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Article

The Application of Artificial Intelligence in Personalized Learning of Music in Junior High School

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Abstract: In recent years, artificial intelligence (AI) technology has shown rapid development and has been widely applied in the field of education, enhancing students' learning enthusiasm and facilitating the implementation of personalized teaching. This article analyzes the theoretical logic and value implications of AI-enabled personalized learning in junior high school music education. Focusing on the modular design and core competency orientation of the 2024 version of the junior high school music textbook published by Shanghai Education Press, it proposes strategies for the application of AI technology, aiming to provide theoretical support and practical reference for the smooth transformation towards personalized education in junior high school music.

Keywords: artificial intelligence; junior high school music; personalized learning; apply strategies

1. Introduction

The new curriculum standards explicitly state that in music education, students should be cultivated in artistic perception, creative expression, and cultural understanding, centered around core competency requirements. This emphasis is fully reflected in the new junior high school music textbooks. Taking the 2024 version of the Shanghai Education Press's junior high school music textbook for the 5+4 school system as an example, it adopts a modular arrangement, achieving a high degree of unity between knowledge impartation and competency cultivation. While retaining the classic music theory system, it adds creative practice and cultural expansion sections, providing excellent content carriers for personalized learning. Artificial intelligence (AI) highly aligns with the concepts of "teaching students according to their aptitude" and "creative expression" in the new textbooks. AI can enable personalized empowerment from emotion recognition to melody generation, driving reform and innovation in music education. Compared to the traditional "one-size-fits-all" teaching model in junior high school music education, the core advantage of AI technology lies in breaking the single closed loop of "teacher teaches, students listen." It can precisely align with the tiered requirements of the new textbooks and individual differences among students, shifting music learning from "passive reception" to "active adaptation." This not only addresses the pain points of traditional teaching, which is difficult to accommodate the needs of students with different foundations, but also makes the competency goals of the new textbooks more operable, injecting new momentum into the high-quality development of junior high school music education.

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2. Theoretical Logic and Value Implications of Artificial Intelligence Empowering Personalized Learning in Junior High School Music

2.1. Theoretical Logic

The application of artificial intelligence in personalized music learning in junior high school is supported by mature educational theories and technical logic. Its core theory is reflected in three aspects:

2.1.1. Constructivist Theory

Constructivist theory can provide a good cognitive foundation for personalized learning, arguing that learning activities are a process of students actively constructing meaning rather than passively receiving knowledge. Artificial intelligence can provide students with a personalized learning environment, allowing them to independently choose their exploration paths based on their own ability levels and learning aspirations. For example, students interested in ethnic music can use artificial intelligence tools to explore the regional cultural connotations behind various tracks in textbooks, completing active construction of knowledge [1]. In the 2024 edition of the junior high school music textbook published by Shanghai Education Press, the ethnic music module covers classic tracks from different regions such as Jiangnan string and woodwind music and Northern Shaanxi folk songs. Artificial intelligence tools can push performance videos and folk background introductions corresponding to the tracks for students through functions such as audio analysis and graphic expansion, and can even simulate the performance effects of different instruments, allowing students to feel the charm of ethnic music in their independent exploration, truly realizing the meaning construction of "a thousand people, a thousand faces", which is highly consistent with the core viewpoint of constructivism, "active exploration and independent growth".

2.1.2. Theory of Multiple Intelligences

The theory of multiple intelligences points out that musical intelligence is one of the core intelligences of humans, and its development exhibits significant individual differences. Artificial intelligence can leverage the collection and organization of multi-dimensional data to accurately identify the ability differences of each student in terms of pitch perception and rhythm grasp, thereby providing appropriate learning support for content at different difficulty levels in textbooks. The differences in musical intelligence among junior high school students are particularly evident. Some students excel in singing but lack rhythm grasp, while others are proficient in playing musical instruments but have weak pitch perception. The 2024 edition of the new textbook precisely designs tiered knowledge points to address these differences - the basic tier focuses on core skills such as rhythm and pitch, the improvement tier focuses on work appreciation and simple performance, and the expansion tier focuses on creative adaptation and cultural exploration. Artificial intelligence can collect students' singing audio, performance videos, and other data in real time, analyze pitch deviations and rhythm errors using audio recognition technology, accurately match the tiered content corresponding to the textbooks, and provide adaptive learning paths for students with different intelligence levels, enabling each student to improve on their original foundation.

2.1.3. Data-Driven Teaching Theory

The data-driven theory emphasizes the optimization and innovation of teaching decisions through analyzing data from students' learning processes. Artificial intelligence can collect data from students in various aspects such as song performance and composition, analyze it in real-time, and generate corresponding learning diagnosis reports. These reports provide a scientific basis for teachers to adjust teaching strategies and for students to optimize their learning paths.

