

Influence of Piano Teaching Mode Based on Human-computer Interaction on Students' Psychological Changes

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Abstract: For a long time, most teachers and students believe that piano is a purely technical teaching activity. However, from the perspective of teaching effect, it is also a problem that cannot be ignored to keep students in a good mental state in the classroom and cultivate their good psychological quality. Learning self-confidence is an important factor affecting students' academic performance. However, with the changes of the times, the "human-computer interaction" music learning method allows students to learn music without being limited to the traditional teaching mode. Through various music learning software, people can learn at any time and interact with various music software, thus effectively solving the problem that teachers dominate in the classroom. Therefore, as a piano teacher, one must not only have a solid theoretical foundation of music, but also must have superb performance techniques, and must also master basic psychological principles. In teaching, students can adopt scientific and effective teaching methods according to various psychological phenomena of students, so that they can have comprehensive performance skills, good psychological quality and emotional control ability. The application of the piano teaching mode based on human-computer interaction in practice also requires piano teachers to continuously learn and update in teaching. Research shows that interactive teaching not only improves students' learning efficiency by nearly 20%, but also promotes teachers' teaching innovation ability by nearly 23% on the original basis, and also makes the classroom atmosphere no longer lifeless.

1. Introduction

In today's rapid development of information technology, the storage and presentation of network data shows its great advantages. The new information dissemination mode brought by the Internet has opened up a new learning channel for our music teaching in an interactive form that is more vivid, attractive and easily accepted by students. In the critical period of cultivating students' artistic cells, modern information technology is used, and modern information technology is used from the

perspective of students' cognition. This enhances students' interest in music learning and achieves the purpose of "learning through fun".

In China, multimedia interactive teaching has become an important teaching method in schools. The multimedia teaching in the classroom is mainly explained by the teacher according to the learned content, and the courseware is presented to the students through the big screen. It can break the traditional blackboard teaching mode. Multimedia can also expand a lot of knowledge in the classroom and arouse the interest of students. For example, before class, teachers can select relevant videos, audios, pictures or animations to attract their attention, and then import the knowledge they have learned into the classroom and gradually guide them into the classroom. In piano teaching, students would be affected by a variety of factors, which would lead to psychological problems such as rebelliousness, low self-esteem, fear of difficulties, dependence, and performance psychological barriers. In terms of playing foundation, character and temperament, understanding, etc., learners would have different mentalities in the learning process, and the specific performance is that their abilities in all aspects are lower than usual. In addition to technical factors, the occurrence of this phenomenon is also related to students' willpower, attention, imagination and aesthetic psychology in a sense.

From this point, it can be seen that when learning the piano, students' different mentalities would produce completely different playing effects. That is to say, the correct feeling of playing requires people's mental coordination and cooperation. Therefore, in the process of playing, in addition to paying attention to skill training, we should also pay attention to psychological experience. Teachers should give students a variety of sensory inspiration, master students' psychological activities, and use human-computer interactive teaching to better stimulate students' interest. For students, mastering their own psychological laws can effectively promote piano learning.

2. Related Work

With the advent of the information age, piano teaching is facing unprecedented development and opportunities, so the traditional piano teaching mode has been reformed to meet the requirements of the big data era. In the context of the era of big data, Wang J explored a novel piano teaching method and approach. At the same time, he also innovated the teaching mode of creative piano collective class under the background of social background, college curriculum education and teachers and students themselves. Based on this, he explores its development path and truly improves the professional ability of piano education teachers in colleges and universities, thereby improving the level of piano education. It enables students not only to master comprehensive performance skills, but also to have good psychological quality [1]. At present, human-computer interaction technology has penetrated into all levels of education, and has made great breakthroughs in many aspects. In the context of human-computer interaction, piano teaching in higher vocational colleges has become the development trend of individualized, adaptive, deep learning and human-computer collaborative learning. Liang G analyzed the current situation of piano group teaching, and put forward reform measures on how to improve the teaching of piano group in higher vocational preschool education [2]. Under the concept of information superhighway, the teaching mode based on informatization has been developed rapidly. Based on the learning theory of constructivism, Liang W proposed a new model of human-computer interaction teaching. In the information age, it is the inevitable trend of the current education development to realize the informationization of education and respond to the challenges of the information age to education. The development and innovation of new technologies has become an important reference in the field of education, which helps students to establish an effective self-learning method and cultivate the ability to continuously update [3]. It is generally accepted that with the help of programmers,

