WHIOCE PUBLISHING PTE. LTD.
PROVIDING
FIRST-CLASS SCIENTIFIC INFORMATION
FOR TOP SCHOLARS

2025 Volume 3, Issue 10
Educational Innovation Research
ISSN: 3029-1844(Print) ISSN: 3029-1852(Online)

Research on Piano Teaching Model Reconstruction for Vocational Undergraduates in the Context of Artificial Intelligence

Shengping Li*
Hainan Vocational University of Science and Technology, Haikou 571126, Hainan, China

**Author to whom correspondence should be addressed.*

Abstract: In the era of deep integration between artificial intelligence and educational digitalization, traditional piano teaching models in vocational undergraduate programs face practical challenges including insufficient personalization, delayed feedback mechanisms, weak practical training components, and disconnection from occupational requirements. Artificial intelligence technology provides data support, technical platforms, and innovative pathways for piano education reform, driving the transition from "skill-transfer-oriented" instruction to "intelligence-enabled pedagogy." Grounded in vocational undergraduate institutional positioning and talent development objectives, this study analyzes the empowering value and practical challenges of AI applications in piano education. Through six dimensions—educational goals, curriculum frameworks, instructional processes, practical scenarios, evaluation mechanisms, and faculty development—we construct an integrated "AI + vocational competencies + aesthetic education" teaching model. The proposed implementation strategies aim to achieve deep integration of technological empowerment with vocational education and aesthetic education, ultimately enhancing the quality of piano talent cultivation in vocational undergraduate programs.

Keywords: artificial intelligence; vocational undergraduate education; piano teaching; instructional model reconstruction; digital teaching

Online publication: November 26, 2025

1. Introduction

With the deepening implementation of policies such as the National Vocational Education Reform Implementation Plan and the Education Digitalization Strategic Action, vocational undergraduate education has become a crucial platform for cultivating high-level technical and skilled professionals. As a core competency course in music education, preschool education, and art education programs, piano instruction emphasizes applied skill development, job-specific adaptability, and holistic competency cultivation, requiring students to possess integrated capabilities in performance, vocal accompaniment, teaching, and stage presentation. However, traditional piano pedagogy continues to face challenges including inadequate teacher-student ratios, lack of personalized guidance, absence of feedback mechanisms for after-class practice, limited practical application scenarios, and subjective evaluation criteria, making it difficult to meet the demands

of large-scale, refined, and professionalized talent development[1].

Artificial intelligence technology, leveraging core advantages such as big data, multimodal perception, intelligent recognition, and virtual simulation, enables real-time pitch and rhythm correction, dynamic learning process monitoring, personalized learning path recommendations, immersive scenario simulation, and diversified evaluation analysis. These capabilities provide technical solutions to address pain points in vocational undergraduate piano education. In this context, reconstructing piano teaching models adapted to the intelligent era serves not only as an inevitable requirement for educational digital transformation but also as a critical measure for vocational undergraduate institutions to strengthen internal development and enhance educational quality. Centering on the logical framework of "why to reconstruct, what to reconstruct, and how to reconstruct," this study systematically explores pathways and implementation mechanisms for redefining piano teaching models under AI-driven conditions, offering theoretical references and practical insights for teaching reforms in similar institutions[2].

2. Core Concepts and Theoretical Foundations

2.1. Definition of Core Concepts

The vocational undergraduate piano program is designed to meet industry demands, targeting fields such as music education, early childhood education, and arts training. It cultivates high-level applied professionals with solid piano skills, comprehensive practical abilities, and strong professional ethics, emphasizing the integration of technical proficiency, career orientation, practical application, and hands-on experience. Supported by artificial intelligence technology, the program restructures traditional teaching models by systematically redesigning objectives, content, processes, methodologies, evaluations, and management systems. This innovative approach establishes a modern teaching framework and operational mechanism tailored for the intelligent era and aligned with the vocational undergraduate education philosophy[3].

2.2. Theoretical Basis

Constructivist learning theory emphasizes student-centered approaches, where AI creates contextual, collaborative, and dialogic environments to facilitate autonomous knowledge and skill acquisition. Personalized learning theory leverages AI data profiling to enable tiered instruction, targeted content delivery, and differentiated teaching methods tailored to learners' diverse foundational needs. Competency-based education theory focuses on vocational skill development, utilizing AI-powered practical training and scenario simulations to enhance applied abilities. Educational digitalization theory empowers the entire teaching process through technology integration, achieving seamless online-offline coordination, cohesive classroom-curriculum connections, and data-driven decision-making[4].

