

Research on Pathways for Cultivating the Core Competency of “Aesthetic Perception” in Music Education Empowered by AI Technology

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Abstract: *As a core driving force of the technological revolution, artificial intelligence is reshaping the field of education, and the deep integration of music education and AI has become an inevitable trend. The new curriculum standards place “aesthetic perception” at the top of the list of core competencies, making it a crucial cornerstone of students’ comprehensive artistic literacy. However, limitations in traditional music teaching methods and technology hinder the cultivation of students’ aesthetic perception competencies. Grounded in the realities of music education, this study analyzes the connotations and developmental patterns of this competency. By integrating the characteristics of AI technology, it explores pathways for AI-enabled cultivation of students’ “aesthetic perception.” The research finds that AI technology can systematically enhance students’ abilities to discover, perceive, understand, and respond to music. At the same time, attention must be paid to the ethics of technology application to ensure that technological advantages are deeply integrated with educational objectives, thereby promoting the high-quality development of music education in the AI era.*

Keywords: Aesthetic perception; Core competencies; Artificial intelligence; Music education.

1. INTRODUCTION

As a key arena for students’ aesthetic education, the field of music education has ushered in a historic opportunity for deep integration with AI technology. This trend stems not only from the endogenous momentum of technological development but is also driven by external educational policies. The promulgation of the new curriculum standards provides clear policy guidance for technology-enabled education. However, traditional music instruction faces numerous limitations, such as the uneven distribution of teaching resources and the narrowness of teaching methods. In the face of these challenges, artificial intelligence technology—with its powerful capabilities in data processing, simulation, and intelligent interaction—offers a ray of hope for overcoming these obstacles.

Reviewing previous research, the concept of “aesthetic perception” as a core competency in music was first introduced in the Curriculum Standards for Music in General Senior High Schools (2017 Edition), and this distinctive feature and philosophy were subsequently incorporated into the development of the New Curriculum Standards for Arts in Compulsory Education (2022 Edition). The standards define “aesthetic perception” as the ability to discover, experience, recognize, and respond to the characteristics of beauty—as well as its significance and role—in the natural world, social life, and works of art. Furthermore, regarding research on practical teaching approaches for the core competency of “aesthetic perception,” Du Hongbin (2018) proposed the view of “cultivating aesthetic perception literacy based on the expressive characteristics of music.” Additionally, research on the integration of AI into music education has yielded significant results. For example, Wang Zhaojun (2024) provided valuable insights into the feasibility and preliminary practical pathways for integrating AI technology into music education. Regarding the future research and application of AI technology, Liu Bing and Liu Yonglian (2024), after exploring the essence of education, introduced the “human-centered” educational goal and argued that “human-centeredness” should serve as the ethical guideline for artificial intelligence technology;

Most existing studies focus on optimizing the technical application level, with few taking the higher perspective of cultivating core competencies to deeply analyze how AI technology can systematically empower the development of “aesthetic perception” literacy in music. Although some studies mention competency development, they lack an in-depth exploration of its underlying mechanisms, practical models, and the evaluation of long-term educational outcomes. In light of this, this study, grounded in the current realities of music education, explores

how artificial intelligence technology can empower the cultivation of “aesthetic perception” competency in music, with the aim of providing a reference for future research and practice.

2. THE POSITIONING AND DEVELOPMENT TRENDS OF “AESTHETIC PERCEPTION” AS A CORE COMPETENCY IN MUSIC

The cultivation of core competencies in music is undergoing profound changes in this era. As a vital cornerstone of the core competency framework, “aesthetic perception” in music also responds to the demands of an era marked by technological innovation.

2.1 The Foundational Role of Aesthetic Perception in Core Musical Competencies

In the current era of continuous educational reform, subject-specific core competencies are the concentrated embodiment of a subject’s educational value; they represent the correct values, essential character traits, and key abilities that students gradually develop through subject-based learning. In the field of music education, core musical competencies serve as a key guiding principle. These encompass multiple aspects, including aesthetic perception, artistic expression, and cultural understanding, among which aesthetic perception occupies a foundational position.

The integration of “aesthetic perception” into the core literacy framework occurs through auditory input, which, via synesthesia, engages the whole body and mind in a multi-sensory, comprehensive experience. This process develops aesthetic abilities, cultivates aesthetic emotions, and nourishes the spirit, thereby achieving the educational goal of well-rounded development. Therefore, aesthetic perception is a higher-order perceptual process that ranks first among the core competencies of the music discipline. It aims to enable students, building upon a foundation of musical knowledge and skills, to deepen their understanding and grasp of musical art through classroom instruction and practical activities, cultivate their perceptual and appreciation abilities, and enhance their personal artistic and humanistic cultivation.

