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2025 Volume 3, Issue 8
Lecture Notes in Education, Arts, Management and Social Science
ISSN(Online): 2705-053X

Exploration on the Application of Artificial Intelligence in Aesthetic Education in Colleges and Universities

Tao Wang*
School of Music, Zhaoqing University, Zhaoqing 526061, Guangdong, China

**Author to whom correspondence should be addressed.*

Abstract: The rise of artificial intelligence (AI) technology has exerted a profound impact on the field of education and brought new opportunities for aesthetic education in colleges and universities. This paper discusses the importance, current situation, and existing problems of aesthetic education in colleges and universities, and puts forward corresponding countermeasures and suggestions. It deeply analyzes the potential and advantages of AI technology in improving the quality of aesthetic education and promoting students' learning effects in colleges and universities. The application paths and future development directions of AI in music aesthetic education are explored, aiming to provide a reference for the innovative development of music aesthetic education in colleges and universities and promote the application of AI in music education.

Keywords: Artificial intelligence; Higher music colleges and universities; Aesthetic education

Online publication: September 26, 2025

1. Development problems existing in music aesthetic education in colleges and universities

1.1. Insufficient professionalism of teachers

At present, the professionalism of the teaching team in college music aesthetic education has obvious shortcomings, which restricts the improvement of teaching quality and the realization of educational goals. Although some teachers have solid performance skills in playing or singing, their understanding of aesthetic education concepts is relatively backward. They fail to integrate aesthetic education into daily teaching, but focus more on technical training while neglecting the guidance of emotional expression, cultural connotation, and aesthetic experience, resulting in aesthetic education becoming a mere formality [1]. Some teachers lack systematic knowledge reserves in pedagogy and psychology, making it difficult to carry out differentiated teaching according to the personality characteristics of different students and are unable to effectively stimulate students' artistic perception and creativity. There are also unreasonable phenomena in the teacher structure: the number of full-time teachers engaged in aesthetic education theory research and practical teaching is limited, and some courses are taught by part-time professional performance teachers whose teaching focus is more on skill transmission rather than aesthetic shaping. The imperfect on-the-job training mechanism makes it difficult for teachers to update their educational concepts and teaching methods from a cutting-edge perspective, and they are unable to meet the diversified

and personalized needs of students in the new era. Some teachers have insufficient understanding of emerging technical means, especially in the trend of the integrated development of AI and music, and lack the ability to apply intelligent tools to teaching practice, missing the opportunity to improve aesthetic education efficiency with the help of science and technology [2].

The unbalanced allocation of teacher resources between regions and institutions further aggravates this problem: high-quality teachers are concentrated in a few key institutions, while local or newly established undergraduate colleges face difficulties in introducing talent and the loss of backbone teachers, resulting in uneven overall teaching levels. Although young teachers have high academic backgrounds, they lack practical teaching experience and the cognition and practice ability of the in-depth value of aesthetic education, making it difficult to reflect the infiltration and comprehensiveness of aesthetic education in classroom design and teacher-student interaction.

1.2. Lack of diversity and innovation in teaching content

In the actual promotion of aesthetic education in colleges and universities, there is still an obvious tendency towards simplification in the construction of teaching content. The curriculum setup generally lacks modular and thematic innovative designs, which makes it difficult to stimulate students' sense of active participation [3]. Some classrooms still adopt the linear teaching method of "teacher demonstration-student imitation," lacking interactive and inquiry-based links, which limits the development of students' aesthetic judgment and creative thinking. Modern music forms are becoming increasingly diversified, with new expressions such as electronic music, environmental sound art, and interactive music installations emerging continuously, but these contents account for an extremely low proportion in existing courses. The disconnection between teaching content and the industry frontier makes it difficult for students to establish an overall understanding of the contemporary music ecosystem. The development of information technology has spawned a large number of new music creation and dissemination methods. However, the coverage of digital skills such as audio software operation, sound programming, and AI composition tools in teaching content is seriously insufficient [4]. Students lack the necessary theoretical support and practical ability when facing intelligent music platforms and cannot effectively use technical means for personalized aesthetic expression. The teaching content has not fully responded to the aesthetic changes brought about by the digital age, resulting in a disconnect between the aesthetic education process and the real cultural environment. The curriculum evaluation system also mostly measures students' performance by traditional standards, which is difficult to adapt to diversified content exploration and innovative attempts, further inhibiting the innovation motivation of teaching content.

