Research on the Training Path for Interdisciplinary Talents in Guzheng Performance under the Background of AI Empowerment: A Case Study of Universities in Ji'an, China

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Abstract. The integration of Artificial Intelligence (AI) into education is catalyzing a paradigm shift in traditional music pedagogy. This paper addresses the critical need to evolve the training model for Guzheng, a quintessential Chinese zither, from a predominantly skill-based apprenticeship towards cultivating interdisciplinary talents proficient in performance, pedagogy, and cultural transmission, with a specific focus on the context of local universities in Ji'an, China. Grounded in a tripartite theoretical framework emphasizing "Performance Precision, Pedagogical Scientification, and Cultural Transmission Depth," this study synergizes these core competencies with the emergent trends of "Cross-boundary Integration, Technology Empowerment, and Demand-Oriented Education." It further incorporates the unique value proposition of Ji'an's regional heritage, namely Lulin Culture and Jinggangshan Red Culture. The research proposes a comprehensive, actionable framework comprising three interconnected pillars: A robust theoretical foundation deconstructing talent competencies and contextual trends; A detailed practical pathway featuring a modular "Foundational Expertise + Pedagogical Empowerment + Practice Enhancement" curriculum, innovative blended "Online-Offline" teaching models, and deep integration of local cultural resources; and A sophisticated AI-empowered scheme operating across six dimensions: personalized instruction, resource optimization, teaching model innovation, data-driven assessment, promotion of educational equity, and AI-assisted music creation/analysis. The findings unequivocally demonstrate that a sustainable and effective training path must adhere to the principle of "Expertise as the Foundation, Culture as the Soul, and Intelligence as the Wing." This research provides a replicable model for the modernization of traditional music education in the AI era and offers significant insights into the dynamic preservation and innovation of local cultural heritage through higher education.

Keywords: Artificial Intelligence (AI) in Music Education; Guzheng Pedagogy; Interdisciplinary Talent Cultivation; Cultural Heritage Transmission; Educational Technology; Local University Development.

1. Introduction

The global educational landscape is undergoing a profound transformation driven by the strategic implementation of "AI + Education" initiatives. [1]This shift is moving pedagogical models from being primarily "experience-driven," reliant on the tacit knowledge of master practitioners, towards being "data-driven," leveraging analytics and intelligent systems to personalize and optimize learning . Within this transformative wave, disciplines centered on intangible cultural heritage, such as traditional Chinese music, face both unprecedented challenges and opportunities. The Guzheng, with its over 2,500-year history, stands as a pillar of China's artistic tradition. However, its conventional training model, often characterized by "single-skill transmission" focusing heavily on technical performance mastery, is increasingly inadequate to meet the multifaceted demands of contemporary society.

There is a growing consensus on the necessity to foster interdisciplinary talents—individuals who possess not only consummate performance skills but also the ability to teach effectively and act as proactive custodians of cultural heritage. [2] This need is particularly acute for local universities, which serve as vital hubs for regional cultural preservation and innovation. These institutions are tasked with the dual mission of cultivating high-quality professionals and contributing to local cultural and economic development .

While scholarly interest in AI applications within music education is burgeoning, current research often remains siloed, focusing predominantly on technological affordances such as pitch detection, rhythm training, or automated accompaniment.[3] A significant research gap exists concerning the systematic construction of a talent cultivation framework that synergistically combines AI empowerment with the deep integration of local cultural identity. Furthermore, local universities, such as those in Ji'an, have yet to establish a coherent Guzheng training paradigm that is simultaneously responsive to the unique characteristics of their regional context (e.g. Lulin Culture, Jinggangshan Red Culture) and the transformative potential of AI technologies.