The foundational role of the “aesthetic perception” competency is also reflected in the development of the other three core competencies. Artistic expression includes singing, instrumental performance, and composition. Only by possessing keen aesthetic perception can students better engage in artistic expression. Second, aesthetic perception helps deepen cultural understanding. As a cultural medium, music embodies cultural significance. Aesthetic perception helps students identify musical and cultural elements from different regions while listening, providing a starting point for exploring the culture behind the music. Furthermore, aesthetic perception can spark inspiration for creative practice. It offers a rich source of material and inspiration, enabling students to ignite their creative spark during such activities.

2.2 The Inevitable Trend Toward Integrating Core Musical Competencies with AI Technology

Compared to the traditional, formulaic educational ecosystem, under the influence and penetration of artificial intelligence technology, educational philosophy is undergoing a profound shift from a knowledge-centered to a competency-centered approach, placing greater emphasis on cultivating students’ intrinsic and implicit abilities, such as creativity, aesthetic perception, empathy, and collaboration. In terms of fostering aesthetic perception, AI technologies such as VR and AR create richer and more realistic musical contexts for students. This immersive experience can greatly stimulate students’ aesthetic interest.

In terms of musical performance, AI technology can provide students with precise guidance on playing and singing, helping them continuously improve their performance skills and better understand and express the essence of musical works. Regarding musical creation, AI technology offers students a wealth of creative resources and tools, inspiring their creative thinking. Furthermore, through data analysis, AI technology can recommend musical and cultural content tailored to students’ interests and learning levels, thereby promoting their understanding and preservation of musical culture.

Therefore, the integration of AI technology with the cultivation of core musical competencies is an inevitable choice in keeping with the times. It infuses music education with a constant stream of fresh vitality and opens up

broader horizons for development. By taking aesthetic perception as its starting point, it enables students to view the world through the eyes of music and to comprehend life with an aesthetic sensibility.

2.3 AI-Generated Contexts: Creating an Immersive Sensory Experience

In music education, context creation is of paramount importance. “Contextual teaching refers to a teaching method in which teachers, based on instructional needs, create scenarios centered on concrete, vivid subjects to evoke students’ emotional and attitudinal responses to the text, thereby helping students understand the content and develop their cognitive abilities, emotional responses, and attitudes.” It can make abstract music more tangible, helping students gain a deeper understanding of musical elements and construct their cognitive frameworks.

In traditional music education, scenario creation often relies on relatively simple and limited methods such as teachers’ verbal descriptions, image presentations, and video playback. Students’ perception of musical emotions and appreciation of musical beauty tends to be relatively superficial, making it difficult for them to truly immerse themselves in the scenarios created by the teacher. However, the emergence of artificial intelligence technologies in music education—such as AI image generation tools, Dolby Atmos, and AI virtual reality—has broken this passive viewing model.

In teaching the Yunnan folk song “Herding Cattle Mountain Song,” teachers use AI image generation tools (such as Stable Diffusion) to create a 3D virtual pasture by combining elements like the topography of the Yunnan grasslands, herds of yaks, and herders. Students wearing VR headsets feel as if they are standing on the plateau of northwestern Yunnan. At the same time, AI avatars are trained based on the characteristics of Yunnan mountain songs and local history and culture. In class, students use the “Doubao” voice assistant to converse with the “mountain song creator,” asking questions about singing techniques for Yunnan mountain songs and their connection to pastoral life. This allows students to immersively experience the full scope of regional musical culture through AI-generated scenarios.

Virtual reality technology, leveraging its unique advantages to construct immersive environments for musical aesthetic perception, is reshaping the landscape of music education. It deeply taps into the potential of musical scenario creation to cultivate aesthetic perception, using cutting-edge technology to enable students to experience music in entirely new ways. Compared to traditional teaching methods, this approach demonstrates significant advantages and provides a continuous source of momentum for advancing students’ musical aesthetic literacy.

2.4 AI-Optimized Feedback Mechanisms: Creating Personalized Aesthetic Experiences

“Assessment is an important channel and means for evaluating and improving the quality of teaching. We must fully leverage the diagnostic, motivational, and improvement functions of assessment to promote student development.” The music teaching evaluation system serves as a means to demonstrate core musical literacy and achieve its objectives. Post-test feedback in traditional music education primarily relies on standardized assessments, making it difficult to delve into the deeper dimensions of students’ personalized aesthetic experiences. At the same time, traditional teaching depends on teachers’ immediate observations and periodic evaluations, which limits the development of students’ personalized aesthetic abilities.

