



# Research on the Application of Virtual Reality in Higher Vocational Education

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**Abstract.** Virtual reality technology enables learners to master the learning content in a specific virtual environment, and solve the problems of lacking context, interactivity, personalization, and immersion in traditional classrooms. Based on the analysis of the characteristics of virtual reality, this paper proposes that the application of virtual reality in higher vocational education can promote students' autonomous learning and provide corresponding virtual skills training. At last, it puts forward the idea of developing a new virtual reality technology teaching mode and teaching platform design.

**Keywords:** Virtual reality technology · Higher vocational education · Teaching model

## 1 Introduction

The wide application of the new generation of information technology represented by big data, virtual reality, and artificial intelligence technology in education has led to changes in educational philosophy, teaching methods, learning methods and other aspects. Among them, virtual reality technology has brought new opportunities for the development of education. It is a kind of high-performance comprehensive computing technology with a powerful three-dimensional display that occurred at the end of the 20th century, giving users a sense of immersion. Virtual reality technology enables learners to master the learning content in a specific virtual environment, and solve the problems of lacking context, interactivity, personalization, and immersion in traditional classrooms [1]. Vocational education is a kind of employability education oriented to professional posts. It pays attention to skill training, and emphasize practicality. In the process of vocational education teaching, the practical teaching effect is not ideal due to the factors such as training site, equipment and facilities, pollution, safety, and non-reappearance. Therefore, the characteristics of virtual reality technology, such as multi perception, existence, interaction, and autonomy, can perfectly meet the demands of simulation teaching resources in higher vocational education, and determine the necessity of its application in vocational and technical education.

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## 2 Characteristics and Development of Virtual Reality Technology

Virtual reality is the combination of virtual and reality. Theoretically speaking, virtual reality technology (VR) is a kind of computer simulation system that can create and experience the virtual world. It uses the computer to generate a simulation environment, so that users can immerse themselves in that situation. Combined with a variety of output devices, virtual reality technology uses real-life data and computer technology to generate electronic signals, so that it can be transformed into a phenomenon that people can feel. These phenomena, developed through the three-dimensional model, can be tangible objects in reality or materials that cannot be seen with our naked eye. These phenomena are not what we can see directly but simulated by computer technology, so they are called virtual reality [2].

Users can interact in virtual reality to promote mutual influence. The characteristics of virtual reality are immersive and interactive. At the same time, it will have a more intuitive visual experience [3]. When users use interactive devices and exist in the virtual environment, they will be integrated with the virtual environment to produce a feeling of their spiritual environment. Interactivity mainly refers to the specific operable technology of users to the objects in the simulated environment and the degree of feedback they can get from the environment. Students can interact with the computer keyboard or mouse, and interact with the three-dimensional environment through some corresponding specific helmet, data glove, and other sensing devices, so as to help users obtain not only realistic vision and hearing but also touch and motion when they are in the virtual environment. To make the virtual environment more intuitive and realistic, many concepts have changed in the teaching practice of virtual reality technology.

Starting from the learners, taking the participants in the virtual environment as the unit breaks the restrictions of age, background, class (Group) division, and other factors. From the perspective of teachers, they no longer appear as preachers of knowledge, but more as guides or proponents of projects or tasks. They become collaborators or partners of learners in the cognitive process, helping learners better understand and internalize the knowledge learning process. As for the teaching environment, things in the virtual classroom are visualized according to the practical conditions, and will change according to the development of projects or tasks. In terms of the teaching resources, they have dynamic development in the virtual environment. The teaching resources will dynamically change according to the learning objectives that learners should achieve, so that learners can obtain resources more conveniently and the utilization rate of resources is higher.