This study, therefore, selects Guzheng education in Ji'an universities as its research focus. It aims to systematically investigate and propose a holistic training path for interdisciplinary Guzheng talents (performance & pedagogy) under the AI empowerment background. By constructing a integrated framework that links theoretical underpinnings, practical implementation strategies, and targeted AI applications, this research seeks to provide both a theoretical foundation and practical, actionable guidance. The ultimate objective is to contribute to the modernization of traditional music education and offer a sustainable model for the dynamic, living inheritance of local culture in the digital age.[4]

2. Theoretical Foundations for Cultivating Interdisciplinary Guzheng Talents

A robust theoretical framework is indispensable for guiding the effective cultivation of interdisciplinary talents. This foundation must deconstruct the core competencies required, situate them within the evolving trends of the discipline, and articulate the strategic value of embedding local cultural characteristics.

2.1 Deconstruction of Core Competencies for Interdisciplinary Talents

The core competency model for an interdisciplinary Guzheng talent must be an integrated and synergistic system, moving beyond a simple aggregation of skills. We propose a “Three-Dimensional Synergy” framework encompassing Performance, Pedagogy, and Cultural Transmission.

2.1.1 Performance Competence: Precision, Versatility, and Expression.

This dimension constitutes the foundational pillar. The objective is to achieve “technical precision and stylistic versatility.”It necessitates a systematic mastery spanning from foundational techniques to advanced interpretative artistry.

Technical Foundation: Mastery of the core technical lexicon, including the “Ten Fundamental Techniques” of Guzheng (e.g., “Tuo” (托), “Mo” (抹), “Gou” (勾), “Da”（打)），is paramount. This includes precise control over touch, articulation, finger independence, and relaxation.

raditional School Mastery: Students must develop a deep understanding of major traditional schools (e.g. Shandong, Henan, Zhejiang, Chaozhou). This involves not only executing characteristic right-hand techniques (e.g. the“Small-Joint”Tuo-Pi(托劈)) of Shandong school, the “Large-Thumb Wandering Shake” of Henan school, the “Fast Four-Point”succession of Zhejiang school) but also, crucially, the subtle and complex left-hand ornamentation techniques (“Zuoyun” (作韵))—“Yin” (吟, vibrato), “Rou” (揉, rolling press), “An” (按, press), “Chan” (颤, tremolo), “Hua” (滑, slide)—that give each school its distinctive aesthetic flavor.[7]

Modern Technique Proficiency: To interpret contemporary repertoire, students must be proficient in modern techniques such as rapid finger sequences (“Kuaisu Zhixu”(快速指序)), percussive effects on the soundboard, playing microtonal intervals, and adapting to altered tunings.

2.1.2 Pedagogical Competence: Scientific Design, Flexible Implementation, and Precise Assessment.

This dimension is the critical bridge to societal relevance and sustainability. It transforms personal mastery into the capacity to effectively educate others.

Scientific Instructional Design: Pedagogy must be informed by theories of music education and cognitive psychology. Instructors (and future teacher-students) must be able to design curricula and lesson plans that are developmentally appropriate for different learner levels (beginner, intermediate, advanced). For instance, beginners focus on sound production, posture, and basic rhythm; intermediate players on tone color, dynamics, and phrasing; advanced players on stylistic authenticity, deep musical interpretation, and cultural context.

Flexible Implementation and Methodology: Effective teaching requires a diverse pedagogical toolkit. This includes direct instruction and demonstration, but also extends to collaborative learning, project-based learning (e.g. preparing a group piece), gamification for motivation, and contextual teaching that connects music to history and culture. Crucially, it includes the ability to integrate AI-assisted tools (e.g. interactive apps, visualization software) to enhance clarity and engagement.

Precise and Data-Informed Assessment: Assessment should be multifaceted. Formative assessment, aided by AI platforms, can track practice time, error frequency, and progress metrics. Summative assessment can combine traditional expert evaluation with objective data from AI performance scoring systems that analyze intonation, rhythm, and even aspects of expression, providing a more comprehensive and less biased evaluation.