develop concurrency and concurrency code that is easy to understand and test. Capel M I used it as a computer program and used it in the classroom. This enables students to successfully teach some new ideas in the classroom, who were reluctant to take piano lessons before starting to use this pedagogy. The main content of its research is to transform the two, and in the future piano courses, various media would be used to jointly access the school's virtual campus service. This allows students to easily apply and master the new knowledge taught [4]. At present, there are two programming methods for industrial robots, one is online extraction, and the other is offline programming. On this basis, Chen C designed a set of interactive teaching programming system for interactive robots. In addition, in the actual environment, the collision detection of the virtual robot is an important means to verify the feasibility of its path. On this basis, a collision detection algorithm based on virtual classroom is proposed, which compares the obtained depth with the generated image to obtain the optimal classroom model [5]. Human-computer interaction teaching has become an important force for educational reform in today's world. Through information technology and electronic learning materials, students can learn better, and teachers can make classrooms more colorful in today's technology era. However, Asad M M found, there are related studies that clearly show its problems. In a practical sense, it helps teachers and students to integrate information technology and electronic technology into their own piano lessons and interactive teaching according to modern technology, without worrying too much [6]. At present, with the continuous change and innovation of educational methods, students' learning content is constantly enriched and developed. Therefore, higher requirements are put forward for education management and education system. At present, piano education generally adopts traditional teaching methods, and some middle schools have not yet formed a complete piano teaching system. To achieve this goal, Xu M designed an interactive teaching system based on human-computer interaction. First, the main control circuit of a set of interactive teaching system is designed, coded in detail, and analyzed in detail. Then, on the basis of establishing an intelligent model, designing a training database, etc., he effectively implemented an intelligent classroom [7].

3. Influence of Interactive Piano Teaching Mode on Students' Psychology

3.1 Psychological Changes of Students

A famous nineteenth-century art teacher often said to his students: "To draw a man's eyes, a man must look at his ears." Because the surrounding environment surrounding the subject sometimes plays a key role as a whole, and this role is often overlooked [8]. The same goes for learning the piano. A major breakthrough in music is impossible if the playing of the piano is nothing but a technical void. If it is only played through notes and different symbols on the score, the musical imagery in the work cannot be presented to the audience. In other words, the musical creation of piano learners is based on a certain knowledge background [9]. The non-semantics and uncertainty of musical expressions make people have different understandings of music. Through the understanding of musical works, students can better understand the artistic conception of music from the certainty of literary language. Therefore, when people get a piece of work, after feeling its surface features, the teacher should let students understand its ideological background, understand its inner thoughts and feelings, and experience the connotation and artistic structure of music from it. The first is to grasp the work as a whole, and then to conduct a detailed analysis of the rhythm, the subtle changes in movement and the detailed images that affect each other. This makes the work fully express the emotion of the work, and try to get close to and reproduce the beauty given by the author at the time of creation, and then like music from the heart [10]. In teaching, in addition to teaching students performance skills, they should also pay attention to cultivating their musical cultural literacy, the two are inseparable. Only by making students truly experience the composer's

unique spiritual world, understand its meaning, feel the specific era background of his creation, and the main ideas that accompany his life, can he present a vivid musical image [11]. Therefore, instead of sticking to a single piano technique, we must improve our psychological quality. This requires teachers to guide students to obtain rich emotional experience from daily life and various art forms in teaching, and to deeply feel the emotional changes [12]. Piano playing is from perceptual understanding to rational understanding, and then to practical application. Only those musical images that are recognized and authentically reproduced can unite listeners, ignite their souls, and thus lead them to worship music from the heart. Psychological changes are integrated as shown in Figure 1.