It is noteworthy that the key to implementing these theories lies in the deep adaptation of artificial intelligence to the 2024 edition of new textbooks. The modular arrangement of the new textbooks provides a content carrier for the practice of the three major theories. For example, the learning data required for the data-driven theory can be accurately collected based on the learning tasks of each module in the textbooks, ensuring a strong correlation between data and learning objectives and avoiding blindness in technology application. At the same time, the rich digital resource interfaces in the textbooks also facilitate the integration of artificial intelligence technology, enabling the precise docking of learning data collection and learning task delivery with the content of the textbooks, thus building a bridge between technology and content for the implementation of theories. For instance, in the music theory module of the textbooks, artificial intelligence can collect students' rhythm practice, mode recognition, and other data, analyze students' mastery of knowledge points such as whole notes and eighth notes, and generate personalized error sets and targeted practice suggestions. In the creative practice module, it can collect students' creative works, modification records, and other data, analyze students' creative directions and shortcomings, and provide data support for teachers to adjust teaching focuses and optimize creative guidance strategies, allowing data-driven to truly serve the achievement of textbook objectives and the personalized growth of students.

2.2. Value Implication

The application of artificial intelligence technology in junior high school music teaching can facilitate the development of personalized teaching. Music teachers can utilize artificial intelligence systems to grasp the learning progress, interests, and comprehension abilities of each student, and tailor learning content and plans around the students' needs. Facing students with different levels of playing ability, artificial intelligence can provide practice tracks of varying difficulty or recommend tracks related to their music preferences, thereby enhancing students' interest in learning. Moreover, artificial intelligence technology can monitor students' learning in real-time, provide personalized feedback, and help students identify their shortcomings and make improvements. This personalized learning experience can enhance students' learning efficiency, strengthen their autonomous learning abilities, and facilitate the comprehensive development of their music skills [2].

3. Application Strategies of Artificial Intelligence in Personalized Learning of Music in Junior High School

3.1. Before Class: Build a Learning Profile and Conduct Personalized Guidance

Before music class teaching, the rational application of artificial intelligence technology can guide students to preview the textbook content, laying a solid foundation for classroom learning. Specifically, firstly, it is necessary to conduct a learning situation diagnosis and set personalized preview goals. Before the start of a new unit, artificial intelligence can build a learning situation portrait based on students' historical learning situations, generate a unit learning situation diagnosis report, and identify the ability gaps of each student in the core knowledge points of the textbook unit [3].

3.2. In-Class: Implement Personalized Teaching Relying on Intelligent Interaction

In music classroom teaching, teachers should focus on personalized learning of the core content of the new textbooks, leverage artificial intelligence technology, promote the integration of collective teaching and individual guidance, and ensure the effectiveness of teaching.

In the teaching of basic music theory, teachers can conduct collective explanations around core knowledge points in music textbooks, such as rhythmic patterns and modes. Then, through an artificial intelligence system, personalized practice tasks are pushed to

students, guiding them to complete the exercises using interactive terminals. The system provides real-time feedback on the answer results and offers in-depth analysis. The personalized practice design here relies on the hierarchical knowledge points of the classic music theory module in the new textbooks, combining the visual demonstration function of artificial intelligence to break down the difficulty of learning, so that students with different levels of foundation can match suitable practice content.

In the teaching of works appreciation courses, teachers can guide students to understand various appreciation methods by combining the cases provided in the textbooks, and then encourage them to conduct personalized exploration through artificial intelligence interactive platforms [4]. Leveraging the big data resource library of artificial intelligence, teachers can extend the content related to the regional culture, historical background, and other aspects corresponding to the tracks in the textbooks, making students' appreciation exploration more in-depth and aligning with the literacy goals of the cultural expansion module in the textbooks.

In the teaching of creative practice courses, teachers can use the music creative practice unit tasks in the textbooks as the core framework. Artificial intelligence technology can provide personalized creative support for students of different levels. After the creation is completed, the artificial intelligence system can generate a corresponding creative analysis report, comprehensively evaluating from three different dimensions: melody fluency, emotional matching, and creative uniqueness, and proposing specific modification suggestions. The empowerment of artificial intelligence in this link will closely adhere to the training objectives of the creative practice module in the textbooks, focusing on stimulating innovative thinking, and allowing technical support to always revolve around the cultivation of core competencies.

3.3. After Class: Conduct Personalized Expansion Based on the Learning Data

In the after-class segment, with the support of artificial intelligence technology, the internalization and transfer application of textbook knowledge can be achieved, forming a closed-loop system of consolidation-expansion-evaluation. The expansion tasks pushed by artificial intelligence will strictly align with the extension goals of each module in the textbook. For example, for the cultural expansion module, appreciation materials of regional folk songs with the same style as the textbook tracks and simple learning and singing tasks will be pushed, which not only consolidates what has been learned in class but also further broadens students' horizons in music culture, making after-class learning accurately echo the goals of the textbook.

Artificial intelligence technology can generate corresponding after-class consolidation tasks based on classroom learning data, and recommend extended practical activities related to textbook content to students, taking into account their interests and ability levels. If students have a strong interest in independent creation, AI-assisted tools and examples of adapting textbook song clips can be provided to them [5].

