

# *The application of modern virtual reality technology in the teaching of vocal music*

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**Abstract:** The application of modern virtual reality technology in various fields is changing day by day, and its application in the field of music is also increasing. And in the music branch of vocal music teaching, the application of these modern science and technology seems more urgent. Like three-dimensional virtual technology, virtual reality technology (VR), augmented reality technology (AR) of these modern technologies, if it can be combined with vocal music teaching, it will bring revolutionary changes for vocal music teaching. Three-dimensional virtual reality technology can turn the abstract acoustic principles of vocal teaching, vocal musculature and music performance virtual simulation into intuitive and realistic scenes, providing students with rich learning opportunities and immersive experiences to improve vocal singing skills and enrich the emotional experience, so as to enhance the quality of vocal teaching and teaching effect.

## **1. Introduction**

The rapid development of modern science and technology in recent times, especially in modern times, has given rise to many new methods, theories and applications, which have certainly been widely used in music, such as music production, recording technology, electronic music and synthesis, and music education [1].

In today's rapidly changing modern science and technology, vocal music teaching should also constantly try to utilize modern science and technology to assist teaching. For example, if modern virtual reality technology, augmented reality technology and three-dimensional virtual technology are widely used in music and vocal music teaching, it will provide more new tools and new methods for music and vocal music education and learning. These new tools and software can help beginners learn the principles of vocalization, singing techniques and music performance. Technologies like virtual reality and augmented reality bring new possibilities for music performance and experience. Through VR glasses or AR devices, students can immerse themselves in virtual music scenes and repeatedly compare with virtual scenes to create a new way of vocal singing training [2]. In addition, AR technology can combine music and the real world, adding dynamic visual effects to the music performance; three-dimensional virtual technology brings intuitive and realistic dynamic motion pictures for acoustic principles and vocal muscles, so that learners can imitate the virtual dynamic images and intuitively understand the whole vocal process and the movement status of each vocal organ. These are the advantages that traditional vocal music teaching does not have. Therefore, the

appropriate integration of virtual reality, augmented reality technology and three-dimensional virtual technology in vocal music teaching can help teachers' teaching and students' learning image deep motion.

## **2. Traditional vocal music teaching and modern science and technology**

### **2.1 Characteristics of teaching vocal arts**

Vocal music is an art form of expressing and interpreting musical works by controlling and applying techniques to the sounds produced by the vocal organs. Vocal singing involves vocal technique, voice theory, and song performance. The first is vocal technique, which requires the singer to be able to vocalize correctly and naturally, including proper inhalation technique, which requires sufficient and stable breath to produce a rich and resonant sound. At the same time, singers need to understand the workings of the oropharynx and vocal cords; secondly voice control skills, which require accurate control of pitch, volume, timbre and intonation. This requires training and practice to develop song skills, including range expansion, voice variation, musical ornamentation skills, and mastery of legato and staccato; then singing words and pronunciation, in vocal singing, clear pronunciation and accurate singing are very important, and singers need to learn the correct way to pronounce the words so that the audience can hear the lyrics clearly enough. At the same time, different languages and music styles have different requirements for vocalization and spelling, and singers need to flexibly master different vocal techniques; for emotional communication and stage performance: vocal music is not only a demonstration of skills, but also the ability to convey emotions and express artistic connotations through the voice. Singers need to understand the emotional expression of the song and impress the audience through musical performance and vocal interpretation. Vocal singing is usually accompanied by stage performance, including posture, movement, and eye contact. Stage performance can be enough to enhance the expressiveness and infectiousness of the song, and make the audience more engaged and feel the music. It can be seen that vocal teaching is an extremely abstract teaching activity, which is only heard but not seen, and it is becoming more and more possible to supplement the teaching with the help of modern technological means.

