has been better integrated into campus education. This integration enriches educational content, enhances teaching effectiveness, and cultivates students' innovative abilities. Simultaneously, campus education provides talent support, research momentum, and dissemination platforms for the digital preservation and development of ICH. Although challenges exist in the integration process—such as technological application, teaching resources, and cultural understanding—the prospects for mutual empowerment between ICH and campus education are vast. This is driven by continuous technological advancement, deepening interdisciplinary collaboration, and increasingly frequent international exchanges. Moving forward, we must fully seize the opportunities of the digital age, proactively address challenges, and continuously explore innovative approaches to deepen the integration of intangible cultural heritage and campus education. This will allow intangible cultural heritage to flourish with renewed vitality within educational settings, making greater contributions to preserving and promoting China's outstanding traditional culture, enhancing national cultural literacy, and fostering exchanges and mutual learning among human civilizations.

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