

# Research on interactive innovation of computer-aided music teaching

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**Abstract.** Music education is an important subject that deepens five education and promotes students' art accomplishment and humanity cultivation in an all-round way, which is of great practical value to improve students' comprehensive quality. In the context of wisdom education, it will provide strong support for students to participate in music teaching deeply by giving full play to the advantages of computer-aided instruction and building an interactive platform for music teaching. By studying the value of interactive innovation in computer-aided music teaching, this paper puts forward the interactive innovation strategy of computer-aided music teaching.

**Keywords:** Computer; auxiliary music teaching; interactive mechanism; innovative strategy.

Music Education as a basic discipline, it is a basic quality of education. It reflects people's thoughts, emotions and social life by teaching music, an aural art, so that students develop strong interests and hobbies in music, having the ability of feeling, expressing, appreciating and creating the beauty of music, teaching the students how to know and feel life and create life in a certain sense, in order to achieve the goal of training students to develop in an all-round way.

## 1 The interactive innovation direction of Computer Aided Music teaching

The correct use of computer-aided instruction in all aspects of music teaching can directly appreciate the singing of musical works, performing posture and other forms of content, and the multimedia sound effects enable students to obtain a clearer musical image, the students have a strong emotional resonance. Thus, can deeply understand the music, the natural performance music, enables the student to obtain the emotion and the psychological satisfaction, the esthetic ability obtains the sublimation.

By analyzing human musical intelligence with big data, it simulates the information process of human visual, auditory, tactile, thinking and reasoning, and constructs its own neural network and algorithm generation, finally, it is applied to human perception music, cognitive music, research music, create music, and innovate the new music teaching mode of "Man-machine interaction". In the music lesson, the artificial intelligence system can simulate the scene of each big concert on the spot, real-time, enhances the student's esthetic appeal. Artificial intelligent electronic musical instruments have advantages that traditional

musical instruments do not have. Electronic musical instruments have the ability to store a large number of musical instruments' timbres. On the basis of this, they can also arrange musical instruments' timbres, we all know that a good piano or violin costs tens of thousands of yuan to simulate the sound effect of a top-class musical instrument, but with simulated sound, we can solve this problem. In addition, with the virtual host, artificial intelligence accompaniment, 5g + VR/AR sharing platform and many other modern elements, to help students access the top music education experience.

The traditional composition theory has a modular teaching system, such as harmony, limbs and music paragraph structure, etc.. Musical artificial intelligence can not only simulate its teaching system, but also possess powerful, efficient and independent composing and calculating ability. The first AI music intelligence Composer, Orb Composer, introduces six basic music modules: Wind, strings, piano, electronics, Pop-Rock and Ambient to create music in a specific style in real time. Musical artificial intelligence can make people who know a little bit of music realize their dream of composing in an instant, but for people who have some ability to compose music, software can trigger their creative inspiration, the work will be automatically generated to do personalized, professional and meticulous modification.

## **2 The interactive innovative value of computer-aided music teaching**

Music teaching is one of the important ways to implement aesthetic education. Therefore, we must pay attention to the characteristics of music in teaching and cultivate students' interest in music. Especially for the first-year primary school students, we should pay attention to the age characteristics of children. Teachers should create conditions in many ways, use modern educational technology means, colorful multimedia courseware let students play in secondary school, Music Middle School, Sports Middle School, learning Chinese music. Reasonable use of computer-assisted teaching, with a variety of teaching methods, to better develop students feeling, understanding, performance of music, from which the art of the edification, behavior of the United States. At the same time, through the collection of industry big data, but also to achieve personalized music education. The teaching platform in the distance music teaching environment can automatically collect the evaluation data of each player, form a personal learning growth data file, clearly understand the situation of piano teaching and scientific research, and through digital quantitative analysis, help the department to work out the best learning path. At the same time gather all the students of the school practice data, mining the most potential talent of piano performance.

