

The Ecosystem of Piano Education and Teaching in the Era of “Internet Plus”*

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Abstract—Based on present piano teaching situation in China and combined with development of the modernization process of the present education informatization and education means, this paper studies the talent training mode of the integration of teaching, scientific research and artistic practice in piano education in the Internet age, and finally forms the piano education and teaching ecosystem in the era of Internet plus, providing theoretical support for piano education and teaching informatization.

Keywords—the era of Internet plus; educational informatization; smart piano; feasibility

I. INTRODUCTION

The rapid development of information technology has promoted the development of educational informatization and the modernization of educational means. Taking the timeline of the rapid development of the Internet as the horizontal axis, artificial intelligence, customization and network communication as the vertical axis, it has been recognized by more researchers with its high and steady rising curve. It has even been proposed that the "fourth industrial revolution", that is, the "age of intelligence". Emerging technologies have penetrated into every aspect of life and have gradually taken an irreplaceable place in the field of learning. With the benefits of new science and technology and the Internet, both teaching and learning will reduce the shackles of traditional methods and gradually become an intelligent educational system. In the field of music education, intelligent and information-based teaching has become an irresistible trend. The core content of educational informatization is teaching informatization. Teaching is the central work in the field of education, teaching informatization is to make the teaching means scientific, technology and education dissemination informatization, and teaching methods modernization. Educational informatization requires the comprehensive application of modern information technology based on computer, multimedia and network communication in the process of education to promote educational reform, so as to meet the new requirements of the coming information

society.¹

"Ecology" is originally used to describe the balance and development relationship between biology and natural environment. It is a system with openness, interdependence and diversity. Later, Lawrence Cremin, an American educator, firstly applied the principle of ecology to study educational activities to explain the development law of education and proposed "ecology of education". In the era of Internet + age, piano education system is positioned to cultivate future excellent music teachers and potential educators. Based on concept of "the development of students' comprehensive ability-oriented", it is constructed information-based core ideas and system structure of piano teaching and set up information platform to support the education method of reform.

II. THE VALUE OF PIANO EDUCATION AND TEACHING ECOSYSTEM IN THE ERA OF INTERNET PLUS

The goal of the ecosystem of piano education and teaching in the era of Internet + is mainly to solve the four major problems that have plagued piano teaching for a long time: First, the orientation of the cultivation goal is too one-sided, changing from the emphasis on "piano skills training" to the "development of students' comprehensive ability-oriented" training objectives; The second problem is the monotonous cultivation mode, in the era of Internet +, the piano education and teaching ecosystem highlights the multi-channel, whole-process teaching methods with strong characteristics of teachers, strengthened teaching ability, and practice-oriented. Third, it is the backward teaching methods and means. The establishment of a network learning platform supported by information technology and supported by digital teacher education resource database can reform the learning mode comprehensively. Fourth, it is the imbalance of music education resources in the east and west of China. Education informatization has the advantages of real-time information sharing and rapid resource updating. The application of educational informatization in piano teaching can greatly reduce the teaching cost and popularize high-quality learning resources.

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¹ Zhao Guoliang. Research on the Application of Educational Informatization in Secondary Vocational Education [J]. Information Communication, 2015(02):168

The traditional training mode of piano talents is still dominated by "oral teaching" by teachers. Although this teaching method has its irreplaceable advantages, it also has its unavoidable limitations. Teaching resources cannot be shared, students can only gain knowledge through classes. The teaching structure is single and teaching content is monotonous, so that students can only learn performance technology in the classroom but cannot meet the training requirements of composite talents suitable for modern society. In view of the current situation that piano education in China is mainly based on "skill practice", the ecosystem of piano education and teaching in the era of Internet + highlights the orientation of "the comprehensive development of students". Based on the platform of "intelligent piano" and "education cloud", the core viewpoint and system structure of "Internet + education" innovation mode of piano talent training "trinity" is constructed. Through the application of modern education technology, a new innovative model of piano education is constructed to form a complementary system with traditional piano education.

III. THEORETICAL FRAMEWORK OF PIANO EDUCATION AND TEACHING ECOSYSTEM IN THE ERA OF INTERNET PLUS

The ecosystem of piano education and teaching in the era of Internet + takes the "trinity" innovation mode of teaching, scientific research and artistic practice as the theoretical framework. The basic content of the research on the integration of education information and piano education in the era of Internet + is to build a cloud information platform for piano education, a platform for scientific research management and teaching, and a cloud platform for art practice, forming a complementary and perfect education system with traditional piano art education. The "tri-in-one" innovation mode will build an information platform for piano education, design multimedia integrated database for piano teaching, build a piano learning ecosystem and virtual simulation experimental teaching space for piano performance. While sharing the achievements of modern education and teaching, teachers should guide students to study independently, cultivate students' comprehensive ability in an all-round way, and expand ideas for education reform.

