Research on the Collaborative Education Mechanism of Integrating AI Music into Music Education from an Interdisciplinary Perspective

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Abstract: With the rapid development of artificial intelligence (AI) technology, the creation and application of AI music are gradually changing the traditional mode and methods of music education, bringing new opportunities and challenges to educators and learners. AI music technology can not only assist music teaching, but also promote interdisciplinary integration and innovation, providing important support for cultivating students' comprehensive qualities. This article systematically explores the collaborative education mechanism of integrating AI music into music education from an interdisciplinary perspective. By analyzing the current situation and technological advantages of AI music education, the study found that AI technology can enhance students' music creativity, expand their artistic thinking, and promote the deep integration of music education with science, technology, cultural history, and other disciplines. In addition, this article summarizes the current technological barriers, insufficient teaching staff, and unequal distribution of educational resources in the development of AI music education, and proposes specific paths for optimizing collaborative education mechanisms, including technical support, curriculum design, multi-party collaboration, and policy promotion. Research has shown that future music education needs to fully leverage the intelligent and personalized advantages of AI technology to build an open, diverse, and efficient collaborative education model, in order to achieve comprehensive improvement of students' artistic literacy and interdisciplinary abilities and open up new paths for the sustainable development of music education.

1. Introduction

Artificial intelligence technology has profoundly influenced various fields of education, among which AI music provides a new path for music education due to its unique creative and expressive forms. Traditional music education is often limited by teacher resources, teaching methods, and student differences, while the addition of AI music breaks these limitations, making the education model more diverse and intelligent.

The integration of AI music into music education can not only help students understand complex music theories, but also improve their music creation ability through intelligent analysis, thereby achieving the goal of collaborative education, which is to comprehensively enhance students' comprehensive literacy on the basis of interdisciplinary and resource sharing.

This article aims to explore how AI music can optimize the collaborative education mechanism of music education through interdisciplinary perspectives. By combining literature analysis, case studies, and model construction methods, corresponding strategies and suggestions are proposed.

2. AI Music and Music Education from an Interdisciplinary Perspective

The rapid development of artificial intelligence (AI) technology is profoundly affecting the field of education, especially in music education, where the application of AI music technology demonstrates multidimensional interdisciplinary integration potential. The connotation of music

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education is not limited to skill training, but also carries the mission of cultural inheritance and creativity cultivation. The combination of AI music technology and educational philosophy provides a new direction for building more efficient and personalized teaching models.

2.1. Development and Application of AI Music Technology

The development of AI music technology benefits from advances in artificial intelligence technologies such as machine learning, deep learning, and algorithm creation. Its core technologies include:

2.1.1. Composition

Through training data, AI systems can generate music with specific styles based on user needs, such as imitating the works of classical music masters or creating modern electronic music. This technology greatly expands the possibilities of music creation.

2.1.2. Style Simulation

AI can mimic music styles from different regions and genres, such as jazz, classical, and pop music, and generate new works through specific algorithms to provide learners with diverse music experiences.

2.1.3. Audio Analysis

AI can accurately analyze the melody, rhythm, harmony and other elements in music, and generate graphical feedback information, which provides a powerful tool for technical training in music teaching.

For example, AI music software such as MuseNet and Amper Music can provide one-stop services from creation to practice. Through these technologies, AI music not only changes the traditional mode of music creation, but also provides educators and students with new learning and practical methods.

2.2. Interdisciplinary Needs in Music Education

The core of music education is to cultivate students' musical literacy and artistic perception, but with the increasing demand for versatile talents in society, single music skill training can no longer meet the requirements of modern education. Music education is gradually transitioning towards the STEAM education model, emphasizing the organic integration of science, technology, engineering, arts, and mathematics. In this context, AI music has become an important tool for interdisciplinary education, as shown in Figure 1.