4. The Safeguard System for the Application of Artificial Intelligence

To ensure the effective implementation of artificial intelligence in personalized music learning in junior high school and fully leverage its integration value with the 2024 edition of textbooks, an effective support system must be established:

4.1. Promote the Transformation of Teachers' Roles

From the perspective of adapting to the needs of artificial intelligence application, junior high school music teachers should promptly shift their role orientation and enhance their abilities. It should be clear that while the application of artificial intelligence technology can improve teaching efficiency and promote personalized learning, it cannot and will not replace teachers. Instead, it will promote the transformation of teachers' roles

from knowledge imparters to learning guides [6]. To meet this requirement, teachers must possess three core abilities:

First, the ability to integrate textbooks and technology. Teachers must be able to accurately grasp the logic of the new textbook layout and the literacy objectives, and choose appropriate AI tools and application methods according to the characteristics of different teaching modules. For example, in the music and culture module, focus should be on the selection and expansion of AI resources; in the creative practice module, emphasis should be on the guided use of AI creation tools. Teachers also need to combine the literacy focus of the textbook units to conduct secondary screening and optimization of AI-generated learning resources, ensuring that the resources not only meet the cognitive level of students but also accurately serve the achievement of the core objectives of the textbook, avoiding the disconnection between technological resources and teaching needs.

The second aspect is the ability to interpret and apply learning data. Music teachers should be able to deeply interpret the learning profiles and reports generated by artificial intelligence, accurately identify the needs of students behind the data, and adjust teaching strategies according to these needs. For example, by analyzing students' practice data in the mode unit, collective difficulties in transposition recognition can be identified, and targeted interpretation can be carried out based on the error data provided by artificial intelligence technology.

Thirdly, it is the ability to guide creativity and cultivate emotions. Teachers need to focus on emotional communication and creativity stimulation, which are difficult to be replaced by artificial intelligence. For example, after students generate melodies using artificial intelligence, they can be guided to incorporate personal emotions into the melodies and make necessary modifications and adjustments. In the work appreciation part, teachers can deepen students' understanding and cognition of the emotional connotation of the works by focusing on the emotional factors identified by artificial intelligence. Schools can improve teachers' abilities and qualities through case studies, special training, and other methods [7]. Specifically, schools can regularly organize special training for junior high school music teachers on the integration of artificial intelligence and the 2024 edition of textbooks, inviting experts to explain the operation methods of artificial intelligence tools and the adaptation skills of textbook modules and technologies. At the same time, schools can build a platform for teacher communication, encouraging teachers to share teaching cases and practical experiences, and promoting mutual learning and common improvement among teachers.

4.2. Pay Attention to Data Security Management

Personalized learning necessitates the collection and analysis of a vast amount of student data, necessitating the establishment of rigorous data security and ethical norms systems to effectively manage data security. In the data collection phase, the fundamental principle of "minimum necessity" should be emphasized, collecting only behavior, emotion, and other data related to textbook learning. Students should be clearly informed of the scope and purpose of data collection, and written authorization must be obtained before implementation. Junior high school students are minors, and their personal information is protected by law. Therefore, in the process of data collection and management, it is imperative to strictly adhere to relevant laws and regulations such as the "Protection of Minors Law" and the "Personal Information Protection Law," establishing a sound data security management system. Schools should designate dedicated personnel to manage student data, encrypt and store the collected data, and strictly prohibit the leakage and tampering of student data. Artificial intelligence systems should be equipped with strict access permissions, allowing only classroom teachers to view relevant students' learning data, ensuring data security and privacy. Additionally, it is essential to strengthen data security awareness and education for students and parents,

informing them of the purpose and significance of data collection, enhancing their data security awareness, actively cooperating with data collection efforts, and establishing a solid data security defense line for AI-enabled personalized learning.

4.3. Implement Dynamic Evaluation and Optimization

A dynamic evaluation mechanism can be established to assess the effectiveness of AI technology application, ensuring that the technology's application aligns with the objectives of the teaching materials. The evaluation system should encompass three dimensions: students, teachers, and technology. During the implementation of the evaluation, a combination of regular monitoring and periodic assessment can be adopted. Monthly, the application effect of the technology can be evaluated by combining AI data and teacher feedback. Each semester, periodic assessments can be conducted based on student works, classroom observations, and other factors.

In addition, the evaluation and continuous optimization mechanism should be improved based on the corresponding evaluation results. For the issue of inaccurate interactive feedback, the audio analysis algorithm and sentiment recognition model can be optimized [8-9].

5. Conclusion

In summary, the 2024 edition of the junior high school music textbook published by Shanghai Music Publishing House, designed for the May Fourth School System, can provide the corresponding content carrier for AI-empowered personalized learning in junior high school music. AI technology, on the other hand, can offer new teaching methods for the effective application of the textbook. The application of AI technology in personalized learning in junior high school music can essentially be seen as leveraging technological means to make the textbook content better adapt to the learning needs of all students, guiding music education from the original standardized training to personalized growth. In this process, the textbook should be taken as the foundation, and AI technology as the auxiliary. Through safeguard measures such as teacher capacity improvement, data security assurance, and dynamic evaluation optimization, the value of integrating AI and textbooks can be fully leveraged to ensure that every student can develop artistic perception, stimulate creative expression, and deepen cultural understanding in music learning, truly realizing the original intention of music education, which is to "educate people through beauty and nurture people through culture".

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