Application of VR Technology in the Construction of MOOC Resources

Qian Huang*
Wuhan Conservatory of Music, Wuhan, 430060, China

*Corresponding author e-mail: 10137@whcm.edu.cn

Abstract. In the context of the epoch-making development of science and the continuous improvement of the social system, VR technology has quietly emerged. With the rapid development of the Internet industry, various industries are also adapting to receive the collisions brought by new fields. VR is one example. In recent years, MOOCs have been continuously expanded, and the development of MOOCs has also attracted more and more attention. Through the analysis and discussion of the application status of VR technology, VR technology and MOOC resource construction are combined to discuss the effect of VR technology on MOOC resources. This article discusses and analyzes the effect and influence of VR technology on the cognitive psychology and thinking optimization of the Solfeggio and ear training courses in the MOOC. This paper uses two conservatories as experimental objects to analyze and compare the difference between the effect of using VR technology in the construction of MOOC resources and the original traditional teaching. The results of the experiment show that the average score of group B is 30.8 (standard deviation=4.2 ), is higher than the average of group A by 27.4 (standard deviation=2.5). Therefore, the introduction of VR technology can more effectively improve the cognitive psychology of learners, and it is also helpful to optimize learners' musical thinking.

Keywords: VR Technology, MOOC Resource Construction, Sight Singing and Ear Training, Musical Thinking

1. Introduction

With the integration of high-end technologies, VR virtual reality technology has gradually become known to people. Due to the rapid development of technology in today's society, VR technology is also developing faster and faster and becoming mature [1]. VR technology is now applied in many fields, and VR technology has brought great influence to many industries. For example, the MOOC, which is very popular nowadays, has been popular since its appearance [2]. At the same time, some scholars have proposed to combine VR technology with MOOC, because according to various data and facts, it has been shown that VR technology has a very positive effect on MOOC, and VR technology has produced a lot in the education field. It has a positive impact on classroom teaching and provides new teaching models and richer teaching resources. Therefore, the purpose of this article is to study and explore the benefits and effects of combining VR technology and MOOC [3, 4].
Many scholars are very interested in MOOC, and many scholars have expressed their views on MOOC. For example, Ji Xia believes that flat video is mainly the main form of MOOC teaching, which lacks some of the advantages of offline education, such as lack of interaction and learning range, and students do not have that kind of learning experience. The emergence of VR technology solves this problem. VR technology can combine virtual reality technology with MOOC teaching, thereby increasing students' interest in class, making the classroom more lively and interesting, and bringing more to students. A good learning experience can improve classroom efficiency and classroom quality, promote the development of MOOC teaching methods in a three-dimensional direction, improve MOOC teaching methods, and solve the shortcomings of MOOC single teaching plane video. Let the teaching method advance with the times, so as to develop in the direction of three-dimensional and digital [5]. Han Zhongling proposed that the current music education courses should focus on the construction of the subject content. The theoretical foundation of the study on solfeggio ear training is psychology, especially cognitive psychology and solfeggio ear training are closely related. Students should pay attention to the cultivation of students' musical psychology when learning solfeggio and ear training, to help students better understand music, so as to achieve the unity of the degree of solfeggio and ear training [6]. Cognitive psychology can be used to help teachers arrange music courses for students of different ages appropriately and to help them learn better. On this basis, VR technology has further promoted the upgrade and optimization of this system.

Combining VR technology with MOOC teaching methods is conducive to the improvement of MOOC teaching methods and can help solve the current imperfect problems in MOOC teaching. Firstly, VR technology deeply integrates the processes and various details in MOOC teaching methods, and then uses virtual and reality technologies to help better construct this teaching method. The combination of VR technology and MOOC teaching methods can have a positive effect. Take cognitive psychology and musical thinking in the solfeggio and ear training courses as examples. VR technology has improved and perfected the original teaching mode [7]. Moreover, this not only brings a new type of teaching method, but also transforms music theory from abstract to concrete, so that the learners of sight singing and ear training will not only feel a new teaching experience, but also let the learners of sight singing and ear training. Teaching is implemented more completely. In this way, the teaching of sight singing and ear training under VR technology not only brings a good experience to the students, but also brings better teaching methods to the teachers, improves the quality of their classes, and improves the teaching efficiency [8, 9]. Therefore, in summary, VR technology has a very good application effect and broad development prospects in the teaching of sight singing and ear training [10].