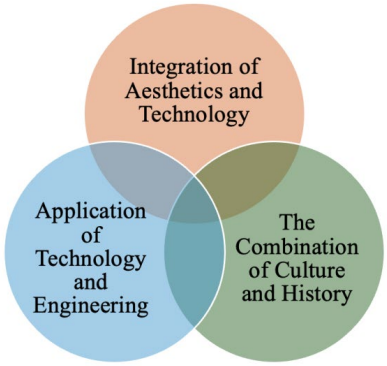

Figure 1 Interdisciplinary needs in music education.

2.2.1. Integration of Aesthetics and Technology

Music education not only needs to impart artistic beauty, but also guide students to understand the scientific principles behind music [1]. AI technology enables students to deconstruct music structures from a scientific perspective through intuitive audio analysis and interactive teaching methods.

2.2.2. The Combination of Culture and History

AI music can simulate music works from different historical periods and cultural backgrounds, allowing students to gain a deeper understanding of the cultural context behind them while learning music.

2.2.3. Application of Technology and Engineering

Through AI music programming or hardware development projects, students can simultaneously master technical and artistic knowledge, thereby cultivating interdisciplinary comprehensive abilities.

The interdisciplinary nature of the STEAM model provides students with a broader knowledge background, enabling them to organically integrate music learning with other subjects and cultivate more comprehensive thinking abilities and creativity [2].

2.3. The Role of AI Music in Education

AI music technology has injected new vitality into music education, and its role is not only reflected in the innovation of teaching tools, but also in providing students with more personalized and diverse learning experiences, as shown in Figure 2

Figure 2 The role of AI music in education.

2.3.1. Personalized Learning

AI technology can identify students' weak links and propose targeted learning plans by analyzing their learning data. For example, AI software can adjust the practice rhythm based on students' performance records and provide them with customized training plans [3]. Personalized learning improves students' learning efficiency while also enhancing the fun of learning.

2.3.2. Creative Inspiration

In traditional music education, students' creative inspiration is often limited by theoretical knowledge or creative skills. The diverse music works generated by AI technology provide students with rich reference materials [4]. For example, AI can generate music ranging from classical to modern, from monophonic to complex symphonies, inspiring students' interest and inspiration in music creation.

2.3.3. Practical Tools

The popularization of AI music software provides students with a convenient platform for creation and practice. Taking MuseNet as an example, this platform can generate complex music works through simple operations, enabling students to master the basic process of music creation in a short period of time. In addition, AI tools like Amper Music not only support music generation, but also enable real-time editing of generated works, providing efficient support for students' music practice.

2.3.4. Diversified Learning Scenarios

AI music can also create immersive learning scenarios through virtual reality (VR) technology or multimedia teaching platforms. For example, students can experience band rehearsals through AI

virtual conducting, or explore the integration of music and ambient sound in AI simulated environments. This diverse learning approach not only enhances students' interest in learning, but also deepens their understanding of music.

3. The Current Situation and Challenges of Integrating AI Music into Music Education

With the gradual maturity of artificial intelligence technology, the application of AI music in music education is becoming a new exploration direction. Although some practical cases have shown that AI music can effectively improve teaching efficiency and students' learning experience, its comprehensive promotion still faces many problems and challenges [5].

3.1. Current Situation Analysis

At present, AI music technology has been applied to a certain extent in music education, specifically manifested as:

3.1.1. Popularization of Intelligent Teaching Tools

AI automatic accompaniment software (such as SmartMusic) and intelligent music teaching platforms (such as Yousician) are widely used in teaching. These tools provide students with an efficient learning experience through audio analysis, real-time feedback, and personalized guidance.

3.1.2. Preliminary Integration of Curriculum System

Some schools and educational institutions have already introduced AI music technology into curriculum design. For example, the music creation course has added an AI music programming module, which combines programming learning with music creation to cultivate students' interdisciplinary abilities [6].

3.1.3. Continuous Expansion of Educational Resources

The introduction of AI music technology has expanded the resource channels for music education, such as providing diverse music score generation, audio analysis, and virtual instrument performance functions. These resources provide students and teachers with richer learning and creative support.