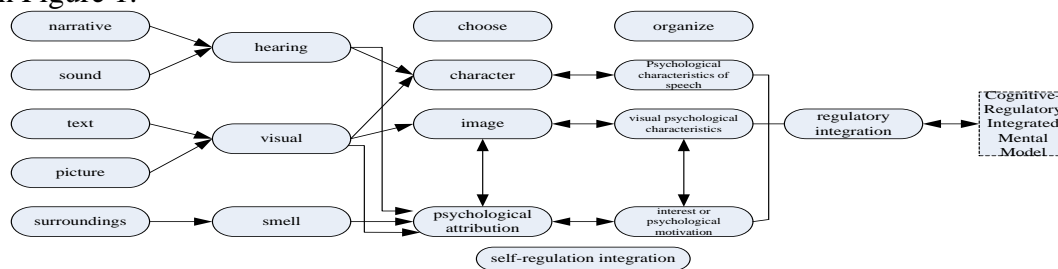


Figure 1: Psychological Change Integration Simulation

3.2 Advantages and Disadvantages of Human-computer Interactive Teaching

"Interactive piano teaching" is to connect the computer and the piano. It guides the player to play through the computer, uses the display screen as a display window, displays the information related to the music, and the keys are connected with the sensor. The computer would automatically feedback the playing process to help players master the skills of the piano. For students, interactive piano lessons that engage them with colors and cool movements. The interactive piano teaching software enables students to have a clearer understanding of pitch and sound names by marking different colors on the keyboard [13]. Therefore, the method of interactive piano teaching would greatly promote the later piano learning. The interactive teaching framework is shown in Figure 2.

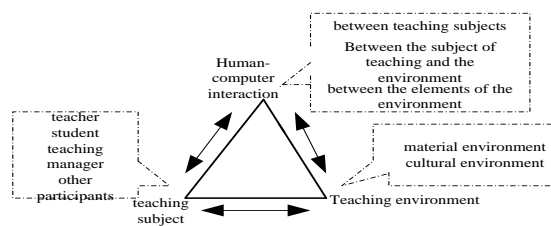


Figure 2: Interactive teaching framework diagram

Due to the differences in the level of students' understanding of music, the human-computer interaction immersion teaching is difficult to achieve the expected teaching effect without the music foundation and the teacher's intervention. Students' music comprehension ability and activity participation level all need the guidance and assistance of teachers. In the teaching process, teachers and students still need to interact and integrate with each other to achieve the expected goals. Second, if there is no real exposure to the piano, their concentration would be weak. Simply using human-computer interaction software cannot meet the requirements of classroom teaching. Therefore, teachers must create a good teaching environment so that students can also participate in music [14]. In schools, although many schools have multimedia, not all students can use human-computer interaction software, and the lack of resources also makes this teaching model unable to be fully implemented. In the teaching process of "Human-Computer Interaction

Technology" course, we also adopt a variety of teaching methods to prescribe the right medicine. The use of multimedia teaching methods has enriched the teaching content. Multimedia such as images, voices, videos, etc., become the interactive content covered in this course, which is also of great help to our teaching. For the types of content that need to be discussed or designed in piano teaching, we would focus on classroom teaching, allowing each student to experience and master it personally, so as to strengthen the learning of theoretical knowledge and the improvement of playing ability. In terms of technology application and user survey, we use the method of survey research to allow students to obtain real and credible data in designing questionnaires and online surveys, and then analyze and summarize them to make optimizations. The interactive teaching data processing flow is shown in Figure 3.