### **2.2 Traditional Vocal Music Teaching Mode**

In traditional vocal teaching, students can conduct real-time vocal training and practice under the guidance of a teacher who can directly observe students' skills and performance and provide timely feedback and guidance. This face-to-face teaching and instruction, as well as traditional teaching methods and approaches, are the most direct way to develop students' vocal skills and musical expression. Teachers provide targeted instruction based on each student's needs and level of proficiency to help students correct mistakes and improve their singing ability. Teachers can observe the details of all aspects of a student's voice, posture, breathing and vocalization, as well as the student's individual needs and level of ability, to better meet the student's learning needs and to ensure that they receive effective instruction and support. This traditional approach to teaching is useful for individualized student development, allowing teachers to tailor individual lesson plans and instruction to the student's voice type, skill level, and learning goals.

However, in the traditional teaching model there are often time constraints and geographical limitations. Traditional vocal music teaching usually requires students and teachers to meet face-to-face at the same location, and students need to participate in course teaching activities at a specific time and place. Basically, a lesson at school lasts about 50 minutes, and the amount of lesson time they can receive in a school year is about 40 minutes. Vocal music is a skill that needs to be practiced

over a long period of time, and short-term lessons may not be sufficient to develop the student's skills and potential. Students may not be able to receive sufficient instruction and practice opportunities in a limited amount of time. Students who wish to increase their hours of study are usually required to pay an additional tuition fee, which can result in higher tuition fees and may become a problem for students of modest means. The need for students and teachers to teach in the same location limits the geographical accessibility of quality vocal education resources and limits the range of choices available to students, especially for those who live in remote areas. Yet the majority of the bountiful educational resources are concentrated in more developed areas, which can lead to limited resources and uneven access in remote areas. Students are limited by the content of face-to-face programs, the time available to teachers, or financial challenges that prevent them from receiving adequate training in vocal education.

### **2.3 Importance of modern technology in the teaching of vocal music**

The abstract nature of vocal music teaching makes this teaching activity involve a number of intangible concepts and techniques that are often difficult to teach and understand. And with the development of modern science and technology, more and more vocal music education resources are provided in online form, and more and more video teaching and distance learning are widely adopted. If modern science and technology can be deeply applied in vocal music teaching, students can get accurate guidance and feedback through online courses and video tutorials. The online learning platform provides students with a variety of three-dimensional simulation, immersive or dynamic learning resources, enabling them to arrange their learning according to their own time and place. There are also real-time video teaching and remote teaching. Through the video teaching platform, vocal teachers can remotely instruct and communicate with students, and students can show their singing and performance through scene shooting and receive real-time guidance and feedback from teachers, providing students with repeated online experience of learning, so that students can get immersive learning training.

## **3. The application of modern virtual reality technology in vocal music teaching**

### **3.1 Application of Augmented Reality (AR) Technology in Vocal Music Teaching**

Augmented reality (AR) is a technology that combines virtual information with the real world. It allows users to communicate with the virtual and real worlds simultaneously by adding computationally generated images, video, sound and other sensory information to the real environment, being able to see both virtual and real elements. Augmented modern technology allows for dynamic changes in virtual voice teaching. By creating a virtual vocal teacher to provide real-time guidance and feedback to students, it is a good solution to the time constraints of traditional vocal teaching and can meet the learning needs of students at any time.

Singing involves recognizing and understanding the organs of breathing, vocalization, and resonance, as well as learning how to use them to produce the correct sound and voice quality. These concepts and skills can be abstract to students and require demonstration and practice to understand and master. With AR technology, students can map their real-time playback to a virtual scene using devices such as equipped cameras and sensors. Teachers can provide real-time feedback and instruction in the virtual scene to help students change their technique, posture, and vocalization. Students can also use devices such as cell phones, tablets, or AR glasses to watch virtual instructors perform and perform techniques. Students can directly observe details such as the guide's larynx and breathing movements to more visually understand proper technique and vocalization. What's more, with AR technology, students can see virtual guides or teachers in their field of vision. With these

virtual guides, students can get guidance and feedback from their teachers during real-time singing. AR apps can understand students' voices and postures, and help them improve their singing, vocalization, and breathing.