Although the application of AI music has brought new possibilities for music education, the overall development is still in its early stages, and its popularity and depth still need to be improved.

3.2. Existing Problems

At present, the integration of AI music into music education still faces the following main issues:

3.2.1. Technical Barriers

The use of AI music software requires a certain technical background, and some music teachers and students lack understanding or operational experience of AI technology, making it difficult to effectively utilize these tools. In addition, existing AI music platforms still have shortcomings in interface design and functional optimization, and further improving user friendliness is particularly important [7].

3.2.2. Unequal Distribution of Educational Resources

There are significant regional differences in the application of AI music education. In urban areas, educational institutions have more funding and technological support to introduce AI music tools; In rural or underdeveloped areas, schools generally lack corresponding software and hardware equipment, making it difficult for students to access advanced resources for AI music education.

3.2.3. Insufficient Interdisciplinary Collaboration

The integration of music education with other disciplines such as science, technology, and mathematics is still relatively limited in practice. Although AI music has the potential to promote STEAM education, in practical teaching, the development and implementation of related courses still remain at the theoretical exploration stage, lacking effective practical paths and collaborative

mechanisms.

3.3. Challenge Analysis

To achieve deep integration of AI music in music education, the following key challenges need to be addressed:

3.3.1. Ethical Issues

AI music creation involves complex copyright ownership issues. Due to the fact that AI generated music works are not entirely created by humans, the scope and ownership of their intellectual property protection are not yet clear, which may cause controversy in educational practice. In addition, how to balance the relationship between AI technology and human creativity, and avoid technological abuse, is also an urgent ethical issue that needs to be addressed [8].

3.3.2. Teacher Training

The development of AI music education has put forward higher requirements for teachers, not only requiring music teaching ability, but also possessing certain AI technology literacy. At present, there is a scarcity of composite teachers capable of fulfilling this role, and AI skill training and knowledge updates for teachers are urgently needed.

3.3.3. Reform of Education Model

The traditional music education model focuses on teacher led instruction, emphasizing skill transmission and performance of works, while the introduction of AI music requires the education model to shift from skill oriented to comprehensive ability oriented. How to design teaching models and course content that are adapted to AI technology is one of the important challenges facing music education reform [9].

4. Collaborative Education Mechanism Integrating AI Music into Music Education

With the rapid development of AI technology, music education not only requires innovation in a single discipline, but also requires collaborative efforts from multiple forces. The collaborative education mechanism focuses on resource integration and multi-party collaboration, achieving a qualitative leap in music education through the integration of technology, curriculum, faculty, and social participation.

4.1. Connotation of Collaborative Education Mechanism

The collaborative education mechanism emphasizes resource sharing, multi-party participation, and interdisciplinary integration, aiming to achieve educational goals through the collaborative integration of schools, families, society, and technological support. In music education, the collaborative education mechanism is not only the rational allocation of teaching resources, but also an important path to combine AI technology with art education, stimulate students' creativity, interdisciplinary abilities, and comprehensive qualities.

The core of the collaborative education mechanism lies in effective collaboration among all parties involved. For example, as the main body of education, schools are responsible for the design and implementation of AI music courses; Families provide learning support for students; Enterprises and social organizations can help improve the AI music education ecosystem by providing resource support and expanding practical scenarios.

4.2. Framework for Building a Collaborative Education Mechanism

In order to promote the deep integration of AI music in music education, the collaborative education mechanism needs to be built around four core aspects: technical support, teacher training, curriculum design, and social participation.

4.2.1. Technical Support

It is essential to build an AI music education platform that provides technical support for intelligent teaching resource management, personalized learning path recommendations, and interdisciplinary knowledge integration—for example, developing a cloud-based AI music teaching system that supports students in real-time creation and learning, while providing analysis and feedback tools for teachers.