The innovation mode of teaching, scientific research and artistic practice contains three dimensions.

A. *Constructing Virtual Simulation Experiment Teaching Space for Piano Performance to Break Through the Bottleneck Between Teaching, Scientific Research and Artistic Practice*

The virtual simulation practice space is constructed by setting up scenes, building models, props and animation processing, so that players can get immersive performance feeling, which builds a bridge for teaching, scientific research and stage practice. During the performance, the performers interact with the virtual world naturally by means of visual, auditory, tactile and other sensing channels.

B. *The Scientific Research Management and Teaching Platform of Piano Education Personnel Training*

In this study, the design of scientific research teaching mode and platform architecture, scientific research management mode and platform architecture are applied to scientific research and teaching. The cloud platform provides a free and open communication space and presents the project process in the form of pictures, text, audio and video, including declaration form, closing form, investigation report, thesis, and supporting materials. It is necessary to use email, message, forum and other means for scientific research members to communicate. Through the connection of the virtual platform, the project members are integrated into one. Scientific management by the school administration department and targeted presentation through cloud platform can not only improve the overall scientific research level of the school, but also provide theoretical support for the operation of various industries in the society.

C. *The Cloud Platform of Art Practice for Piano Education Talent Training*

Traditional piano art performance practice is often limited by time, site, equipment and other factors, while cloud platform art practice mode can break through various limitations and maximize students' artistic practice. The cloud platform mainly includes the following two forms: first, piano network classroom: the digital piano room, multimedia classroom and Internet + are the main implementation environments for the piano network classroom, and the typical teaching activity sequence is designed. Through the "cloud" platform, man-machine interaction is realized, which breaks through the limitations of traditional teaching time and space, saves teaching costs, and improves after-class feedback, ultimately promoting the improvement of teaching quality. Other resources shared in online piano classes are MOOCs, <http://mooc1.chaoxing.com/course/246424.html>, set up for lessons in the following columns: course chapters, teacher style, teaching methods, teaching objectives, teaching effects, teaching materials, and teaching resources. There are not only multimedia resources, but also interactive communication platforms for teachers and students. Second, the establishment of digital music experimental teaching system: the traditional mode of piano concerto is the live performance of the orchestra and the piano, with a large number of people, which needs a lot of manpower, material resources and financial support. Digital orchestra, on the other hand, combines multimedia technology with MIDI music technology to produce music software for the orchestral part of the piano concerto, restore every note in the score to each instrument, and output it in audio format, which is convenient for students to take with them and achieve the band effect of "one person". It has been proved by experiments that the digital experimental teaching system can improve the single status of teaching equipment and teaching environment, improve teaching efficiency while optimizing the classroom and enriching teaching forms. Third, live piano network: the most popular mode of "network live broadcasting" is integrated into the cloud platform of piano teaching, and the live broadcasting

resource module is added into the cloud platform. By virtue of the openness, timeliness and the tamper-proof quality of network broadcast, it can effectively simulate the stage performance environment.

IV. IMPLEMENTATION PLATFORM OF PIANO EDUCATION AND TEACHING ECOSYSTEM IN THE ERA OF INTERNET PLUS: INTELLIGENT PIANO

With the vigorous development of science, technology and electronic technology, the piano has also got rid of the traditional shackles and constantly improved itself to ensure the new social demand, thus the intelligent piano emerges at the right moment. On the basis of respecting the traditional piano teaching concept, the intelligent piano will optimize and upgrade the teaching content, teaching methods and teaching means of the traditional piano teaching, achieve the innovation of the relationship between teaching and learning in piano education, and create a new situation of piano teaching. Smart piano is a modern scientific and technological achievement under intelligent environment, which retains the musical characteristics of traditional piano and adds a controllable LCD screen. The LCD screen is based on the comprehensive application of modern technology, so that it has the automatic playing system, automatic tuning, mute function, the traditional piano pronunciation and electrical pronunciation two-way conversion. There are also smart music, recording and playing audio and video, network piano classroom, remote teaching, human-piano interaction and other new functions. On the basis of the traditional "one-to-one" piano teaching model, intelligent technology has changed the space-time relationship between teachers and students in the teaching process and become a great opportunity for the integration of piano education and informatization.

The learning style of smart piano consists of three components. First, it is the construction of piano teaching resources. The database is based on the traditional teaching materials of piano, and the library of multimedia integrated teaching materials such as "performance audio, video, music, pictures and games" is established. Data mining is used as the basis of retrieval technology to facilitate students to collect relevant learning materials. Second, it is the use of interactive piano teaching platform. The interactive piano class based on the "intelligent piano" equipment focuses on the interaction between human and computer. On the basis of retaining the traditional teacher teaching, it is aided by computer teaching. Third, it is intelligent evaluation. The intelligent resource database will classify learning resources according to their categories and difficulties and evaluate students' learning level through the student model built in the education cloud, so as to accurately select learning resources according to students' actual needs. It tracks students' learning progress timely and develop a reasonable, scientific learning plan according to their learning situation.

