

Exploration of Paths for Artificial Intelligence Technology Empowering Personalized Music Teaching in Secondary Vocational Schools

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Abstract: In the field of music education, increasing attention has been paid to students' personalized needs. Each student is an independent individual with distinct talents and developmental requirements. Therefore, it is particularly important to meet students' differentiated needs, implement personalized teaching, and enhance students' practical music abilities and professional literacy. With the development of artificial intelligence (AI) technology, its advantages in student learning diagnosis, content customization, practical training, and evaluation feedback have provided new solutions for personalized music teaching in secondary vocational schools. Based on this, this paper combines the core needs of personalized teaching, explores specific paths for AI empowering personalized music teaching in secondary vocational schools, and analyzes the challenges and countermeasures during the implementation process, aiming to provide useful references for relevant educators.

Keywords: Artificial Intelligence; Secondary vocational schools; Music; Personalized teaching

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1. Introduction

Personalized education refers to a teaching model that provides each student with content and methods tailored to their characteristics, based on factors such as learning abilities, traits, and interests. Its advantage lies in meeting students' personalized needs, stimulating their interest and potential in learning, and enabling students to participate more actively in the learning process.

With the development of AI technology, its penetration in the field of education has deepened. Through functions such as data processing and intelligent analysis, AI technology can provide students with personalized learning experiences and services, promoting the transformation of teaching from a "teacher-centered" to a "student-centered" approach. Therefore, this paper focuses on the paths of AI technology empowering personalized music teaching in secondary vocational schools, combining the characteristics of secondary vocational music teaching and students' needs, and explores specific ways of in-depth integration of AI and teaching, in order to provide new ideas for the reform of music education in secondary vocational schools.

2. Core paths of Artificial Intelligence technology empowering personalized music teaching in secondary vocational schools

2.1. Constructing an intelligent student learning diagnosis system to accurately identify personalized needs

The prerequisite for realizing personalized teaching is to accurately grasp students' needs. AI can comprehensively analyze students' learning situations through data collection and analysis, providing a scientific basis for teaching decisions.

AI can collect students' learning data through intelligent teaching platforms, performance recording equipment, and other tools. Taking students' piano practice as an example, AI can record students' intonation, rhythm, dynamics, and other elements in real time during their performance, and accurately analyze their learning status ^[1].

With the help of machine learning algorithms, AI can conduct in-depth analysis of the collected data to identify students' learning characteristics. Specifically, first, it can identify students' learning styles, determining whether they are auditory, visual, or kinesthetic learners; second, it can diagnose students' ability shortcomings, such as understanding students' deficiencies in emotional expression and rhythm control by analyzing performance data; third, it can extract students' interest preferences, clarifying their preferences for specific music styles, creative forms, and musical instruments. Based on these analyses, a student learning profile is generated, clearly presenting each student's personalized needs ^[2].

Students' learning situations are constantly changing, and another advantage of AI is its ability to track students' learning progress in real time, dynamically adjusting student profiles based on their practice results, test scores, and other factors, ensuring the timeliness and accuracy of learning diagnosis.

2.2. Innovating personalized teaching content and methods to stimulate learning initiative

Based on the results of intelligent learning diagnosis, AI can be used to create a teaching model adapted to students' personalized needs from two aspects: teaching content and teaching methods.

2.2.1. Precisely customizing teaching content

First, recommending hierarchical content. According to students' music foundations, AI recommends suitable teaching content for students at different levels ^[3]. Specifically, for students with zero foundation, it can recommend basic music theory knowledge and simple musical instrument entry exercises; for advanced students, it can recommend complex music performance and basic music creation content. At the same time, combined with students' interest preferences, it recommends different learning materials for them.

Second, generating contextualized content. Using AI's virtual scenario construction function, contexts matching the teaching content are created to enhance the sense of immersion in learning. For example, when learning classical music, AI can be used to build a virtual classical concert hall scenario, with supporting historical and cultural explanations, allowing students to understand the cultural background of music in an immersive environment.