### **3.2 Application of Language Analysis Techniques in Vocal Music Teaching**

The art of songs from different regions and cultural backgrounds usually use their respective local languages, for example, in vocal studies, students will be exposed to songs from different ethnic groups, including ethnic minority songs, and in Western singing, they will also be exposed to songs from different countries. Using language analysis techniques and machine learning algorithms, researchers can develop voice assessment tools for quantitative analysis of students' biting, pronunciation, etc. The system can also provide targeted responses and guidance, which can help teachers and students to more accurately evaluate and change their bite pronunciation.

### **3.3 Application of virtual reality technology (VR) in vocal music teaching**

Virtual reality (VR) is a computer-generated simulated environment in which users can immerse themselves and interact with the virtual environment. It typically uses devices such as head-mounted displays and joysticks to provide sensory experiences such as sight, sound and touch.

Virtual reality technology combined with vocal music teaching can provide students with a more immersive and interactive learning experience. Students choose a simulated theater, concert hall, or any performance venue in which to practice and perform, and can also choose stage settings for different types of venues, as well as take on different roles and work with a virtual choir or orchestra. Vocal music is a skill course, rich practical experience helps learning to obtain, virtual reality technology can precisely meet the practical needs of students, which is the cultivation of students' ability quality. Secondly, it is also helpful for the cultivation of students' innovative thinking ability. Virtual reality technology can create a unique scene of artistic expression, allowing students to explore the combination of sound and vision. They can experiment with different expressive styles, emotional expressions, and stage presentations, interact with virtual characters, and discover the possibilities of new artistic creations in virtual environments within environments. In addition, virtual technology has many potentials and applications in aesthetic education. It can provide rich and diverse visual and auditory experiences to expand students' aesthetic perception and understanding. It is mainly embodied in immersive art experience, artwork creation and practice, cross-border art integration, and multi-distance cultural experience. Virtual modern technology has a strong sense of immersion, and this sense of immersion can well broaden students' artistic sense of touch, stimulate their appreciation and creativity of diversified arts, and stimulate their desire to learn.

### **3.4 Application of Three-dimensional Virtual Technology in Vocal Music Teaching**

3D virtualization is a technology that simulates and presents virtual environments or objects in three dimensions. It creates builds visual, realistic 3D models and animations that enable users to observe and interact with them from multiple perspectives.

The whole process of singing is governed by two factors: rationality and sensibility. The so-called sensibility includes artistic performance and expression. Rationality includes the use of breathing, articulation, body movement, etc., including the more detailed and breathing and articulation related to the mouth, nose, throat and other organs, as well as the movement of various body parts. From preparation to vocalization to singing, the movement of these organs during the whole dynamic process is not separate, but a whole, so it invariably increases the difficulty of vocal learning. This process seems to be very complicated, the good thing is that each activity process is perceptible,

because the movement of each body part has a certain pattern. However, as these things are invisible and intangible, its abstract nature leads to the teacher's explanation is often mixed with perceptual understanding in the rational concepts, which also makes the students' perception not very clear. Three-dimensional virtual technology can be and singing related body organs created into visual, realistic three-dimensional models and animation, is not lost as a very good teaching tools.

#### 4. Conclusion

The application of modern science and technology in education and teaching has some practice and research results, these results give us a lot of inspiration and help. Modern technology can also play a good role in teaching vocal music. However, it is difficult for modern technology to be transformed into applications in the field of vocal music teaching. We believe that the application of these modern technologies in vocal music education has great potential and advantages, which can provide students with immersive and personalized learning experiences. In particular, 3D virtual technology, virtual reality and augmented modern technology can provide students with rich learning opportunities so that they can learn vocal music on their own time and at their own pace. Online learning can also broaden the scope of students' learning by giving them access to a wider range of music education resources and knowledge. These technologies are helpful in developing students' skill literacy, thinking ability, and aesthetic perception. Overall, modern technology has a broad application prospect in the field of vocal music education, but it requires the unremitting efforts of technologists and vocal music educators from generation to generation.

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