1.3. Insufficient teaching facilities and equipment

In the process of promoting aesthetic education in colleges and universities, the construction of teaching facilities and equipment has failed to keep up with the actual needs of educational development, restricting the improvement of teaching quality and the all-around development of students' artistic literacy [5]. Music classrooms still remain in the stage of traditional acoustic environment configuration, lacking modern sound field control systems and sound insulation designs. During teaching, problems such as sound interference and excessive reverberation are prone to occur, affecting students' accurate perception of intonation, rhythm and timbre. Although there are electronic music laboratories or multimedia music classrooms, the internal equipment is outdated and the computer configuration is low, which cannot run the current mainstream digital audio workstation software, limiting the cultivation of students' practical abilities in music creation, arrangement and production. The number of recording equipment is scarce and the update is lagging behind, making it difficult to meet the teaching needs of multi-person and multi-part recording. In practical sessions, students can only conduct simple sound collection, and cannot deeply experience the complete recording process and post-processing technology. In terms of musical instrument equipment, the number of pianos is insufficient and the rehearsal time in piano rooms is tight, making it difficult for students to obtain sufficient independent practice opportunities. In courses that rely on high-frequency repetitive practice, such as sight-singing and ear training, vocal music training, the shortage

of equipment directly affects learning outcomes [6]. Some emerging music technology-related courses, such as intelligent music programming and interactive sound design, cannot be offered due to the lack of corresponding hardware support, resulting in the curriculum system lagging behind industry development.

2. Application of Artificial Intelligence technology in college music aesthetic education

2.1. Analyzing sound recordings to assist students in adjusting and improving singing methods

AI-driven sound analysis technology can convert sound signals into visual waveforms, spectrograms and parameter indicators, making abstract singing states observable and comparable. In terms of intonation deviation detection, the system can accurately identify deviations within a semitone and mark specific time periods to help students locate problem passages [7]. In the evaluation of rhythm stability, AI can point out the specific positions of rushing or dragging beats by comparing with standard beat templates, improving beat control ability.

As a typical application case, Magic School.ai integrates deep learning models and large-scale vocal music databases, and can identify sound feature patterns under different voices, vocal ranges and singing styles. When a student completes a recording and uploads it to the platform, the system completes multi-dimensional analysis in seconds and generates a personalized diagnostic report. The report not only points out the technical problems existing in the current singing, but also automatically matches practice repertoires and training plans suitable for their development stage based on the student's historical performance and ability level [8]. For beginners, the system may recommend short-phrase exercises focusing on breath control and basic intonation training; for advanced learners, it may push technical fragments involving complex embellishments or cross-vocal range transitions.

The feedback mechanism is not only limited to post-event analysis, but can also be extended to real-time interaction scenarios. Some AI systems already support simultaneous singing and evaluation, transmitting real-time prompts to students through in-ear monitoring devices, such as voice reminders like "too high laryngeal position" and "insufficient breath", forming a closed-loop training process [9]. Teachers can retrieve the analysis data of all students to understand the overall mastery and individual differences, thereby designing targeted explanations focused in group classes and deepening technical guidance in individual classes. AI does not replace the teacher's role, but frees them from repetitive listening and discrimination work, focusing on higher-level teaching goals such as artistic expression and emotional communication. In this way, technology and humanity work together to promote music aesthetic education towards the deep integration of scientificity and personalization.

2.2. Artificial Intelligence technology providing teachers with diversified intelligent tools

With the help of AI-driven diversified intelligent tools, music teachers can achieve efficiency improvement and teaching optimization in multiple links, such as curriculum design, classroom implementation, and after-class feedback [10]. As a basic intelligent musical instrument, the electronic keyboard integrates sensors and real-time feedback systems, which can instantly transmit students' performance data to the teacher's terminal, helping teachers accurately grasp each student's technical weaknesses, providing teachers with visual analysis reports, and enabling them to conduct more targeted guidance during teaching.

As an AI-based composition platform, Amper Music allows teachers to quickly generate customized background music or accompaniment fragments according to teaching needs. This tool is particularly suitable for music creation courses. Teachers can adjust the style, speed and mode through simple parameter settings to construct audio materials that meet the teaching context. It greatly shortens lesson preparation time, stimulates classroom interaction, and allows students to understand theoretical knowledge in a real musical context. Orb Composer further expands the intelligent composition assistance capability. Its deep learning model can imitate the structural characteristics of different music genres, helping teachers demonstrate core content such as harmonic progression and melody development, enhancing students' understanding of musical forms [11].

The ONE intelligent piano uses LED light guidance and real-time error correction mechanisms to help students maintain correct fingerings and rhythms during independent practice. Teachers can view the practice data of the whole class through the cloud background, understand the overall learning progress and formulate differentiated teaching strategies. Using computer auditory recognition technology, it automatically evaluates the quality of students' performances, marks wrong notes, missed notes and rhythm deviations, and generates personalized feedback reports for teachers' reference, thereby reducing repetitive work and focusing on the cultivation of artistic expression [12]. The ONE intelligent piano room integrates space management and teaching monitoring functions to achieve multi-terminal linkage. Teachers can remotely monitor the practice status of multiple piano rooms and provide guidance in a timely manner, improving teaching management efficiency.

