Rethinking Music Education: Exploring the Collaborative Role of Artificial Intelligence and Digital Resources in Promoting Diversified Piano Teaching Models

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Abstract: With the continuous development of science and technology, artificial intelligence technology is popular in the field of education and teaching. At the same time, digital resources and music teaching activities are organic combined, which will undoubtedly provide sufficient power and vitality for music education and deepen the reform of music teaching. In piano teaching, artificial intelligence and digital resources cooperate to help form a diversified piano teaching model, which greatly improves the effectiveness of piano teaching. This paper first introduces the concept and characteristics of artificial intelligence, digital resources, the analysis of artificial intelligence and the significance of the digital resources used in piano teaching, then summarizes the common problems of the current piano teaching model, finally to explore the artificial intelligence and digital resources to promote diversification path to reconstruct the piano teaching mode. The purpose is to provide a useful reference for relevant personnel and realize the organic integration of artificial intelligence, digital resources and diversified piano teaching models.
Keywords: Music Education; Artificial Intelligence; Digital Resources; Piano Teaching Model; Synergy Effect

1. INTRODUCTION

Under the background of music education informationization, piano teachers should innovate teaching mode according to the background of The Times. In piano classroom teaching, artificial intelligence and digital resources provide reliable support for the formation and application of diversified piano teaching models.

In order to further play the synergistic effect of artificial intelligence and digital resources in the diversified teaching mode of piano classroom, it is necessary to explore practical strategies from four aspects of concept, design, teaching process and teaching evaluation, and achieve good results in music education reconstruction.

2. INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DIGITAL RESOURCES

2.1 Artificial Intelligence

Artificial intelligence is a part of computer science, which has interdisciplinary nature and takes the theory and system of human intelligence simulation as the development content and research direction (Chen, 2023). Artificial intelligence has the characteristics of perception, understanding, adaptability and support. It further expands thinking information by simulating human thinking process, so as to sense human behavior, adapt to environmental changes and support human goals based on mechanisms and strategies. When artificial intelligence is used in music education, it will change the concept, content and method of music education to different degrees, which conforms to the inevitable trend of music teaching reform and optimizes the teaching effect of music education.

2.2 Digital Resources

Digital resources refer to the digital integration of information resources aided by computer technology and multimedia technology (Lu, 2021). The analysis of digital resources from the field of education, that is, digital education resources under the support of a variety of technologies to achieve the digital integration and use of educational information. Common digital resources include micro-course, MOOC, network platform, etc.

When digital resources are applied in course teaching, they can innovate teaching ideas and teaching methods, and inject new vitality into course teaching. The application of digital resources in piano teaching in the field of music education can stimulate the enthusiasm of students in learning piano, strengthen the interaction between teachers and students, teachers and students and multimedia equipment, and achieve the dual goals of piano knowledge teaching and piano performance skills improvement (Mandanici et al.).

3. THE SIGNIFICANCE OF ARTIFICIAL INTELLIGENCE AND DIGITAL RESOURCES FOR PIANO TEACHING

3.1 Create a good classroom environment

Artificial intelligence uses AR, VR, human-computer interaction and

other forms to teach piano, and new digital resources teach piano knowledge in the form of micro-courses and MOOC, which is quite different from the previous didactic-style teaching mode. Students can be attracted by the new teaching mode quickly, and pay attention in the piano class, forming a strong learning atmosphere. In the long run, students can relax in a good piano classroom environment and stimulate their initiative in learning piano.

3.2 Enrich the experience of piano teaching and learning

Based on the AR technology of artificial intelligence, teachers led students into the piano playing practice room, so that students could intuitively and vividly experience the space environment of the training room, and standardize the use of piano equipment to truly enrich the immersive experience of students.

Not only that, in the piano practice, teachers let students interact with the virtual piano in real time. When there is a mistake in practice, the system will automatically prompt and demonstrate the correct operation, so that students can correct their mistakes in time. This interactive exercise can enrich the teaching and learning experience of teachers and students, and mobilize their enthusiasm for teaching and learning.

In addition, the network platform supports the acquisition of piano related information, online communication, etc., which better helps teachers and students to enrich their piano knowledge reserves, so that they can increase their wisdom through the network platform communication (Scripp et al., 2013).