In a pilot program at a certain school—using the piece “Hometown by the Sea” as an example—students employed “wave rhythm cards” to independently mark challenging rhythmic patterns and then utilized an AI training platform for real-time correction. The AI system can accurately identify issues such as early or missed beats and provide voice prompts, offering unlimited opportunities for repeated practice. This addresses the inefficiency of “one-to-many” rhythm instruction in traditional teaching, enabling students to gain targeted aesthetic experiences.

Through data accuracy, diverse interaction, and immediate feedback, personalized AI learning systems have broken through the inherent limitations of traditional music education in terms of aesthetic experience and evaluation mechanisms. Not only do they provide students with “tailor-made” paths for aesthetic growth, but by making post-test feedback scientific and visual, they also advance the cultivation of musical aesthetic perception from “experiential practice” to “evidence-driven, precision education.”

3. CHALLENGES AND FUTURE PROSPECTS FOR THE APPLICATION OF AI TECHNOLOGY IN MUSIC EDUCATION

How to enhance the effectiveness of cultivating students' "aesthetic perception" through AI while preserving the humanistic core of music education is a fundamental question that must be addressed today.

3.1 The Transformation of the Music Teacher's Role and the Development of Digital Literacy

Using AI to foster the core competency of "aesthetic perception" in music has not only reshaped teaching models but also placed new demands on music teachers' roles and professional competencies. This will give rise to a new form of instruction—a collaborative teaching model featuring both "artificial intelligence" and "teachers."

Teachers must leverage their humanistic strengths—which AI cannot replace—to become "emotional catalysts" for students' aesthetic perception. The development of AI technology in music education places multidimensional demands on music teachers' professional competencies. In terms of professional knowledge, teachers must not only be proficient in traditional music theory and pedagogy but also master the fundamental principles of AI and the operational logic of AI tools designed for music education.

In terms of teaching ability, teachers must enhance their skills in AI-assisted instructional design, integrating AI resources based on student characteristics to design interactive teaching activities. At the same time, they must strengthen their data interpretation skills, analyzing AI-recorded learning behavior data to accurately track student learning progress and optimize teaching strategies. In terms of educational philosophy, teachers must break free from fixed mindsets, adopt a "human-machine collaboration" mindset, and recognize that AI is a teaching aid rather than a substitute for teachers, while consistently maintaining a human touch and aesthetic guidance throughout the teaching process.

4. ETHICAL CONTROVERSIES AND PROSPECTS FOR BALANCING AI TECHNOLOGY AND HUMANISTIC VALUES

As artificial intelligence technology becomes deeply integrated into the field of music education, complex ethical risks lurk behind the improvements in aesthetic perception efficiency and personalized learning experiences it brings. The primary ethical dilemma is that reliance on AI may lead students to engage in superficial thinking. A long-term "feed-based" information acquisition model may inadvertently erode students' initiative in learning, leading to technology addiction and fostering intellectual laziness.

The alienation of teacher-student interactions represents a secondary risk arising from technological intervention in educational relationships. The "digital profiles" formed by AI teaching systems through data collection and analysis, while capable of providing precise diagnostic assessments of student learning, reduce teacher-student interaction to data feedback and algorithmic recommendations. The essence of human interaction lies in emotional empathy and the exchange of ideas; however, the emergence of generative AI has transformed the core of interpersonal interaction into cold algorithms, which is bound to lead to the alienation of teacher-student relationships. Students, meanwhile, lose the opportunity for in-depth dialogue with teachers within the closed loop of algorithmic recommendations.

To address these ethical risks, a multi-stakeholder collaborative governance system must be established. Teachers should strengthen emotional communication with students and convey humanistic values; the government and education authorities should increase investment in music education and provide support to underdeveloped regions; schools should strengthen AI technology training for teachers; and at the legal level, relevant regulations and policies must be refined to achieve multidimensional governance encompassing technology, education, and law. Only then can artificial intelligence truly become an enabler rather than a source of alienation in music education.

5. CONCLUSION

In exploring how AI technology can empower the cultivation of the core competency of “aesthetic perception” in music, it has demonstrated immense potential to revolutionize traditional teaching models. Research has found that AI technology reshapes key aspects of teaching, thereby empowering the intrinsic logic of competency development. It acts upon students’ core abilities to “discover, feel, recognize, and respond” to the beauty of music. At the same time, as technology is deeply integrated, we must remain vigilant regarding its potential impact on the central role of teachers and students, the depth of emotional engagement, and humanistic values. Only by upholding the central role of “people” in music aesthetic education can technology truly serve the fundamental educational goals of deepening students’ aesthetic perception and promoting their well-rounded development.

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