3. The Value and Challenges of Artificial Intelligence Empowering Piano Teaching in Vocational Undergraduate Programs

3.1. Empowerment Value

Precision-oriented skill training utilizes AI for real-time detection of pronunciation errors, rhythm, hand positioning, and key touch, providing millisecond-level error correction to replace traditional inefficient repetitive drills. Personalized learning support leverages big data to generate individualized learning profiles, dynamically adjusting song difficulty levels, practice intensity, and training priorities to achieve "one-person-one-strategy" customization. Expanding teaching boundaries, intelligent practice companionship eliminates limitations of class hours and practice rooms, enabling students to engage in self-directed practice, playback review, and comparative demonstration at any time. Enhanced professional scenario simulation creates virtual environments for stage performances, classroom instruction, and collaborative playing/

singing to improve job adaptability and on-site performance capabilities. Objective teaching evaluation employs AI-driven quantification metrics to reduce subjective scoring biases, enabling process-oriented, diversified, and traceable assessments. To alleviate teacher staffing pressures, AI assumes foundational tasks including practice accompaniment, error correction, and performance evaluation, allowing educators to focus on aesthetic appreciation, artistic expression, and professional competency development[5].

3.2. Realistic Challenges

Outdated teaching philosophies persist, with some educators treating AI merely as a tool rather than embracing it as a catalyst for transforming instructional models. This has led to an imbalance favoring technical proficiency over holistic education. The disconnect between technology and professional practice remains evident, as existing AI systems primarily serve exam preparation and solo performances while falling short in supporting vocational modules like instrumental performance, teaching methodologies, and accompaniment techniques. Furthermore, teachers' digital literacy gaps—particularly their limited expertise in AI operation, data interpretation, and blended learning design—prevent effective technology integration into classroom practice.

The imbalance between artistic and technical aspects, coupled with excessive reliance on AI, tends to mechanize performances while neglecting emotional expression, aesthetic experience, and humanistic depth. Uneven development of software and hardware infrastructure, along with high investment costs for intelligent pianos, visual capture systems, and virtual simulation devices, results in lagging resource development and maintenance. Insufficient systematic restructuring has led to fragmented applications across isolated components, failing to establish a comprehensive model encompassing objectives, curricula, teaching methodologies, evaluations, and support mechanisms[6].

4. Overall Approach for Restructuring Vocational Undergraduate Piano Teaching Models in the Context of Artificial Intelligence

4.1. Reconstruction Principle

Career-oriented education rooted in competency development closely aligns with demands of preschool education, art training, and cultural service roles, enhancing vocational skills and holistic literacy. Technology-driven empowerment centers on aesthetic education as its core philosophy, leveraging AI to boost efficiency while teachers guide artistic expression and aesthetic appreciation, steadfastly upholding the essence of education. Personalized instruction and individualized development are implemented through data-driven profiling for tiered teaching that caters to learners from beginners to advanced levels. Theory-practice integration seamlessly connects classroom learning, AI training, virtual practice, and workplace internships. Human-machine collaboration drives innovation while maintaining core principles, with AI handling technical training and teachers leading artistic cultivation, aesthetic development, career guidance, and value education[7].

4.2. Reconstruction Objective

We aim to establish an innovative teaching model integrating "AI-powered intelligence, core vocational competencies, and aesthetic education value guidance," achieving the following transformations: Teaching processes will shift from "lecture-based instruction" to "data-driven, precision teaching." Learning methods will transition from "passive imitation" to "self-directed exploration and personalized development." Practical scenarios will evolve from "closed piano studios" to "virtual simulations combined with real-world job placements." Evaluation systems will move beyond "subjective assessments" to adopt "human-machine collaboration and multi-dimensional process evaluation." The ultimate goal is to cultivate high-quality, interdisciplinary, and AI-integrated vocational undergraduate piano professionals.

5. Pathways for Restructuring Vocational Undergraduate Piano Teaching Models in the Context of Artificial Intelligence

5.1. Reconstruction of Training Objectives: A "Three-Dimensional Objective System" Empowered by AI

At the technical skill level, AI is utilized to achieve precision and standardization in performance, sight-reading, accompaniment, and singing. At the professional competency level, core competencies in piano instruction, stage performance, artistic guidance, and event organization are strengthened. At the comprehensive literacy level, aesthetic literacy, humanistic literacy, digital literacy, innovative literacy, and professional spirit are enhanced[8].