2. Method

2.1 VR Technology
VR, which is what we often call virtual reality technology, has had such an early concept in the 1920s. To use computers and some science and technology to make people produce a kind of virtual scene senses, and there are virtual sensory enjoyment in time and space. We already know the origin of VR technology from the above is actually very early, so in what way is it realized? In fact, the use of our eyes will produce confusion. When two cameras are constantly taking two photos, the two images are overlapped. When we think it is a photo, what we see is one In-depth information. There is a phase difference between the left eye and the right eye, so there will be an overlapping area between the two eyes. Of course, the left eye can see more left or right than the right eye, so they will have one difference in the position of the image, when they overlap, we see that there is a depth of field. In fact, this principle is also applied to other products, which are also related to VR.

2.2 VR Application
Virtual reality is currently a new thing for the masses. In some art exhibition halls, the combination of VR and art, culture and creativity is a new experience for the people. They are immersed in it and feel
2.3 Advantages of VR Technology in Sight Singing and Ear Training Courses

Virtual reality (VR) technology breaks through the constraints of time and space and has the advantages of immersion, conception and interactivity, making it widely used in the education field. The use of VR technology in the sight singing and ear training courses not only overcomes the limitations of the environment, but also collects multi-modal interactive data to drive the interactive environment to perform all aspects of sight singing and ear training, prompting learners to learn more. In view of the above situation, this research introduces VR technology to the sight singing and ear training system based on learning style. First of all, VR technology simulates an immersive virtual classroom, allowing learners to naturally interact with multiple perceptions. The data obtained from this is both accurate and sufficient. Together with the rich methods of sight singing and ear training in the virtual environment, it can accurately The driving system is adapted to learners' different learning styles, giving learners a highly personalized teaching experience, and maximizing the potential and talent of learners. Secondly, the virtual environment meets the needs of knowledge transfer through practical operations in engineering education, and promotes learners to complete the combination of theory and practice. Finally, the virtual environment supports the multi-dimensional display and interaction of knowledge, stimulates learners' senses and memory in an all-round way, and fully stimulates learners' learning motivation. To sum up, this research proposes a VR interactive method based on learning style. This method designs a learning style judgment method suitable for a virtual interactive environment. The learner's subjective and objective data is analyzed to determine the learning style, and then according to the judgment result, the virtual interactive environment is continuously adjusted for sight singing and ear training, so that the learner interaction in an environment that meets their own preferences can stimulate learners' learning motivation and improve academic performance.

2.4 VR Technology Solfeggio and Ear Training Evaluation Algorithm

VR technology is used to improve the accuracy of judging learning styles, and then adjust the virtual interactive environment based on the judgment results to adjust the virtual interactive environment to adapt the interactive environment to learners’ learning preferences, thereby stimulating learners’ learning motivation and improving academic performance . When analyzing the experimental results, this article uses not only the relevant formulas in statistics, but also the relevant formulas of standard deviation. The following is the relevant formula:

\[ s = \sqrt{\sum((x_1-x) \times 2 + (x_2-x) \times 2 + \ldots + (x_n-x)/(n-1))} \]  \hspace{1cm} (1)

\[ \sigma = \sqrt{\sum((x_1-x) \times 2 + (x_2-x) \times 2 + \ldots + (x_n-x) \times 2/n)} \]  \hspace{1cm} (2)
\[ p(B) = p(B \mid A)p(A) + p(B \mid \bar{A})p(\bar{A}) \] (3)

3. Experiment

3.1 Research Object
According to the above description, this study invited 60 subjects to participate in the experiment, with an average age of about 20 years old. They were randomly divided into two groups, A and B. Group A consisted of 20 boys and 10 girls, and Group B consisted of 20 boys and 10 girls. The experiment chooses solfeggio and ear training in cognitive psychology and musical thinking optimization as the research direction. It is divided into five stages: pre-school test, learning process, post-school test, questionnaire survey and postponement test. Pre-school testing is an assessment of learners' prior knowledge. In the learning process, the two groups of learners study the same teaching materials in different environments. Group A learns in a page-based sight singing and ear training system "MO Class Resources" that uses a learning style model. Group B uses VRIS-E for learning. The post-study test is a test of learners' learning achievements. After all learners complete the post-study test, they need to fill in the IMMS to answer their feelings about the course. One month later, the learner will take the postponement test.