3.3 Promote the all-round development of students

The use of artificial intelligence and digital resources in piano teaching can not only change the one-time characteristics of traditional piano teaching, but also mobilize the internal drive of students in piano learning by using the functional advantages of artificial intelligence and digital resources, so that students can develop good learning habits.

Specifically, piano teachers use digital resources to break the time and space limitations of piano teaching, realize the extension of the classroom, and meet the learning needs of students offline at any time and anywhere. In addition, teachers provide students with opportunities for inspiration, piano creation and piano performance, so that students' comprehensive piano skills and music literacy can be cultivated imperceptibly (Gao & PENG, 2023).

4. CURRENT PIANO TEACHING MODEL OF COMMON PROBLEMS

4.1 Old piano teaching concepts

Piano teaching practice is greatly affected by the teaching concept. If the piano teaching concept fails to adjust with the music teaching reform, the teacher will apply a teaching model for a long time in the piano class, that is, the teaching model of "teachers' demonstration practice and students' passive imitation", which will limit students' musical thinking to varying degrees and is not conducive to stimulating students' potential in piano learning (Rahma, 2023).

Under the guidance of the traditional teaching concept, the proportion of theoretical knowledge such as piano style and harmony will be greater than the proportion of practical practice such as the background of repertoire creation and the analysis of performance skills. With the imbalance between theoretical courses and practical courses, it is not conducive to the comprehensive development of students.

4.2 Piano teaching design is one-sided

Nowadays, piano teaching design focuses on the design of classroom teaching process. Comparatively, there are few designs before and after class, which is difficult to ensure the continuity and effectiveness of students' learning of piano knowledge (Bi, 2023). From the perspective of piano teaching model innovation, once the piano teaching design fails to be carried out in a process, it will affect the application of new teaching models such as artificial intelligence and digital resources, and then affect the teaching effect of piano, which is not conducive to the creation of efficient piano classroom.

4.3 A single piano teaching process

At present, the group piano teaching mode is widely used, which means that the individual differences of students are not given due attention (Chen, 2021). In the course of piano teaching, teachers often repeat the theoretical knowledge, ignoring the basic requirements of curriculum reform and music education teaching innovation. Especially in terms of teaching methods, new teaching models such as artificial intelligence, micro-class and flipped classroom were not introduced in time, and there was a lack of interaction in piano class, resulting in a dull classroom atmosphere and low teaching efficiency (Wise, 2013).

4.4 Limitations of piano teaching evaluation

Nowadays, the content of piano teaching evaluation is one-sided, and the evaluation subject is based on the teacher's evaluation. The evaluation results cannot comprehensively and objectively reflect the stage teaching situation of piano, and the practicability of teachers' decision-making will be greatly reduced. The traditional evaluation mechanism cannot better meet the needs of piano teaching reform in the new era, and cannot better serve the training of piano talents. In order to really optimize the effect of piano teaching, we must improve the teaching evaluation mechanism.

5. THE PATH OF ARTIFICIAL INTELLIGENCE AND DIGITAL RESOURCES TO PROMOTE THE RECONSTRUCTION OF DIVERSIFIED PIANO TEACHING MODE

In the new era, the teaching mode of music education is dynamically adjusted. In the past, the piano teaching mode is single, which makes the piano teaching effect unsatisfactory. Now the education information age is quietly coming, artificial intelligence, digital resources in the information age widely penetrated into the field of music education. When artificial intelligence, digital resources and piano teaching activities are integrated, they can play a positive role in the synergy of diversified piano teaching models and improve the efficiency of piano teaching as a whole. The following focuses on exploring the feasibility strategy of artificial intelligence and digital resources to promote the construction of diversified piano teaching mode:

5.1 Refactoring piano teaching ideas

As the change of piano teaching environment, piano teachers to innovate their teaching ideas, + piano teaching of artificial intelligence, digital resources used in piano teaching correct cognition, fully understand the meaning of piano teaching mode multiple building, on the new teaching idea, guided by regulating the behavior of piano teaching. In other words, artificial intelligence and digital resources have enriched piano teaching resources to a certain extent, broken through the traditional piano teaching mode, and changed the piano teaching space. In this regard, teachers should adjust their mentality, successfully complete the transition from traditional teaching concepts to new teaching concepts, and effectively implement diversified piano teaching models, such as micro-courses, MOocs, flipped classrooms, etc., guided by the reconstructed new teaching

concepts, so as to maximize the educational value of diversified piano teaching models and ensure that the piano teaching tasks are completed well and quickly (Rui & Wong, 2024).