Third, designing personalized learning tasks. AI can design differentiated tasks based on students' ability goals and learning rhythms ^[4]. For instance, if some students are interested in creation, teachers can guide them to use AI as an auxiliary tool for music creation, encouraging them to try writing simple music segments, and AI recommends suitable harmony and arrangement materials according to their creative ideas.

2.2.2. Intelligently innovating teaching methods

First, building intelligent interactive teaching. With the help of natural language processing technology, schools can develop AI-based intelligent Q&A systems. Students can ask questions encountered in the learning process to the system, and AI can provide corresponding answers and examples by analyzing the questions ^[5]. At the same time, teachers can use VR technology to build virtual music classrooms, where students can interact in real time with AI virtual teachers and other students, such as conducting virtual ensemble exercises to improve their collaborative abilities.

Second, constructing inquiry-based learning methods. By setting question chains, AI can guide students to actively explore music knowledge. For example, when learning music creation, AI first raises basic questions, then gradually asks in-depth questions based on students' answers, stimulating their thinking and inquiry enthusiasm. At the same time, AI can recommend relevant learning resources to help students find answers independently.

2.3. Building an intelligent practical training system to enhance practical abilities

2.3.1. Virtual musical instruments and simulated training

Secondary vocational schools have limited musical instrument resources, which is not conducive to students' after-class practice. Schools can develop AI-based virtual musical instrument systems, allowing students to conduct practical training through computers, tablets, and other devices. Virtual musical instruments can replicate the playing feel and sound effects of real instruments, and can also correct mistakes in real time during students' performances and provide improvement suggestions, helping students correct problems in a timely manner.

2.3.2. Generating personalized training plans

Based on learning goals and the analysis of students' learning situations, AI can formulate personalized training plans for students, specifying the training content, duration, and frequency^[6]. For example, for students with insufficient emotional expression in piano performance, AI can design a special training plan for emotional expression, arranging 15 minutes of daily practice on music segments rich in emotions, and matching it with AI emotional analysis tools. This allows students to understand the skills of emotional expression by comparing their own performance audio with that of professional performers. At the same time, AI can adjust the plan on time based on students' training results: if a student makes slow progress in a certain training content, AI can reduce the training difficulty or increase the practice duration; if the progress is obvious, it can increase the training difficulty, ensuring the gradual progression of training.

2.3.3. AI-assisted creative practice

Some students are interested in music creation, and AI can provide them with creative auxiliary tools to lower the threshold of creation and encourage them to carry out practical innovation^[7]. For example, an AI music creation platform can generate a preliminary melody draft based on the creative theme and style preferences input by students; students can modify and adjust the draft, and AI recommends suitable harmony and arrangement plans in real time to help them complete the creation of a complete work. At the same time, students can upload their creative works to a virtual display platform, communicate and evaluate with other students, and enhance their enthusiasm and sense of accomplishment in creation.

2.4. Improving the diversified intelligent evaluation system to promote all-round development

First, expanding evaluation dimensions. With the help of AI, evaluation dimensions can be expanded from skill mastery to comprehensive literacy, including: basic ability evaluation, such as students' mastery of music theory knowledge and proficiency in performance skills; aesthetic ability evaluation, assessing students' music aesthetic level by analyzing their appreciation reports of music works and their ability to judge different styles of music; emotional expression evaluation, using AI audio emotional analysis technology to judge students' emotional expression effects based on their performance in aspects such as changes in playing dynamics and speed control during performance; innovation ability evaluation, evaluating students' music creation works from dimensions such as melody innovation and arrangement rationality; collaborative ability evaluation, in virtual ensemble and chorus training, AI can evaluate students' team collaboration ability by analyzing their coordination and rhythm unity.