The choice of network link is very important in the construction of distance music teaching environment, which directly determines the quality and effect of the course. In the construction of the music distance teaching environment, the biggest difficulty they encounter is the testing of the network link. The construction of the whole environment can be simply divided into audio-video interconnection and piano interconnection, in theory, two pianos could work as long as their links were clear over the internet. However, in the actual test, it was found that the common network link from the operator's computer room through the school's central computer room load balancing equipment and a series of firewalls, behavior management, switches and other equipment, QQ, wechat, web pages, audio and video can be linked to dialogue.

It has been proved by practice that "listening, thinking, singing, doing and editing" can be carried out in music teaching by using modern educational technology and integrating computer with music teaching, it is an effective teaching method in music teaching for imparting and training music knowledge and skills. By using this teaching method, students

can acquire the basic knowledge and skills of music through training in different forms and contents, obtain the preliminary music feeling ability, the connoisseurship and the performance ability. The correct use of computer-aided instruction in all aspects of music teaching can directly appreciate the singing of musical works, performing posture and other forms of content, and the multimedia sound effects enable students to obtain a clearer musical image, the students have a strong emotional resonance. Thus, can deeply understand the music, the natural performance music, enables the student to obtain the emotion and the psychological satisfaction, the esthetic ability obtains the sublimation.

The network teaching mode not only enables students to directly experience the thinking mode and artistic creation of different regions and cultures, but also enables teachers and students not to leave school through the network exchange and cooperation among schools and organizations, we can experience the charm of foreign masters, and we can also interact with music masters and teams both at home and abroad through the Internet, so as to further enhance the inspiration of teachers and students. At the same time, the teaching under the network environment can integrate all kinds of scattered resources, gather and share all kinds of resources and intelligence, and play their respective strengths in the teaching interaction process. In the development of distance music teaching environment, the goal is to help teachers and students in the teaching and practice of playing repertoire, through the platform intelligence evaluation of players playing the piano pitch, rhythm, speed, strength, performance, difficulty and other dimensions of detection and analysis, through the functions of real-time feedback and accurate assessment, teachers and students can see the whole teaching process directly, and the assessment data are given to teachers and students when they play the piano, realize teaching students according to their aptitude and truly realize the closed loop of music teaching process.

### **3 The design of interactive innovation system of Computer Aided Music teaching**

#### **3.1 Structure of the musicianship training assistance system**

The music skill computer-aided training system is composed of data acquisition, storage, analysis, display and decision-making. The input data of the system includes preset training content, data recorded by peripheral equipment and contrast data. The input is multi-channel and the output of the system is mainly image and sound. In addition, the system can be divided into three parts: the first part is a database-based training management system, including data entry and display, training progress management, the second part is an assistant system based on the analysis of practice data, which helps teachers to monitor the students' status and put forward suggestions on training content The third part is the system part, which is centered on the playback demonstration, to help teachers and students improve the training program. The training management system is the core of the whole system, which mainly corresponds to the database, the auxiliary analysis subsystem corresponds to the inner loop, and the playback suggestion subsystem corresponds to the self-correcting outer loop.

#### **3.2 Functions and peripheral equipment of the CASM system**

The system design needs to make the analysis to the music basic skill basic essential factor, take the vocal music training teaching as an example, from sings the physiological mechanism aspect to study. Vocal music is a singing skill, and vocal music training is a systematic training around this skill. Proper vocalization is coordinated by breathing,

pronunciation, empathy, and language, but they are also interdependent, and no single factor can exist in vocalization alone. Our training process, whether from the breath of the hand or from the sympathetic position of the hand, should ultimately be the accumulation of the whole body in the best singing state. Therefore, CASM system in the application of vocal music training at the same time to take into account the sound and physiological aspects of many elements, which require different peripheral equipment and computer connection to collect. The sound module is mainly composed of recording equipment and its corresponding recording software, audio analysis software and integrated platform. The system can process the signals produced by the students' singing and playing in time. The sound is collected by recording equipment and software, and analyzed by spectrum analysis software, the music training elements, such as pitch, rhythm and resonance state, are extracted, and then the playback function is realized by recording equipment.