2.1.3 Cultural Transmission Competence: Deep Cognition, Proactive Dissemination, and Sustainable Innovation.

This dimension represents the spiritual core and long-term purpose of the talent's work, ensuring the art form remains a living tradition.

Deep Cultural Cognition: This involves a scholarly understanding of Guzheng's history, its embeddedness in Chinese philosophy and aesthetics (e.g. the concept of“Qiyun”(气韵)), and, critically for Ji'an, the specific cultural resources of the Lulin Culture (e.g. its scholarly traditions, folk customs) and the Jinggangshan Red Culture (its revolutionary spirit and associated musical forms).

Proactive Dissemination: Talents must be equipped to share Guzheng culture beyond the conservatory. This includes organizing and performing in concerts, participating in community cultural events, school outreach programs, and leveraging digital media platforms (short videos, live streams) to reach wider and younger audiences.

Sustainable Innovation: Transmission is not mere replication. It involves creative adaptation and innovation. This can manifest as composing new works inspired by local culture, adapting local folk tunes for the Guzheng, or developing new teaching methodologies (like AI-assisted modules) that ensure the art's relevance for future generations.

2.2 Evolving Trends in Guzheng Professional Education

Guzheng education is experiencing several convergent trends that inform the proposed training model:

Cross-boundary Integration: The field is moving beyond a narrow focus on canonical repertoire. There is increasing emphasis on integrating knowledge from musicology, ethnomusicology, education, digital humanities, and management, creating more well-rounded and adaptable professionals.

Technology Empowerment: The integration of AI, multimedia, and data analytics is no longer optional but essential. These technologies are reshaping every aspect of music learning, from practice tools to concert production, demanding new digital literacies from both students and educators .

Demand Orientation: There is a stronger focus on aligning educational outcomes with real-world societal needs. This includes preparing graduates for diverse career paths (performers, educators, arts administrators, cultural entrepreneurs) and explicitly linking university training to regional cultural development goals.

2.3 Strategic Value of Integrating Local Characteristics

For Jinggangshan University, leveraging Ji'an's unique cultural assets is a strategic imperative. This integration offers:

Enhanced Educational Depth: Lulin and Red Culture provide rich, authentic content that deepens students' cultural understanding and provides unique material for artistic creation and research.

Differentiated Talent Profile: Graduates who possess specialized knowledge of local culture are uniquely positioned to serve the cultural and educational sectors of the Ji'an region, enhancing their employability and local impact.

Synergy with Regional Development: By cultivating talents who can contribute to local cultural industries, tourism, and heritage preservation, the university fulfills its social service mission and fosters a virtuous cycle of mutual reinforcement between the institution and its community.

3. Practical Pathways for Cultivating Guzheng Performance Talents

The theoretical framework must be operationalized through concrete, actionable strategies. This section details the practical pathways.

3.1 Constructing a“Performance + Pedagogy”Modular Curriculum System

The curriculum is the backbone of talent cultivation. We propose a three-module system designed for coherent skill-building:

Module 1: Foundational Expertise (Performance Precision). This module systematically builds technical and artistic proficiency.

Year 1: Technique Standardization & Rehabilitation. A rigorous course re-establishes core fundamentals (“Ten Techniques”) for all incoming students, regardless of prior training, ensuring a unified high standard. Exercises are contextualized using motifs from Ji'an folk music.

Year 1-2: Traditional School Immersion. In-depth study of 2-3 major traditional schools, combining technique mastery (e.g. Shandong “Tuo-Pi”（托劈）), repertoire learning (e.g.“Four Brocades”（四段锦）), and scholarly analysis using AI-powered literature review tools to understand stylistic origins.

Year 2-4: Advanced Repertoire & Stylistic Analysis. Students learn complex contemporary and traditional pieces, grouped by style (e.g. Beijing-opera style, poetic style). AI tools are used to analyze and compare stylistic features across pieces, fostering analytical thinking.

Module 2: Pedagogical Empowerment (Teaching Scientification). This module bridges performance skill to teaching ability.