V. MATERIAL SUPPORT FOR THE ECOSYSTEM OF PIANO EDUCATION AND TEACHING IN THE ERA OF INTERNET PLUS

A. *Intelligent Teaching*

Intelligent teaching breaks through the traditional piano teaching and solves the disadvantages of traditional teaching; at the same time it achieves more comprehensively teaching of music theory knowledge, music creation, background and performance skills, and makes the problems in after-class practice also explained. There are "video explanation", "intelligent error correction", "intelligent with lights" and other ways. "Video explanation" refers to the course teaching in the associated APP or its own computer, which can be divided into two forms: live broadcasting and video recording. Learners can also make corresponding choices according to their own needs, and both sides can interact. Compared with traditional teaching, intelligent piano has great advantages in improving learning interest and timely tracking and guidance. "Intelligent error correction" means that learners will record their mistakes in the process of playing, score them according to the whole song, and keep a historical record of their practice process and time, all of which are automatically counted by the computer. "Smart with light" is an LED light connected to the computer in all the keys. The prompt light of the keys will help students practice.

B. *Intelligent Music Score*

The built-in storage has the storage of the library, which can be used by APP or the built-in system. It can automatically turn the page when using the music through the built-in system, which solves the practice interruption caused by turning the music score. On the basis of the auto-playing function of music score, it also adds paragraphs and self-set playback. Some devices can connect music score and teaching video to achieve higher learning efficiency.

C. *Network Piano Classroom*

This approach of teaching a class over the Internet and having one teacher for multiple students is called smart piano classroom. All the machines are connected, but the teacher can control all the machines and equipment. In addition, some brand operators have independently developed teaching courses, which are combined with games, videos, animations and other forms of interest to students, which can fully improve students' interest in learning. The course is built into the piano, teaching can be done independently by students, and evaluation and feedback will be generated automatically.

D. *Automatic Performance Function*

It can receive SD, USB, DVD, CD, portable hard disk and other signal sources. As long as the built-in computer has such a program, it can start playing automatically. As long as connected to the Internet, it can also achieve long-distance transmission and control the recording and playing even not at the same place. After the video connection, you can either simultaneously demonstrate or interactively sing karaoke together.

E. Automatic Tuning Inspection

Its essence is the function of detecting intonation and it is also the combination of piano and computer. In a computer capable of detecting intonation, a medium called a pickup is used to compare the sound to a previously set tone. When the computer has a clear judgment, there will be a prompt, which will also appear on the dashboard or in the marquee. Then according to these, there is a tone adjustment and beginners can also correct by themselves.

VI. CONCLUSION

To sum up, the research on the ecosystem of piano education and teaching in the era of Internet + is a contemporary proposition with practical significance. Its innovation is mainly reflected in the following three aspects: First, it pays attention to the transformation of teaching thinking mode, focus on cultivating students' innovative spirit and ability. The reconstruction of teacher-student relationship in universities is built on the basis of "student-oriented" concept, and the interactive piano teaching based on education cloud is theoretically explored. Through the introduction of modern information technology, it designs piano teaching multimedia integrated database construction content, piano learning ecosystem, and piano performance virtual simulation experiment teaching space. Second, the construction of "Internet + teaching materials" should be applied to pay attention to the updating of the content structure of teaching materials. The new learning platforms should be formed, such as Internet + offline, Internet + teaching, Internet + independent learning, and Internet + feedback and communication. On the one hand, it makes the textbook "live" up and the traditional paper book contents more incisive and more classic. On the other hand, it makes the new teaching methods, experience and guidance can be updated in a timely manner, transmitted to the users of the textbook. It fully reflects the principal position of students in teaching and the way of teaching and learning characterized by "autonomy, inquiry and cooperation", which makes the traditional teacher-centered classroom teaching structure undergo fundamental changes. Thirdly, it is to construct the piano learning ecosystem and improve the inequality of teachers. The piano learning ecosystem takes the piano network classroom as the core, with the digital piano room, multimedia classroom and Internet + as the main implementation environment. It designs the sequence of typical teaching activities, realizes man-machine interaction through cloud platform, constructs piano learning ecosystem with network as carrier, improves the imbalance of teachers, breaks through the limitations of traditional teaching time and space, and thus realizes a brand-new teaching structure. In addition to saving teaching costs, the feedback after class should be improved to achieve better teaching evaluation quality.

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