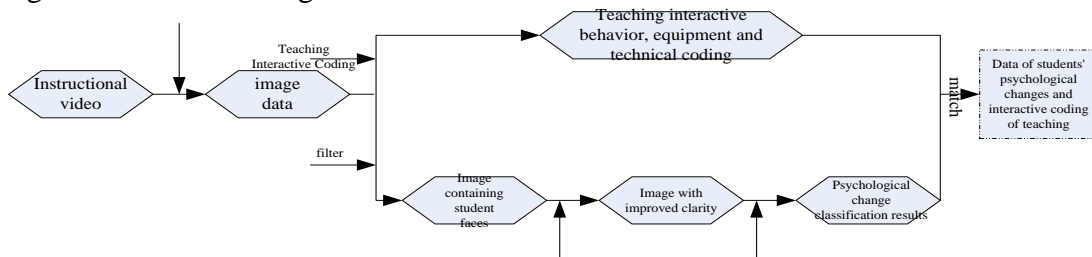


Figure 3: Interactive teaching data processing flow

3.3 Relationship between Mental State and Interactive Piano Teaching

Psychological changes play a pivotal role in people's survival adaptation, behavioral choices, completion of activities, and physical and mental health. Students' psychological changes in learning are different. Research has found that happiness, surprise, boredom, confusion, and frustration play an important role in successfully achieving goals or hindering them. During learning, students' mentality would change in different ways. This change is a direct reflection of the previous learning situation, and would also have a certain impact on subsequent learning. Psychological conditions have a dual impact on learners' learning, and can be said to be a distraction, but with the right guidance, it can help them think and make decisions. Different psychology would produce different learning effects, so the psychological state of the learners in the learning process also has a certain influence on the students' piano learning. Therefore, it is necessary to study the psychology of students. However, most of the current research focuses on the influence of learning emotion on academic performance, while in the learning process, there are few researches on the factors that affect the learning effect. However, the researchers found that students' mindsets also changed during the teaching interaction. When there is a lack of communication between teachers and students, students may feel disgusted with learning the piano, or even directly reject it in the long run. Therefore, teaching interaction does have an impact on students' psychology. Moreover, music can change a person's character. Students have different personalities, some of them are more introverted, weak, introverted, and do not like to express their emotions. According to these characteristics, teachers can choose a song with distinctive personality and passion for them, or express strong feelings with lyrics. Some classmates are more cheerful and active, and they may feel restless in class. Because their character lacks soft and meticulous elements, they tend to appear too impulsive on some issues. So teachers can give them some soothing music to ease their impulses.

3.4 Difference between Traditional Teaching Mode and Human-computer Interaction Teaching Mode

The emergence of the interactive teaching mode makes it have the incomparable advantages of the traditional classroom, and it is gradually emerging all over the world. There are many problems with traditional piano teaching methods. Music should be in life, not studied seriously in the classroom, and the method of learning music should not be purely theoretical. However, in real life, many Chinese children often show a rigid and old-fashioned feeling in the process of learning the piano. They often learn a note, a rhythm, a theoretical knowledge, instead of learning and experiencing. There are also a small number of students who feel physically and mentally exhausted under the dual pressure of parents and teachers. They are psychologically resistant, and it would make them feel very uncomfortable to bring up piano lessons, and the absorption rate of knowledge is even less. The most practical and fundamental problem that Chinese students encounter in piano teaching is that they are divorced from the essence of music. The "interactive" piano teaching mode is different from the previous teaching methods, emphasizing the rhythm of music and the connection between music and life. It attaches great importance to the essence of music, emphasizes that music should return to nature, return to its original nature, and stimulate students' music learning potential, so the absorption rate of knowledge in all aspects would inevitably increase. Such a teaching system allows students to relax more, feel the joy brought by music, and be more appreciative and intoxicated when learning the piano.