The technical skills layer utilizes an AI-powered intelligent practice system to capture real-time performance data, conducting precise analysis of pitch accuracy, rhythm, and key touch pressure. It generates personalized error correction plans and improvement suggestions to help students swiftly overcome technical challenges and establish standardized performance habits. The professional competence layer employs AI-driven virtual teaching scenarios that simulate authentic classroom environments. Students can practice through virtual student models while the system evaluates teaching language, demonstration performances, and interactive guidance from multiple dimensions. Integrated with an AI stage performance simulation system, it optimizes stage presence and on-site adaptability, enhancing job readiness. The comprehensive literacy layer leverages an AI art resource library featuring piano works from diverse cultural backgrounds. By intelligently analyzing compositions' creative contexts, stylistic characteristics, and emotional expressions, it guides students in deepening cultural understanding and refining aesthetic appreciation. AI-powered creative tools further assist in improvisational performances and musical composition, stimulating innovative thinking and cultivating integrated professional competencies suited for the intelligent era.

5.2. Curriculum System Restructuring: Modular Courses Based on "AI + Specialty + Career" Framework

The AI-based application module includes intelligent piano system usage, music data analysis, and digital music resource production.

Core Piano Skills Module: Performance, Sight Reading, Improvisational Accompaniment, Singing and Playing, Chamber Music Ensemble. Professional Practice Module

Piano pedagogy, children's piano training, classroom organization, virtual teaching simulation. Aesthetic education and cultural modules, work appreciation, ethnic music, China piano works, artistic aesthetics and expression. Practical training modules, AI virtual performances, campus concerts, off-campus base internships, social aesthetic education services.

5.3. Restructuring of Teaching Process: Closed-loop Blended Learning with "AI + Offline" Approach

Establish a closed-loop system integrating "AI pre-class diagnostics, precision in-class instruction, intelligent post-class training, and phased comprehensive evaluation." Before class, AI assigns preview tasks, assesses foundational knowledge, and generates learning progress reports. During lessons, teachers deliver targeted explanations based on data analytics, focusing on artistic techniques, career guidance, and overcoming key challenges. After class, AI provides practice sessions, real-time error correction, post-class reviews, and tiered assignments. At the unit level, AI skill assessments combined with teacher evaluations help identify gaps and dynamically adjust learning paths.

5.4. Reconstruction of Teaching Methods: Human-Machine Collaborative Multidimensional Teaching Approach

AI-powered precision error correction method. Dual audio-visual recognition for correcting pitch, rhythm, hand positioning, and fingering. Virtual simulation teaching method that replicates stage, classroom, and ensemble performance scenarios to enhance on-site adaptability and professional competence. Tiered teaching methodology.

AI-generated portraits are categorized into beginner, intermediate, and advanced professional training classes to

facilitate tailored instruction. The project-based teaching methodology employs musical concerts, instructional training sessions, and vocal performance competitions as project-based learning experiences to complete the entire practical process. The aesthetic immersion approach involves teacher-led guidance in work comprehension, emotional expression, and stylistic interpretation to prevent technical alienation.

5.5. Practice Scenario Reconstruction: "Four-in-One" Practice Platform

AI-powered intelligent training center, smart piano classroom, visual correction system, and virtual studio. On-campus performance platform featuring piano recitals, arts festivals, singing competitions, and demonstration classes. Virtual professional scenarios simulating children's piano lessons, stage performances, and collaborative accompaniment. Off-campus internship bases including primary/secondary schools, kindergartens, art training institutions, and cultural centers.

Through deep integration of AI technology with physical spaces, the platform establishes a comprehensive practical ecosystem spanning skill training to professional immersion. Within the AI-powered training center, smart piano classrooms equipped with IoT devices collect real-time performance data from students. Combined with visual correction systems, these technologies conduct 3D analysis of playing postures and finger movements to generate personalized training plans. Virtual rehearsal studios utilize motion capture and scene rendering technologies to simulate stage environments with varying lighting and sound effects, helping students adapt to diverse performance scenarios. Regular piano showcase performances and arts festivals on the campus platform not only provide students with performance platforms but also collect data such as facial expressions and audience reactions through AI feedback systems, assisting instructors in evaluating performance quality and emotional delivery. In the virtual career simulation module, students can engage in interactive teaching sessions with AI-generated virtual peers via VR devices, while the system provides professional competency ratings based on teaching methodologies and communication effectiveness. Stage performance simulations randomly generate unexpected situations (e.g., equipment malfunctions or audience disruptions) to train emergency response capabilities. Off-campus internship bases maintain long-term collaborations with local educational institutions and cultural venues. Students working in real-world positions utilize AI teaching assistants to document instructional processes and analyze learning progress, enabling real-time feedback on practical data and dynamic optimization of teaching strategies—ultimately achieving seamless transition from academic learning to professional practice.