3.2 Use VR System for Learning
In the course of learning solfeggio and ear training through VR, calling the encapsulated abstract method can not only reduce the learning time, but also ensure the readability of learning. In the case, a specified number of VR models are generated at one time without repeated operations, which saves modeling time. Texture and export only need two or three lines of VR code to realize the functions of a dozen lines of code in MAXScript, which can greatly improve the efficiency of use. The learning system can also realize the interaction of the model in each unit. Learners can use the virtual reality program without being familiar with the internal structure of the VR learning system, simplifying the use process. Graphical modeling is a WYSIWYG modeling method. The position and size of the model can be adjusted by dragging the points, lines and surfaces of the editable polygon. The high-precision model location points often have a drawing plan, and dragging cannot be achieved at this time. High precision requirements. VR automatically generates the VR code written by the system, which can realize the digitization of the model, and accurately control each coordinate through the code. In the case of the VR model, the location, size and number of faces of each learning resource are guaranteed by accurate codes to ensure the high precision of the model.

4. Result

4.1 Analysis of Experimental Data Results

| Table 1. Comparison of variance results between the two schools |
|---------------------------------------------------------------|
|                | Experiment 1 | Experiment 2 | Experiment 3 | Experiment 4 |
|-----------------|--------------|--------------|--------------|--------------|
| Experiment group | 93           | 96           | 90           | 97           |
| Control group   | 65           | 70           | 65           | 68           |

As shown in Table 1, the average values of attention, relevance, confidence and satisfaction of the learners in group a are slightly lower than those in group B. After one-way analysis of variance, it is found that the two groups' The scores are significantly different, and the difference in IMMS total score is also statistically significant.
The results of the pre-school test, post-school test and postponed test of the two groups of learners are shown in Figure 1. Using one-way analysis of variance to analyze the values of these two groups of preschool tests, the results show that there is no significant difference in the values of the two groups of preschool tests, which indicates that the two groups have the same level of prior knowledge. The introduction of VR technology has a more positive impact on learners’ learning motivation. In addition, during the experiment, it was found that the learners in group B were more active in learning than group A, and they were less distracted.

**Table 2.** How Satisfied are the Students of the two schools with the two teaching models

|                      | Very satisfied | Quite satisfied | Dissatisfied | Unclear |
|----------------------|----------------|-----------------|--------------|---------|
| **Experiment group** | 53%            | 39%             | 7%           | 1%      |
| **Control group**    | 24%            | 30%             | 42%          | 4%      |

As shown in Table 2, the average of group A in the post-school test is 32.4 (standard deviation=3.4), the average of group B is 36.8 (standard deviation=2.3), and the score of group B is higher than that of group A. The pre-school test score is used as the covariate, and the post-school test score is used as the dependent variable to perform covariance analysis. The results show that there is a significant difference in the scores of the two groups in the post-school test, and the effect size of the before and after scores of group B is 0.637, indicating that the academic performance has been greatly improved.
Figure 2. How Satisfied are the students of the two schools with the two teaching models

As shown in Figure 2, the accuracy of the VR-based sight singing and ear-training learning in all dimensions is slightly better than the method based on ordinary learning, indicating that the introduction of VR technology has a positive effect on improving the quantity and accuracy of interactive data, resulting in style accuracy of judgment has increased. Similarly, the results of the deferred test of the two groups and the results of the pre-school test were analyzed by covariance analysis, and it was found that the difference between the two groups' scores was statistically significant. The average score of group B was 30.8 (standard deviation=4.2) higher than that of group A. The average is 27.4 (standard deviation = 2.5). Therefore, the introduction of VR technology can more effectively improve learners' academic performance, and it is also helpful to learners' continuous memory of knowledge. The learning style judged by the first round of interactive data and the learning style judged by the ILS questionnaire are substituted into the formula. The result is a P value ranging from 75% to 85%, which indicates that the method has high accuracy for judging the learning style of the four dimensions.

5. Conclusion
This research proposes a learning method of solfeggio based on VR technology. Based on this theory, a set of virtual reality interactive system is constructed for cognitive psychology and musical thinking optimization. This method judges the learning style by collecting subjective and objective data of the learner, and then makes adaptive adjustments to the virtual interactive environment with reference to the judgment result. The learner interacts again in the adjusted environment to generate new data, which will affect the learning style. The judgment and adjustment of the virtual interactive environment are carried out in a loop. This method not only solves the problem of inaccurate data acquisition of the adaptive teaching system based on ordinary learning, but also solves the problem of lack of experimental operation, and also provides learners with a highly personalized learning experience. Experimental results prove that this method improves the accuracy of judging learning styles, has a positive impact on learners' learning motivation and academic performance, and realizes the educational concept of rational use of learning resources.

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