From the perspective of traditional piano teaching, cramming and rote memorization is a relatively common method, and many teachers who follow traditional piano teachers believe it. No matter the staff, pitch, or rhythm, as long as they read and memorize more, they would be able to master it proficiently. One can imagine that this kind of rote memorization is largely unsolvable. Although it is not necessary to memorize formulas and equations like mathematics, physics and chemistry, any subject requires memorization when learning, and music is no exception. However, the rote method can only allow them to remember and learn in a short period of time, but not allow them to fully grasp. Students' memory is far inferior to that of teachers who have been playing piano lessons for many years, and short-term memory does not guarantee that everyone can remember what the teacher taught them. This leads to the fact that what they learned in the last class should be a review, but it is still a new experience every time. This vicious cycle can prevent them from absorbing new knowledge and reduce their motivation to learn. Different from the traditional piano teaching method, changing rote memorization to human-computer interactive image memory would have better effect and further stimulate students' desire to learn. Table 1 shows the different efficiencies of the two modes in various aspects.

Table 1: Different efficiencies of the two modes in various aspects

| teaching mode | Knowledge mastery | Classroom activity | Memory capacity | Relaxation |
|----------------------------|-------------------|--------------------|-----------------|------------|
| traditional piano teaching | 68% | 70% | 73% | 64% |
| Interactive piano teaching | 92% | 94% | 88% | 98% |

3.5 Model on Students' Psychological Changes in Human-computer Interactive Teaching

In the human-computer interaction mental model, the function $f(x)$ shows that the error between the test attribute and the teaching requirement is obvious, and the function can reflect the difference between the two. The smaller the function value $f(x)$, the better the effect. In this paper, the

conventional errors of knowledge points are used to optimize and adjust the existing knowledge points. The value of the specified parameter is $A_i + D_i \times 18$. Among them, A_i is the answer of the knowledge point, and D_i is the difficulty of the knowledge point. The use of C_i expresses the i th problem of specifying a ratio, specified as follows:

$$C_i = \frac{A_i + D_i \times 18}{\sum_{j=1}^n A_j + D_j \times 18} \quad (1)$$

n is the overall score for the number of genes in the instructional requirement K .

$$C_{1k} = \sum_{i=1}^m C_i \quad (2)$$

The error of k knowledge points in the teaching requirements is:

$$\aleph_{ck} = |C_{kk} - C_{1k}| \quad (3)$$

Among them: C_{kk} is the weight of the K th knowledge point; C_{1k} is the weight of the first knowledge point. It is stipulated as follows:

$$\aleph = \sum_{i=1}^m \aleph_i \quad (4)$$

m is the total number of knowledge points. In this system, the methods of designing the knowledge mastery self-test are usually different. It stipulates that:

$$f = 12 \aleph + \varphi + 47 \gamma + 0.2\xi \quad (5)$$

In the above regulations, \aleph is used to express the overall error of the knowledge points in the teaching, and φ is used to express the error of the test time specified by the teaching. γ refers to the error of average difficulty and test difficulty, and ξ refers to the absorption degree of each knowledge point. In order to effectively divide the overall error, the relative weight ratio, the error weight value in the above formula is obtained in practical application. Therefore, it is obvious that the smaller the f value of this formula, the more successful the reform of the teaching model is. Its design for self-testing in the practical application of genetic algorithms:

$$f = 12 \aleph + \varphi + 47 \gamma \quad (6)$$

Among them, θ_t is the dynamic weight error of dynamic knowledge points in teaching. Here is the weight factor C_s for evaluating the learning situation of students' knowledge points:

$$C_s = C_{sp} - C_{sk} \quad (7)$$

C_{sp} is the average correct rate of knowledge points. C_{sk} is the number of students who test themselves in the correct knowledge assessment process, that is, the ratio of the total score of the knowledge points in the assessment to the total score. It is not difficult to see that $0 < C_{sp} < 1, 0 < C_{sk} < 1$. When the accuracy of self-tested knowledge points is higher than the average correct rate of knowledge points, C_s is negative, and when students' self-correction rate knowledge is lower than the average correct rate of knowledge, C_s is positive. The error of some of the knowledge points is:

$$\aleph_i = |C_{kk} - C_{1k} + C_s| \quad (8)$$

Overall error of knowledge:

$$\varepsilon = \sum_{i=1}^m \varepsilon_i \quad (9)$$

m is the total number of knowledge points. It can be seen from the above formula that the weight of teaching knowledge points can test the accuracy of students' dynamically changing knowledge points by itself.