### **3.3 The main interface of the system**

A large number of peripheral equipment in the system are connected to the computer, recording training data and displaying them in the main interface, the windows in the main interface have music window, reference wave window, training wave window, respiratory curve window, EMG curve window and record play button, etc. . These windows display different data for trainers to refer to. In the music library of the main interface, you can choose the songs you need to practice and the progress of teaching. Display the preset demo waveform in the reference waveform window, and the training waveform window displays the trainer's waveform. The breathing curve window shows the trainer's breathing condition during the training, and the myoelectric curve window shows the trainer's muscle tension condition. Various play buttons allow you to play demo recordings and trainer recordings. There are also buttons for rhythm analysis, pitch analysis, sentence break analysis and resonance analysis. These windows can be used to judge the accuracy of pitch, the accuracy of rhythm and intensity, the accuracy of pronunciation, the level of overtones in resonance and singing sound, the amount of breath and parameters of respiratory movement, the situation of larynx, the expression of musical expression, the trajectory of body movements in performance, etc. .

## **4 Sound module in 3.4 CASM system**

The sound subsystem has three functions: real-time processing of sound signal and sequencer signal, comparing two kinds of signals and real-time feedback of signal difference. The system can also play the correct signal data preset in advance for learners' reference. The system can count out the critical errors, give the causes of the errors and improve methods, so as to achieve the goal of learning and training through testing. At the same time, considering the characteristics of testing and the requirements of learners, the system has real-time. This module involves the training content of sound, including rhythm and length, pitch, staccato, resonance and so on. Phrase graph comparison is a window that compares the waveforms of the referrer and the trainer by the sound waveforms, in which two sets of waveforms are displayed in real time. In the process of playing, students can see the waveform, on the waveform can directly see the volume size, the point of the lyrics, the rhythm of the graphics, the integrity of the phrase. By comparing the group information, the students themselves could find out the problem and then correct themselves. The sound of singing is a complex compound. The fundamental frequency of the human voice during singing is generally in the range of 100 Hz to 1500 Hz. In addition to the fundamental frequency, the song also contains a wealth of overtones and partials. Traditional teaching and training mainly rely on experience, using "functional hearing" to judge the sound of

"chest, head, pharynx, oral cavity, high-position resonance" and other abstract concepts. After the spectral analysis of the sound, the pitch of the music and the intensity of various overtones, partials (timbre, resonance) in different frequency bands can be observed. This method is used to obtain the average spectrum, or "frequency spectrum", for the analysis of sound frequencies in a time domain.

## 5 Conclusion

Learning from the novel network cooperative teaching, we can fully learn from the characteristics of foreign well-known institutions of education, teaching features, use of transnational network links, automatic piano playing system, to achieve synchronous teaching in different places, making use of the network and automation equipment to create the simulated situation of field teaching can promote the emotion and infection of teachers and students, and help students to study effectively in the master class. Through the long-distance live broadcast, interaction, recording and playback of the course, while improving the teaching effect, it widens the boundary of region and time for music education, it has played a good demonstration effect in the integration of music education and science and technology.

## References

1. Chen Feier. Talking about the application of computer music technology in music teaching [J]. *Science and Technology Wind*, 2017, (22): 26.
2. Fan Ling. The origin and evolution of interactive thinking in electronic music [J]. *Journal of Nanjing University of the Arts (Music and Performance)*, 2017, (3): 107-114.
3. Yang Fan. On the Application of Computer Software in Harmony Teaching in Colleges and Universities [J]. *Drama Home*, 2017, (14): 191-192.
4. Niu Lin; Lin Yan. Thoughts on Using New Media to Spread Symphonic Music [J]. *News Front*, 2018, (20): 154-155.
5. Bao Wei. Application and Research of Computer Music Technology in Music Teaching in Colleges and Universities [J]. *North Music*, 2018, (8): 159-161.