## 3 Characteristics and Development of Virtual Reality Technology

### 3.1 Promoting Students' Autonomous Learning

In the traditional higher vocational education in China, due to the great differences in students' learning levels, it is difficult for students with insufficient foundation and ability to have a comprehensive and deep understanding of the knowledge imparted by teachers. However, students with higher basic levels will be able to understand quickly, and hope to further improve the teaching progress. The long-term existence of this

problem has a certain impact on students' learning enthusiasm [4]. With the help of virtual reality technology, the learning mode is gradually developing towards a vivid and effective direction, and the number of teaching resources and platforms will increase progressively, which brings convenience for the combination and production of teacher's teaching resources. Students can start from their own actual situation, choose different facilities, combine with the virtual teaching resources distributed by teachers, carry out targeted autonomous learning. In this way, it can meet the actual needs of different levels of students, so as to stimulate students' autonomous learning ability and awareness.

### **3.2 Promoting Students' Autonomous Learning**

In the traditional teaching mode, due to the limitation of time, space, funds and other factors, the teaching situation is usually fixed and single, which cannot provide learners with a rich and effective learning situation. The application of virtual reality technology in vocational education teaching can present a variety of teaching methods. Stimulating learners' senses with virtual reality teaching can help them obtain knowledge. Virtual reality teaching creates a virtual situation for learners to observe and experience through each learner's physical and mental immersion. The virtual simulation practice gives learners a sense of being on the scene, constantly internalizes technical knowledge, and further summarizes and discusses from the virtual practice, so that learners can immerse themselves in the process of virtual perception of life and production practice [5]. Taking computer technology major as an example, in some theoretical courses, such as the computer basic course, the teaching method of virtual and real segmentation can be adopted. First, the theory is explained, and then the virtual reality technology is displayed so that learners can intuitively understand the composition and assembly process of components.

In the courses that need to be verified repeatedly, such as the data structure course, teachers can adopt the teaching mode of combining virtual with reality. Since algorithm thinking is abstract, it is usually difficult for learners to understand. Through virtual reality technology, the process of algorithm is shown in an easy-to-understand form [6]. In more comprehensive courses, such as the website development course, we can adopt the teaching mode of virtual reality integration, and then create the teaching environment and equipment conditions needed for teaching.

### **3.3 Provide Corresponding Virtual Skills Training**

Higher vocational education pays attention to the training of corresponding vocational skills. Through the application of virtual reality technology, a virtual training system is born. Compared with the traditional training system, this system has great advantages in stimulating students' interest in learning, improving the teaching environment, and enhancing the safety factor. In this virtual training system, students can complete some activities that cannot be done in a general setting, such as high-risk explosion tests, close observation of planets, and some large-scale instrument operation tests. In the actual teaching process, teachers can gradually guide students to apply what they have learned to practice [7]. At the same time, students can also set up their own virtual training

environment and carry out their own knowledge exploration and research with the help of virtual reality technology.

### **3.4 Provide a Platform for Communication and Dialogue**

In virtual teaching mode, cooperation and conversation can promote learners to understand and master knowledge. Virtual reality technology provides learners with two ways of cooperation and conversation, namely human-human interaction, and human-computer interaction. In the interaction between people, in order to meet the speed of responding people's instructions to virtual reality technology, the computer constantly rectifies through the feedback received so as to achieve interactive feedback in particular situations. With modern information technology as a tool, learners can communicate more smoothly in virtual reality technology. The essence of conversation in virtual reality teaching practice is the interactive sharing process of knowledge, experience and wisdom. In human-computer interaction, the presentation of human sensory function is very important. Usually, we will use people's vision, hearing, and touch to design a three-dimensional input and output device, making learners intuitively operate the computer in real-time to complete the interactive task [8].

### **3.5 Providing Virtual Reality Tasks**

Higher vocational skills training is based on the working situation, aiming at solving problems and tasks, and taking "learning by doing" as the starting point of teaching logic. In the traditional computer technology classroom, most teaching methods are cramming; learners passively accept the teacher's teaching content, making it easy to produce negative and stereotyped knowledge content. Virtual reality technology can provide simulation, verification, exploration, and other forms of tasks. For example, with real problems and tasks as the focus, learners solve problems and tasks through empirical research, and teachers guide learners through questioning and setting up situations, and provide new ways for further problem solving [9].