Aiming at the large amount of computation caused by the simultaneous execution of each mode in the existing multiple teaching systems, a fast algorithm is proposed. The provisions are as follows:

$$P_{k,k-1} = \vartheta_{k,k-1} P_{k-1} \vartheta_{k,k-1}^T \quad (10)$$

Suppose the prediction residuals are:

$$\Delta Z_{k,k} = Z_k - H_k X_{k,k-1} \quad (11)$$

Then its variance S_k is:

$$S_k = A_k U^T A_k^T + R_k \quad (12)$$

Whether innovative thinking is divergent is judged based on the prediction residuals, as shown below:

$$\Delta Z_{k,k}^T \Delta Z_{k,k} \leq \lambda \text{tr}(S_k) \quad (13)$$

In the formula: λ is the adjustment coefficient, and the sensitivity and accuracy of divergence detection would be different if different values are taken. When calculating the predicted value of teaching quality at time k at time $k-1$, the influence of classroom atmosphere from time $k-1$ to time k on the predicted value is not considered, so after optimization we get:

$$\Delta v(k) = v(k,k) - v(k,k-1) \quad (14)$$

Let $\Delta v(k)$ be a one-dimensional column vector composed of the difference of classroom atmosphere at N moments before time k :

$$\Delta v(k) = [\Delta v(k), \Delta v(k-1), \dots, \Delta v(k-N)]^T \quad (15)$$

When the above conditions are met, the model is as follows:

$$\frac{1}{N} \text{tr}(E[\Delta v(k) \Delta v^T(k)]) \leq \mu_a \quad (16)$$

In the real-time operating system, security platform and other environments, interactive teaching only needs to focus on its functional requirements. The software of the platform is centered on the processing unit, which is also the key to the whole system. It is loaded with a human-computer interaction program in a special way, which is the most important performance.

4. Correlation between Traditional Teaching Mode and Human-computer Interaction Teaching Mode

In piano teaching, if teachers always adhere to traditional and rigid teaching methods. It would make its teaching develop into invalid teaching, and the effective teaching method is that teachers have certain musical literacy themselves. Basic knowledge and skills are imparted to students through methods accepted by students so that they can be put to good use. Through the knowledge

and skills mastered by students to gradually form their own musical literacy, it analyzes and reflects on students' musical quality, so as to optimize the teaching mode, compile new teaching materials, and improve teachers' musical accomplishment. This is also an optimization process. In short, "interactive" efficient teaching highlights the relationship between teachers and students "teaching" and "learning", that is, the interaction between teachers "teaching" and students "learning". Once the interactive teaching is established, the interactive relationship between teachers and students forms a virtuous circle and becomes an effective teaching method. Therefore, the content taught by teachers cannot fully reflect the effectiveness of education, but should be determined by the learning process and results of students. The effective teaching of human-computer interaction requires teachers to summarize and reflect at any time. While choosing appropriate and appropriate teaching content, we should constantly think about how helpful our teaching methods are to students' professional development. The implementation of this method has improved the ability of students and teachers in all aspects by more than 20%, and has great development prospects. All in all, the difference between the two modes is mainly reflected in learning efficiency, knowledge mastery, classroom activity, divergent thinking, and innovation demand. The learning efficiency comparison is shown in Figure 4.