Theoretical Courses: Leverage university courses like “Music Pedagogy,” “Educational Psychology,” and “Curriculum Design,” with specific application to Guzheng teaching scenarios for different age and skill levels.

Practical Methodology Labs: Hands-on workshops on using intelligent teaching tools, AI scoring systems, and designing lesson plans that incorporate blended learning and gamification.

Micro-teaching & Simulation: Students practice teaching peers, receive feedback, and use video analysis for self-reflection, building confidence and competence before real-world teaching.

Module 3: Practice Enhancement (Application & Integration). This module ensures competency transfer to real-world contexts.

On-Campus Practice: Mandatory participation in Guzheng ensembles, annual solo/group recitals, and thematic performances (e.g. “Red Culture Music Festival”). Teaching skill competitions are organized to assess comprehensive abilities.

Off-Campus Internships: Structured partnerships with local schools, cultural centers, and tourism departments provide semester-long teaching and performance internships. A “Post-Internship Debrief” using AI-driven data analysis of teaching videos helps students refine their practice.

3.2 Innovating Teaching Models and Methods

Blended "Flipped-Classroom"Model:

Online Phase (Asynchronous): Students access curated resources on an LMS (e.g. Moodle, "Learning Through"): high-definition technique videos, scores, readings, and AI-powered pre-class quizzes. They submit practice videos for preliminary AI feedback.

Offline Phase (Synchronous): Classroom time is reserved for high-value interactions: addressing individual difficulties identified online, masterclass-style coaching, ensemble coaching, and collaborative projects. The instructor uses aggregate data from the online phase to guide the session.

"Intelligent-Fusion" Pedagogical Methods:

AI-Augmented Feedback: Use software like `Sonic Visualiser` or proprietary systems to visualize pitch accuracy, dynamic contours, and rhythmic stability. This provides objective, visual evidence to supplement the teacher's aural feedback.

Contextualized Learning: For teaching pieces like "The Sun Shines Bright on Jinggangshan,"employ scenario-based teaching, incorporating historical documentaries, field trips to revolutionary sites, and discussions on conveying revolutionary spirit through music.

Project-Based Learning (PBL): Assign projects such as "Adapt a Ji'an Folk Song for Guzheng Ensemble,"requiring research, arrangement, rehearsal, and performance, thereby integrating performance, pedagogy, and cultural innovation.

3.3 Deep Integration of Local Cultural Resources

Curricular Integration:

Red Culture Repertoire: Systematically include pieces like "The Sun Shines Bright on Jinggangshan,""Ode to the Red Plum Blossom,"and adaptations of "Ten Send-offs to the Red Army"in the syllabus. Teaching emphasizes historical context and emotional expression.

Lulin Culture & Folk Music: Offer a special topics course on the music of Ji'an (Caicha opera, flower-lantern tunes). Teach students the methods of transcribing and adapting these melodies for Guzheng, exploring connections with traditional ornamentation techniques.

Practical Integration:

On-Campus: Organize "Guzheng Cultural Weeks,"themed concerts celebrating local culture, and lecture-recitals that explain the cultural significance of the music being performed.

Off-Campus: Establish partnerships with the Jinggangshan Tourism Bureau and local (intangible cultural heritage) protection centers. Students participate in cultural performances at historical sites and contribute to digitization projects of local music archives.

4. AI-Empowered Training Scheme for Interdisciplinary Guzheng Talents

This section elaborates a detailed, six-dimensional AI application scheme.

4.1 Personalized Teaching: AI-Driven Adaptive Learning Paths

Implement a Learning Management System (LMS) with AI analytics capabilities. The system:

Data Collection: Aggregates data from practice apps, online quizzes, video submissions, and instructor notes.[5]

Learner Profiling: Uses machine learning algorithms to create a dynamic "Competency Map"for each student, identifying strengths and weaknesses across the three core competencies.