In short, the current application of virtual reality technology in higher vocational education focuses on presenting the practical situations that are "unable to enter, invisible, unable to move and difficult to reproduce" to learners. It will help learners develop their thinking and ability together, promote learner's active learning, and create an ideal environment for learner's autonomous learning. Compared with traditional methods, learners will realize the dream of learning in an ideal environment through the virtual situation platform; improve learning efficiency to obtain more knowledge. At the same time, virtual reality technology provides learners with an immersive multi-perception environment, and promotes learners to continuously explore, analyze, evaluate, optimize and further process knowledge.

## **4 The Application of Virtual Reality in Higher Vocational Teaching Mode Design**

### **4.1 Design Principles**

The first principle is to take the learner as the center, to promote the learner's interest in learning as the main design principle. The multi-level knowledge structure content constantly stimulates the learner's spirit of inquiry so that the whole learning process of learners can be guided, monitored and evaluated. The second principle is to find and solve problems in time through the feedback of learning achievements. The third principle is to give full play to the intermediary function of virtual reality technology, master the correct teaching strategies, combine the relevant teaching resources with learner's interests, and let learners evaluate them, make the design of virtual reality technology teaching mode more perfect, and promote the continuous leading development of education [10].

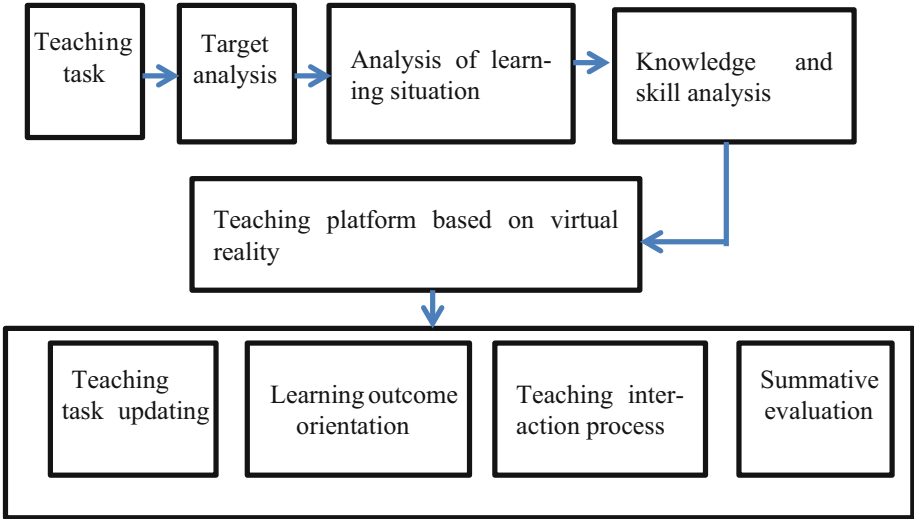
### **4.2 Design Content**

The purpose of the application of virtual reality technology in teaching is to realize the construction of learners' skills, and the "learner-centered" teaching mode by improving the teaching design. The design of the new learner-centered virtual reality technology teaching mode and teaching platform is carried out from three aspects: one is to support personalized learning. In order to enable each learner to achieve the learning goal, virtual reality technology can effectively solve the problem of learning subject simplification. According to the personality characteristics of each learner, different designs are made to create different scenes, so that learners can better study. The second is to support autonomous learning. For learners, the fun of learning is very important. Virtual reality technology provides learners with a rich learning environment. As the curriculum becomes more diversified, VR will stimulate learner's interest in learning. VR/AR technology supports autonomous learning, which allows learners to control and exercise their problem-solving ability, so as to improve learning efficiency. Third, support online teaching. Due to the more needs of learners, virtual reality technology can provide significant help for learners who cannot attend class in time. MOOC and other distance online education cannot be limited by space and time, and combine VR/AR technology with online courses to improve their technical ability and employment competitiveness (see Fig. 1).