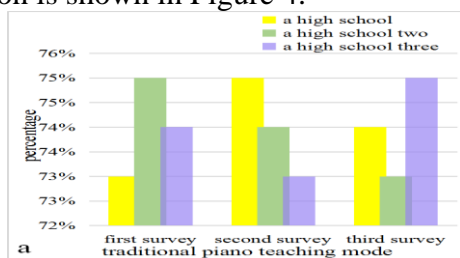


Figure 4 a: Traditional piano teaching mode

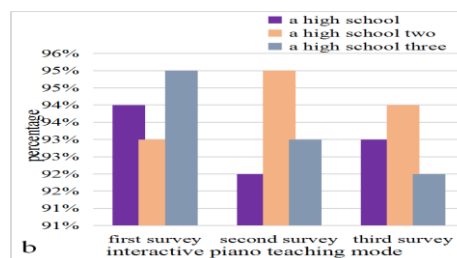


Figure 4b: Interactive piano teaching mode

Figure 4: Comparison of learning efficiency

It is found through random survey data that the traditional piano teaching model is largely accomplished by rote memorization. Many teachers feel that they can learn by reading and memorizing. However, this kind of rote memorization method can only let them remember in a short time, but not really let them master. The data results also clearly show that the learning efficiency can only be maintained at about 74%. However, human-computer interactive teaching is different from the traditional piano teaching method. By converting rote memorization into interactive image memory, it can be found that the learning effect is significantly improved by nearly 20% on the original basis. Figure 5 shows the comparison of knowledge mastery.

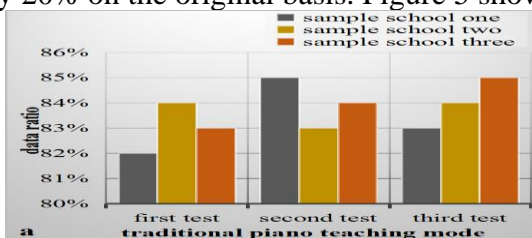


Figure 5a: Traditional piano teaching mode

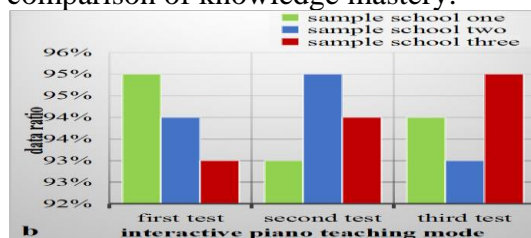


Figure 5b: Interactive piano teaching mode

Figure 5: Comparison of knowledge mastery

Through data comparison, it is found that most of the traditional piano teaching mode adopts the method of rote memorization, and its knowledge cannot be truly mastered by students. Short-term memory does not guarantee that everyone can master the knowledge imparted by the teacher proficiently. In this way, a vicious circle is formed, and the mastery of knowledge is maintained at an upper-middle level, basically stable at 83%. If things go on like this, people can neither master

old knowledge nor absorb new things, and their motivation to learn would be greatly reduced. It would be even better if rote memorization was transformed into human-computer interactive teaching. For example, converting a lot of jerky knowledge into a painting can leave some impressions in the mind. This makes their understanding of knowledge more profound, and the degree of mastery of knowledge can reach about 95% according to the current data, and it would continue to improve in the future. The classroom activity comparison is shown in Figure 6.

In the traditional piano teaching mode, most teachers would make the students sit upright and cannot walk around at would, which has a certain impact on the learning of music, and the learning method of music should not be purely theoretical. In the process of piano teaching for Chinese students, the most prominent problem is that they are divorced from the essence of music. The experiment found that the classroom atmosphere is very depressing and cannot stimulate the enthusiasm of students. The "interactive" piano teaching method is different from the previous teaching methods, focusing on the rhythm of music and closely related to people's life. This teaching method allows students to fully relax in piano lessons and appreciate the beauty of music. The body and spirit can be fully rested without being restricted by the rigid traditional classroom, and the classroom activity has been significantly increased by nearly 30% compared with the previous one, which is an unprecedented change. Figure 7 shows the comparison of innovation demand under the two teaching modes.