5.6. Restructuring of Evaluation System: Multidimensional Evaluation of Human-Machine Collaboration

AI evaluates technical aspects including pitch accuracy, rhythm, proficiency level, practice duration, and task completion rates. Teachers assess artistic elements such as emotional expression, timbre quality, interpretive power, stage presence, and instructional standardization. Process evaluation incorporates AI training data, classroom performance, homework completion, and performance documentation. The assessment framework features multiple evaluation channels: teacher evaluations, AI assessments, self-assessment and peer reviews, as well as industry mentor evaluations. Career-oriented assessments emphasize teaching competencies, vocal performance skills, practical abilities, and job relevance. Faculty restructuring focuses on cultivating "professional + AI + career-ready" triple-skilled educators, with enhanced training in AI teaching tool application and data literacy. Teachers are encouraged to engage in frontline industry practice to strengthen professional expertise. Industry experts, key instructors from training institutions, and AI engineers are recruited as adjunct faculty. Support is provided for educational research to drive innovative teaching methodologies and facilitate the translation of research outcomes.

6. Conclusion and Prospects

The restructuring of piano pedagogy in vocational undergraduate education within the AI era represents not a rejection of

traditional teaching methods, but a systemic transformation driven by technological empowerment, conceptual innovation, and systemic redesign. By redefining educational objectives, curriculum frameworks, instructional processes, practical scenarios, assessment mechanisms, and faculty development, this approach effectively addresses persistent challenges in conventional piano education—including insufficient individualization, delayed feedback cycles, weak practical application, and low occupational relevance—achieving an organic integration of "AI-powered precision enhancement, vocational competency core values, and aesthetic education guidance." The new model not only boosts skill training efficiency but also preserves artistic essence and educational integrity, propelling vocational piano education toward transformation characterized by precision, personalization, professionalism, digitalization, and aesthetic cultivation.

Looking ahead, as large-scale models, multimodal interaction, and digital twin technologies continue to mature, artificial intelligence will see deeper applications in piano improvisation composition, intelligent teaching assistants, personalized course design, and immersive vocational training. Vocational undergraduate institutions should seize the strategic opportunities of educational digitalization, steadily advance the deep integration of AI with piano instruction, continuously optimize teaching methodologies, and enhance talent cultivation quality. By nurturing more high-caliber, interdisciplinary, and innovative music professionals, these institutions can contribute to the high-quality development of vocational education in the new era.

Disclosure statement

The author declares no conflict of interest.

References

[1] Han F, Guo GS, Tian GM, Duan LB, 2025, AI-empowered modernization of vocational education: Value, logic, dilemmas, and pathways. Journal of Guangxi Vocational and Technical College, (05).

[2] Yang ZN, 2025, A study on the collaborative innovation mechanism of generative AI empowering the digital transformation of vocational education. Vocational and Technical Education, 46(25): 65-71.

[3] Guo GF, 2025, Exploring Pathways for Piano Teaching Reform in Higher Education under Digitalization Context. *Theater Home*, (29): 168-170.

[4] Bu RY, 2024, On the Pathways to Enhancing Piano Improvisational Accompaniment Skills. *Theater Home*, (29): 80-82.

[5] Jiang YQ, Bu L, 2025, Research on the Connection between Piano Education and Basic Music Education in Teacher Training in the New Era. *Contemporary Music*, (02): 38-40.

[6] Gao M, 2025, New Paradigm of Music Education in the Intelligent Era from the Perspective of New Liberal Arts: A Study Based on DeepSeek Music Teaching Applications. *Popular Literature and Art*, (22): 118-120.

[7] Yan WQ, 2025, Exploration of Music Education Evaluation Models in the Era of Artificial Intelligence. *Music Education and Creation*, (08): 14-18.

[8] Yang YZ, 2025, Research on Innovation and Development of Musical Art in the Era of Artificial Intelligence. *Charming Hunan*, (01): 26-28.