4.2.2. Teacher Training

To meet the integration needs of AI and music education, special training courses or certification programs are offered to cultivate composite talents who have both music education background and proficiency in AI technology. Through continuous professional development programs, help teachers master the basic principles and educational applications of AI music technology.

4.2.3. Course Design

AI music courses should be developed to cater to the needs of students from different age groups, with a focus on integrating interdisciplinary knowledge. For example, in primary school, simple music creation software is used to cultivate interest, AI programming basic courses are introduced in secondary school, and advanced algorithm music creation courses are added in university [10].

4.2.4. Social Participation

We encourage businesses and communities to support AI music education by donating equipment, developing educational software, and organizing music creation competitions to promote the widespread adoption of AI music in educational settings. Enterprises can collaborate with schools to provide internship opportunities or establish joint laboratories, promoting the integration of theory and practice for students.

4.3. Practical Path

4.3.1. Case Analysis

Taking the "AI Music Creation and Education" course offered by a certain university as an example, this course combines AI music creation with educational objectives through project-based learning. Students learn the use of AI composition tools in the course and complete interdisciplinary music creation projects in groups, which not only exercises their technical abilities but also enhances their artistic expression.

4.3.2. Diversified Collaboration

It is suggested to integrate educational resources, including AI laboratories, music associations, and social music institutions, and organize interdisciplinary collaboration projects. For example, collaborating with the School of Music and the School of Computer Science to research AI music education, jointly developing teaching cases and creative works.

4.3.3. Evaluation System

A scientific evaluation index system should be established to measure the comprehensive growth of students in AI music learning. The evaluation content includes the degree of technical mastery, music creation level, interdisciplinary collaboration ability, and learning satisfaction, ensuring the objectivity and comprehensiveness of educational effectiveness.

5. Strategic Suggestions for Optimizing Music Education Models

In order to better integrate AI music technology into music education, it is necessary to optimize from four aspects: policy, technology, cooperation, and teacher construction, as shown in Figure 3

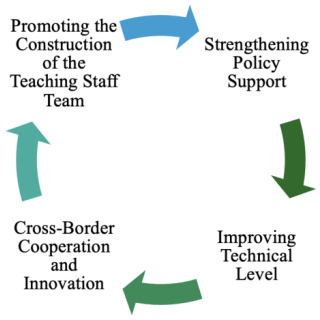

Figure 3 Strategic suggestions for optimizing music education models.

5.1. Strengthening Policy Support

The government should introduce special policies for AI music education, providing financial support and technology promotion plans. For example, adding AI music education to education development plans, promoting balanced distribution of regional educational resources, and narrowing the education gap between urban and rural areas.

5.2. Improving Technical Level

In response to the high technical threshold of current AI music software, they should optimize user interface and functional design to reduce the difficulty of use for educators and learners. In addition, the localization development of AI music systems should be strengthened to better meet the teaching needs and cultural backgrounds of different regions.

5.3. Cross-Border Cooperation and Innovation

It is necessary to promote deep collaboration between music education and disciplines such as computer science and psychology. For example, collaborating with psychological experts to study the impact of AI music on students' emotions and creativity, they should also work with computer scientists to develop an AI music creation platform that is both educational and interactive.

5.4. Promoting the Construction of the Teaching Staff Team

Specialized training programs should be established to provide systematic training on AI music teaching abilities for music teachers. At the same time, attract talents with interdisciplinary perspectives to enter the field of music education, and build a teaching staff that combines artistic and technological literacy.

6. Conclusion and Prospect

6.1. Research Summary

The integration of AI music provides an innovative collaborative education mechanism for music education. Through technological support, curriculum design, and interdisciplinary collaboration, it helps to enhance students' music literacy and comprehensive abilities.

6.2. Future Research Directions

Future research can further explore the application of AI music in the field of special education and its profound impact on educational equity. At the same time, it is necessary to strengthen the interactive research between AI technology and music education practice, in order to provide support for building a more intelligent and personalized education system.

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