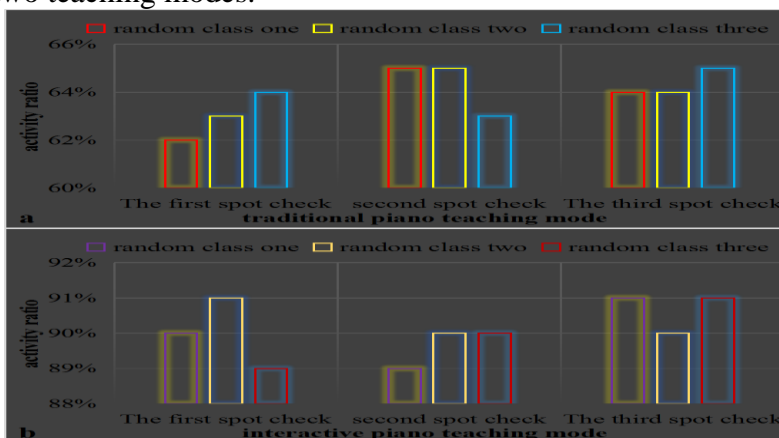


Figure 6a: Traditional piano teaching mode

Figure 6b: Interactive piano teaching mode

Figure 6: Classroom activity comparison

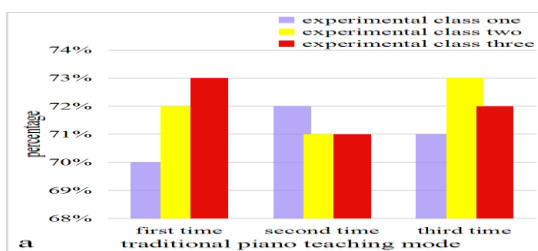


Figure 7a: Traditional piano teaching mode

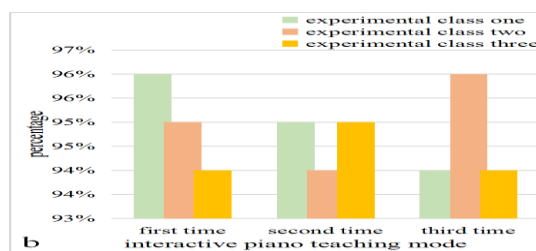


Figure 7b: Interactive piano teaching mode

Figure 7: Comparison of innovation demand under two teaching modes

Whether it is from the data or various surveys, it can be found that due to the traditional piano teaching model, the demand for innovation would naturally only stabilize at about 71% for a long time. There may be a downward trend in the future, causing students to study for the sake of learning. In fact, teachers with serious inner rebellious psychology are completely unaware of the fact that they completely ignore the importance of students being the dominant position. In interactive piano teaching, teachers are required to formulate individualized plans according to the

students' personalities and keep innovating. A recent survey found that its demand has undergone a qualitative leap, and it has increased by about 23% on the original basis. In addition, corresponding quality education is provided to them, and music is used to improve and supplement their personality, so that their psychology is more healthy and stable.

5. Conclusion

The practice of teaching reform in recent years shows that: in the case of rationally planning teaching content, actively innovating teaching methods, and using a variety of teaching methods, in the teaching of "human-computer interaction", students' learning interest and enthusiasm for learning have been greatly improved. The quality of teaching has been significantly improved. It is necessary to adhere to the student-centered approach, continuously deepen the teaching reform, give full play to the initiative of teachers and students, and carefully arrange the teaching content. The flexible use of teaching methods and the use of various forms can further improve the quality of teaching and achieve the purpose of teaching. Only in this way can we provide more talents for the society. As a music educator, choosing interactive teaching is by far the best choice. At present, the application of smart pianos and smart classrooms in teaching is getting more and more attention, but there are also some problems that need to be solved. In many schools, teachers pay more attention to teaching problems such as teaching model improvement and teaching method innovation. While accepting new things, they also conduct relevant research and give systematic teaching modes and methods. As a piano educator, we should conform to the trend of the times and continuously improve ourselves on this road of reform, thus providing a new road for cultivating and mastering modern music technology. Piano teachers should continuously research and update in the teaching process to realize the feasibility of the piano teaching mode based on human-computer interaction. People can use the network platform, combined with the popular cloud voice query, to quickly find information about music and find related images. It is necessary to enrich the lectures in the classroom and carry out scientific programming according to the design before the class. It is necessary to continuously update information resources, change the boring and lazy classroom atmosphere, and improve the teaching effect.

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