5.2 Refactoring piano teaching design

The basic link of the reconstruction of diversified piano teaching mode is instructional design. Through reasonable design, the layout of artificial intelligence and digital resources in piano teaching activities is completed, which guides the whole-process application of diversified piano education mode before, during and after class (as shown in FIG. 1), so as to better serve piano teaching and optimize the quality of music education.

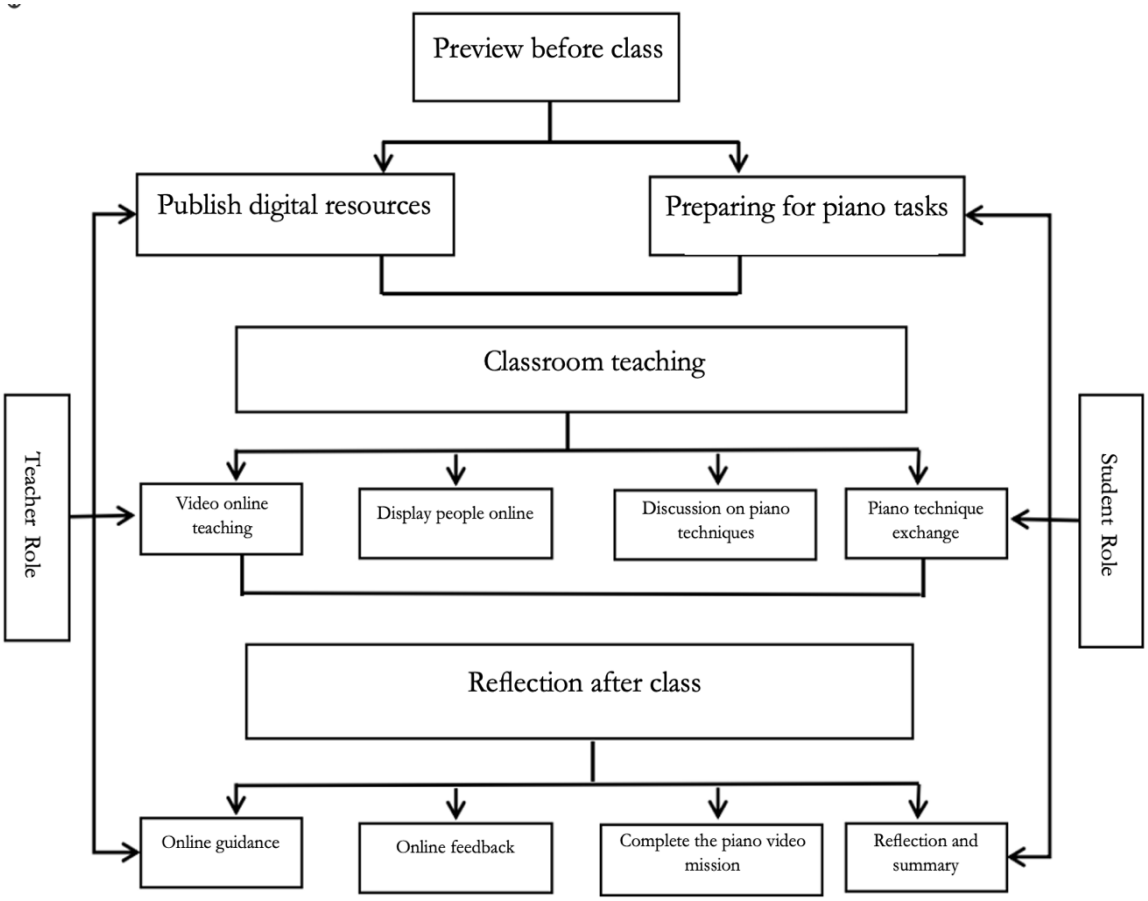

Figure 1: Artificial intelligence, digital resources used in piano teaching process

Design before class: teachers use the big data technology of artificial intelligence to analyze the behavior characteristics of students in piano learning, and establish a personalized learning model to comprehensively understand the students' music style preference and master the students' piano performance level. To prepare for the application of digital resources in piano classroom teaching. The teacher also publishes micro-lecture and MOOC teaching videos before class with the help of the network platform.