Second, innovating evaluation methods. On the one hand, process-oriented evaluation should be implemented. AI can record students' learning process data in real time, incorporating classroom practice, after-class training, creative practice, and other links into the evaluation scope to fully reflect students' learning progress^[8]. On the other hand, multi-

subject evaluation should be integrated. In addition to teacher evaluation, AI can introduce student self-evaluation and peer evaluation functions. That is, students can conduct self-evaluation of their performances or creations through an intelligent evaluation platform, comparing against the ability evaluation standards generated by AI; in virtual learning communities, students can also evaluate each other's works, and AI analyzes the mutual evaluation content, extracts reasonable suggestions, and helps students improve.

2.5. Integrating intelligent teaching resources to break resource limitations

One of the important problems faced by secondary vocational music teaching is the uneven distribution of resources. AI can integrate resources and build a sharing platform to provide students with high-quality and balanced teaching resources.

AI can integrate high-quality music teaching resources at home and abroad to build a resource library covering music theory knowledge, musical instrument teaching, creative tools, and other content^[9]. The resource library should have the following characteristics: first, diversity, including teaching materials of different music styles such as classical music, pop music, and folk music, and teaching videos of various musical instruments such as the piano, guitar, and guzheng; second, hierarchy, classifying resources by difficulty levels such as entry-level, advanced, and expert-level to adapt to students with different foundations; third, updateability, with AI regularly capturing the latest music teaching resources and industry trends to ensure the timeliness of resources.

Based on student profiles, AI can accurately push content from the resource library to students in need. At the same time, an inter-school resource sharing platform is built, and through AI's resource matching algorithm, high-quality teaching resources from different secondary vocational schools are shared, enabling students from schools with weak resources to also access high-quality music teaching content^[10].

3. Challenges and countermeasures of artificial intelligence empowering personalized music teaching in secondary vocational schools

3.1. Challenges

Although AI has significant advantages, it also faces some challenges in personalized music teaching in secondary vocational schools. First, the lack of emotional warmth. Music is an art of emotion, and although AI can simulate the technical elements of music, it is difficult to truly understand the emotional connotation and humanistic value in music, which may lead to insufficient emotional transmission in the teaching process. Second, the insufficient technical application capabilities of teachers. Some secondary vocational music teachers lack experience in applying AI technology and find it difficult to skillfully apply it in the teaching process. Third, risks of data security and privacy protection. AI collects a large amount of students' personal data during the teaching process, and this data faces the risk of being leaked or misused.

3.2. Countermeasures

In response to the challenges faced by AI in personalized music teaching in secondary vocational schools, specific countermeasures can be taken from the following three perspectives. First, construct a "human-machine collaboration" teaching model. AI is mainly responsible for standardized tasks such as learning diagnosis, content recommendation, and technical error correction, while teachers should focus on emotional guidance and humanistic education in teaching, ensuring the unity of the technical and humanistic attributes of teaching. Second, strengthen the training of teachers' technical capabilities. Secondary vocational colleges can carry out targeted training to improve teachers' ability to apply AI technology. At the same time, a teacher exchange platform should be built to organize teachers with rich experience in technology application to share practical cases, promoting mutual learning among teachers. Third, establish a sound data security assurance system. At the technical level, data encryption, access permission control, and other technologies should be adopted to ensure the security of students' data; at the institutional level, data usage specifications should be

formulated, clarifying the scope of data collection, purpose of use, and retention period, and prohibiting the use of students' data for purposes other than teaching; at the awareness level, data security education for teachers and students should be strengthened to raise awareness of privacy protection.

4. Conclusion

Under the background of vocational education reform and the development of AI technology, integrating AI technology into personalized music teaching in secondary vocational schools is an inevitable choice to promote the high-quality development of music education in secondary vocational schools. In this process, we must also recognize that AI is not a panacea. Challenges such as insufficient emotional transmission and weak technical capabilities of teachers in its application process need to be addressed through strategies such as “human-machine collaboration” and “teacher training”. In the future, with the continuous iteration of AI technology and the continuous update of educational concepts, it is necessary to further explore the path of in-depth integration of technology and teaching, so that AI can better serve personalized music teaching in secondary vocational schools and cultivate high-quality vocational talents with musical literacy, practical abilities, and innovative awareness.

Disclosure statement

The author declares no conflict of interest.

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