### **4.3 Design of a New Teaching Platform Supported by Virtual Reality Technology**

According to the above teaching mode design principles and elements, combined with practical teaching experience, the design of a new teaching platform supported by virtual reality technology should include the following contents:

One is the analysis of the learner's learning situation. Learning situation refers to the relevant knowledge and intelligence that learners have mastered when learning specific knowledge. The second is the analysis of learner's personality differences. Personality difference refers to the different ways and characteristics of problem-solving in learner's learning activities, which constitutes the psychological differences of individuals in the



**Fig. 1.** Higher vocational teaching design process based on virtual reality.

virtual environment. It is characterized by motivation and interest, emotion and will, character and temperament. The third is the analysis of the learner’s cognitive style. Cognitive style refers to the way of information processing that the learners like or develop. If we can make clear the difference, we can guide and help the learners.

The new teaching platform can combine virtual reality technology, big data infrastructure, distributed computing and distributed storage methods to build a virtual reality teaching application and resource management intelligent training platform combined with big data intelligent analysis. The new teaching platform includes eight functional applications, and the subsystems include: teaching support management subsystem, training project management subsystem, teaching resource management subsystem, teaching evaluation analysis and guidance subsystem, training experience subsystem, data display subsystem, system management subsystem and innovation incubation subsystem, as shown in Fig. 2.

The research and development of a virtual reality technology teaching platform system, based on the learning theory of modeling, provides important support for student-centered personalized learning and autonomous learning. In the teaching process of higher vocational education, the new virtual reality teaching platform system can improve the traditional mode of learning, innovate teaching methods, and provide professional support for students’ education. Therefore, the active use of the teaching platform system can make students more and more interested in learning. At the same time, using the diversity of the new teaching platform, students can choose different courses to make the lessons more flexible, and repeat the learning courses according to their own needs, so as to apply personalized strategies to improve the effect of skill learning.

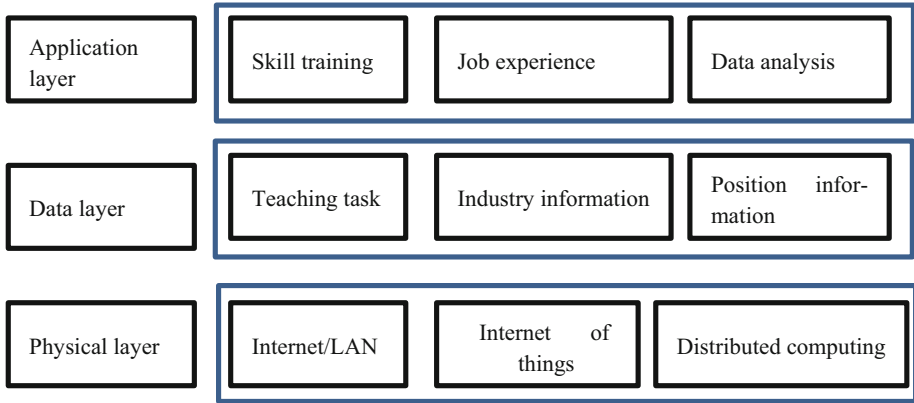


Fig. 2. Construction of teaching platform based on virtual reality.

## 5 Epilogues

At present, the reform of Higher Vocational Education in China is in full swing. In the process of reforming teaching ideas and methods, with the help of virtual reality technology, we have formed a set of virtual reality training system. By using this system, we provide a more realistic virtual reality environment for students' autonomous learning, as well as the changes of virtual skills training. In this way, we can realize the deep integration of virtual reality technology and higher vocational education by combining practical teaching, continuous improvement of teacher's quality, and reasonable development of the virtual platform.

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