The video content includes the important and difficult points in piano teaching and the performance of famous masters to guide students to understand the knowledge of piano courses (ZHENG, 2021).

Design in class: teachers carefully design the course training link and the classroom display link, choose the creation class, scene training class and ensemble class around the content of the piano course, and process the application of digital resources to improve the utilization of diversified piano teaching mode. For the classroom display, teachers provide students with the opportunity to improv performance, so as to activate the classroom atmosphere, stimulate students' piano performance potential, and exercise students' innovation and creativity. In addition, teachers use video network to teach piano knowledge, independently share MOOC videos of analog performance and classic performance, and summarize technical points of piano music at the end of the video. Students can also upload piano practice videos and share them among groups to arouse students' enthusiasm for learning piano (Campbell, 2017).

After-class design: piano teaching is carried out by combining online and offline teaching modes, allowing students to upload piano works, and encouraging students to communicate online and learn from each other. Teachers organized symposia and performance activities on piano theme offline to help students popularize knowledge, and let students conduct self-test, self-display and self-improvement in performance practice. Through the video playback function of micro class and MOOC, teachers can accurately help students improve their piano playing techniques, and also allow students to learn deeply with the help of software such as "Play Bar Piano" and "Global Piano". Teachers review the piano playing homework submitted by students online, give timely feedback, and assign personalized homework tasks to students to promote students' progress.

5.3 Reconstruct the piano teaching process

In the process of music education reform, piano teachers should use diversified teaching models under the environment of artificial intelligence and digital resources. In this regard, it is necessary to combine the background of The Times and the teaching situation, change the orientation of piano teaching objectives, and reasonably select piano teaching materials to provide important guidance for curriculum teaching. The most critical thing is that teachers should deeply analyze the characteristics of artificial intelligence and digital resources to make them play a full role in diversified teaching models. The rational use of digital

resources can meet the two-way interaction between teachers and students in the piano class, bring the feelings between teachers and students closer, and meet the students' intelligent and information-based learning needs. In fact, the process of piano music teaching, namely, knowledge imparting, music connotation understanding, skills upgrading, improve the ability of process. When artificial intelligence and digital resources help the application of diversified piano teaching models, teachers should use artificial intelligence technology to build intelligent teaching resource library, establish virtual learning platform, and start a comprehensive tutorial system (Wen, 2024). Help students supplement and extend piano knowledge, enrich students' artistic feelings, gradually help students master piano playing skills, so that students can improve music appreciation and analysis ability in the interesting learning process. Teachers can use Auralia software to provide multi-dimensional music transmission such as timeliness, rhythm and emotion, so as to provide better support for students' solfegsinging and ear practice, and to perceive music elements in a comprehensive and three-dimensional way. Teachers should use intelligent automatic composition and arrangement in the piano teaching, intelligent piano ensemble two teaching models, the specific analysis is as follows.

Intelligent automatic composition and arrangement: The application of intelligent automatic composition teaching mode, the teacher sets the speed and tempo around the piano repertoire, and selects the instrument to play, then the system generates the corresponding model according to the set information, and automatically displays the music. Intelligent automatic arranging teaching mode supported by MIR music information retrieval technology, automatic analysis of digital audio, and divided the music category, orderly according to related to music, when determined after being adapted music, can automatically retrieve material, this link support personalized creative teachers and students, such as personalized Settings rhythm, melody, finally with the help of music arranger, generate new music (WANG, 2021).