2.3. Artificial Intelligence technology providing solutions for music evaluation

The application of AI technology in music evaluation is gradually changing the traditional evaluation model, improving the scientificity and objectivity of evaluation through data-driven methods [13]. With the help of audio analysis algorithms and machine learning models, the system can real-time capture and quantitatively analyze multi-dimensional indicators such as intonation, rhythm, dynamics changes and timbre characteristics during performance or singing.

In actual teaching scenarios, after students complete a vocal or instrumental performance, the AI system can generate a visual report in a short time, marking specific notes that deviate from the standard pitch, time points of rhythm deviations, and the stability of dynamic strength control, helping teachers and students quickly locate technical weaknesses. Some platforms have realized the expressive analysis of details such as breathing pauses, legato and staccato processing, further expanding the depth of evaluation [14]. The AI music detection solution developed by Pex Inc. in the United States demonstrates the extended value of automatic content recognition technology beyond copyright monitoring. Its core technology can distinguish music fragments generated by artificial intelligence, providing technical support in music originality identification.

In the examination scoring link, AI can conduct hierarchical judgment on different levels of ability performance through preset scoring models, reducing scoring fluctuations caused by human factors. In large-scale online music courses or remote assessments, this automated evaluation mechanism effectively improves efficiency and fairness. Experiments show that students who receive AI feedback make significantly faster progress in intonation correction and rhythm stability training than the control group that only relies on teachers' verbal guidance. With the continuous optimization of neural network algorithms, future evaluation systems will also have advanced functions such as cross-style comparison and emotional expression tendency recognition, promoting music education evaluation towards intelligence and personalization.

2.4. Artificial Intelligence providing diverse sound synthesis and special effect processing functions

Through deep learning and neural network algorithms, artificial intelligence can simulate various musical instrument timbres, vocal characteristics and complex sounds in nature, realizing highly realistic audio generation. AI-based sound modeling technology can accurately capture the timbre characteristics of specific singers or performers and generate new audio content with personalized colors accordingly. For students majoring in music performance, this means they can obtain virtual tutor-level demonstration resources for imitation learning and artistic expression improvement. In national music inheritance courses, AI can reproduce endangered traditional singing styles or rare musical instrument timbres, helping students deeply understand the connotation of regional music culture and enhance the depth and breadth of aesthetic experience [15].

In terms of special effect processing, artificial intelligence can automatically identify audio frequency bands, emotional tendencies, and rhythm structures, thereby realizing intelligent reverb, equalization, compression, and spatial positioning processing. When students record works, they can obtain professional-level sound effect optimization suggestions and complete real-time rendering with the help of AI plug-ins without mastering complex post-production

processes, improving creation efficiency and reducing technical barriers, enabling more students without technical backgrounds to focus on the expression and aesthetic conception of music itself.

Some advanced AI platforms also support multi-modal interaction, linking visual elements with sound effects to create an immersive audio-visual integration experience. Such functions are widely used in modern stage design, multimedia musical rehearsals and interdisciplinary art projects, promoting aesthetic education from a single auditory perception to comprehensive sensory education. Teachers can use these tools to guide students to carry out thematic creative practices, such as constructing projects like "emotional soundscapes" and "urban sound maps", stimulating their artistic imagination and social responsibility. The application of artificial intelligence in sound synthesis and special effect processing is reshaping the technical ecology and teaching logic of higher music education. It is not only an upgrade at the tool level, but also an innovation of educational concepts, prompting aesthetic education to pay more attention to the release of individual creativity and the integration of science, technology, and humanity.

3. Conclusion

In the era of rapid scientific and technological development, artificial intelligence technology is rapidly penetrating various fields with its unique advantages, and college music aesthetic education is no exception. The application of artificial intelligence technology in music education has enriched teaching methods, significantly improved teaching effects and students' learning experience, and has shown great potential and practical effects in college music education. Artificial intelligence technology has brought new opportunities and changes to the traditional music education model, and will surely play an increasingly important role in music aesthetic education, providing strong support for cultivating high-quality and innovative talents. The further application of artificial intelligence technology in music aesthetic education requires the joint efforts of college teachers, technology developers and education policy makers to seek effective solutions to ensure the sustainable development of artificial intelligence technology in the field of music education.

Disclosure statement

The author declares no conflict of interest.

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