Personalized Learning Path: Automatically generates and recommends a customized weekly plan for each student, suggesting specific exercises, videos to review, and repertoire sections to focus on. The instructor oversees and adjusts these PLPs.

4.2 Optimizing Teaching Resources: Dynamic, Cloud-Based Repository

Create a centralized, cloud-based "Guzheng Digital Resource Hub" for Ji'an universities.

Content: Hosts a vast library: masterclass videos, performances, academic papers, scores, teaching plans, and a special "Ji'an Cultural Music" database.

Dynamic Updating: Uses AI tagging for easy searchability (e.g."Shandong school, intermediate technique, vibrato"). Resources are continuously updated by a consortium of instructors.

Accessibility: Available to students, local teachers, and the public, fostering lifelong learning and community engagement.[6]

4.3 Innovating Teaching Models: Intelligent Practice and Analysis Tools

AI-Powered"Smart Mirror"for Practice: Software like `Tonara` or `Yousician` provides real-time feedback on rhythm and pitch during individual practice, acting as a 24/7 practice assistant.[4]

Advanced Music Analysis: Use tools like `Melodyne` to deconstruct student recordings, providing visual analysis of intonation curves and rhythmic grid alignment, facilitating detailed self-correction.

4.4 Data-Driven Assessment and Feedback

Move beyond subjective grading.

Multimodal Assessment: Combine AI analysis of audio (pitch/rhythm accuracy) and video (posture, hand position) to generate objective technical scores.

Comprehensive Feedback Reports: AI generates detailed reports after key performances or teaching simulations, highlighting trends over time and suggesting specific improvements. This data also helps instructors identify class-wide challenges.

4.5 Promoting Educational Equity: Breaking Geographical and Economic Barriers

Resource Sharing: The Digital Resource Hub is made freely accessible to schools and communities across the Ji'an region, especially in rural areas.

Low-Cost Access: Free AI practice apps reduce reliance on expensive private tutors. Live-streamed masterclasses and Q&A sessions allow remote students to learn from experts.

4.6 AI-Assisted Music Creation and Analysis

Creative Exploration with AIVA: Guide students in using AI composition platforms like AIVA to generate musical ideas based on parameters derived from Ji'an folk music, which they can then refine and arrange for Guzheng, fostering creativity.

Deep Style Analysis with AI: Use AI tools to analyze large corpora of music from different Guzheng schools, identifying subtle patterns in ornamentation and rhythm that can inform both performance practice and scholarly research.

5. Discussion and Conclusion

This research has articulated a comprehensive and systematic framework for cultivating interdisciplinary Guzheng talents in the AI era, with specific application to the context of Ji'an universities. The proposed model successfully integrates a clear theoretical foundation—the "Three-Dimensional Synergy" of competencies—with detailed practical pathways and a forward-looking, multi-faceted AI empowerment scheme.

The core argument is that for traditional music education to thrive in the 21st century, it must embrace a holistic approach. It must steadfastly maintain "Expertise as the Foundation" through rigorous technical and artistic training. It must be animated by "Culture as the Soul,"ensuring that deep cultural understanding and local identity inform and enrich artistic practice. Finally, it must adopt "Intelligence as the Wing," strategically leveraging AI and digital technologies not to replace traditional knowledge, but to enhance learning efficiency, personalization, accessibility, and creative potential.

The implementation of this model requires institutional commitment, faculty development in digital pedagogy, and ongoing investment in technological infrastructure. Future research should focus on the empirical validation of this framework through longitudinal case studies at Jinggangshan University, measuring its impact on student learning outcomes, graduate employability, and contributions to local cultural vitality.

In conclusion, this study provides a viable and innovative path forward for traditional music education in local universities. By embracing the synergy of expertise, culture, and intelligence, institutions like Jinggangshan University can not only preserve precious cultural heritage but also transform it into a dynamic and relevant force for the future, cultivating a new generation of talents who are both masters of their art and architects of its continued evolution.

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