Intelligent piano ensemble: The teacher saves the piano concerto into the intelligent repertoire library. When the piano player retrieves the music, the piano ensemble and piano ensemble instruments are selected independently to meet the needs of students' personalized playing practice. For students, they can experience the fun of human-computer interaction, from which they can exercise their piano concerto ability. Not only that, this teaching model also supports students to cooperate with professional

bands and high-level pianists during performances, so that students can understand the connotation of music in an immersive way, and then deepen their impression on the new teaching model of intelligent piano ensemble, so that it can better cooperate with the practice of diversified piano teaching models in the future. Among them, the teaching mode of double piano performance is welcomed by teachers and students, so as to cultivate students' ability of double piano cooperation. To be specific, students submit piano practice audio and video on the system, then the music recognition technology and visual recognition technology quantify the audio and video data, and artificial intelligence calculates from the piano practice rhythm, style characteristics and other aspects, and highly matches partners with similar styles. When the partners practice the piano program, the intelligent acoustic analysis technology is used to analyze the rhythm, timeliness, and tonality of the audio and video in multiple dimensions, and the judgment results are displayed intuitively and comprehensively in the form of a report, which provides a reference for the improvement and refinement of the students' piano performance skills in the future (Muhonen, 2016). In addition, the piano teacher and flexible use of multimedia teaching and social software, in the piano classroom teaching of the integration of multimedia teaching software and web portal, micro courseware, etc., and with the help of twitter accounts, such as # WeChat public spread piano theory knowledge and play video, rich students the experience of learning the piano, the new media platform to mobilize the enthusiasm of the students to learn the piano. Teachers with the help of a network platform to carry out online interactive teaching piano theme, form a good situation of interaction. Teachers can also strengthen the integration of piano theory and practice by integrating network resources, such as installing APP on iPad, introducing the meaning of virtual piano keys to students, providing students with opportunities to familiarize themselves with keys, and encouraging students to play piano tracks electronically, so as to realize the organic integration of theoretical teaching and practical teaching (Lian & chang Pan, 2022).

5.4 Reconstruction of piano teaching evaluation

To really understand the music education teaching situation, especially the effect of piano teaching practice, to reconstruct the piano teaching evaluation, namely the combination of artificial intelligence with teacher evaluation, on the basis of realizing the multi-dimensional evaluation of piano education, comprehensive evaluation of students to learn the piano action (SUN, 2022). The evaluation results have authenticity and reliability,

and can provide a basis for the adjustment of diversified piano teaching model. Specifically, the piano teacher sets the evaluation standard according to the analysis of learning behavior and learning situation of the system, and establishes the learner model including the data of learning behavior such as composition, arrangement, concert and duet. The system automatically matches the standard, marks the improper piano performance in the report, and indicates the students to correct their mistakes and make up for the deficiencies. Depth of the artificial intelligence based on data analysis, data mining to summarize the students' learning style, learning rule, and fully reflect the students' piano practice frequency, the piano learning time and progress, to make students master degree of knowledge in the piano classroom teaching, and students in the class time of follow-up study. In fact, the intelligent evaluation model can help students find a suitable piano learning path, provide personalized services to students, and meet the diversified learning needs of students. In addition, teachers develop teaching applications with the help of artificial intelligence technology (Brown, 2012), carry out interesting and interactive games, test students' performance in the game, and conduct intelligent evaluation, pointing out the direction for individualized piano teaching. Teachers can also analyze the learning results of students in the piano classroom and the professional degree of piano performance according to the learning feedback results of each stage summarized by the intelligent teaching management system, so as to prepare for the effective application of diversified piano teaching models.

6. CONCLUSION

To sum up, information and intelligent teaching is an inevitable trend. Teachers must master the application skills of artificial intelligence and digital resources in the field of music education and teaching if they want to reconstruct music education. In piano teaching, artificial intelligence, digital resources in the new teaching mode for application, in order to make up for the shortcomings of traditional teaching mode, through innovative piano teaching idea, and the whole process of application before, class, after class, greatly diversified piano teaching mode of education value. Digital resources such as intelligent automatic composition and arrangement, intelligent piano ensemble, micro-courses and MOOC play their due roles in the coordination of diversified piano teaching models, greatly improving the effectiveness of piano teaching, and cultivating

excellent piano talents for the development of music.

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