The Application of "Virtual Reality + Education" in College Practical Teaching

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Abstract: "Virtual Reality + Education" provides students with virtual simulation experimental environment with its virtuality, immersion and experience, which can improve the learning effectiveness and learning enthusiasm of students. Due to the constraints of conditions, some experiments with high risk and high experimental equipment prices cannot be carried out effectively in the college practical teaching. How to break the bottleneck of practical teaching in colleges and universities, and improve the effectiveness of college teaching through "virtual reality + education" is urgent and imminent. Taking the current situation of college practical teaching as starting point, this paper discusses and researches the feasibility and effectiveness of the application of "virtual reality + education" in college practical teaching combining with the development of virtual reality technology. It is expected to provide reference for the academic research and practical application of the emerging field "virtual reality + education" in the future.

1. Introduction

Practical teaching in colleges and universities is the most important link in the cultivation of professional competence of college students. It plays an extremely important role in cultivating college students' sense of social responsibility, ownership and practical ability. As an important part of higher education, practical teaching combines the theoretical knowledge learning with the mastery of practical ability, and at the same time combines the scientific research practice in the school with the business practice outside the school. With the rapid development of science and technology, a series of emerging technologies such as artificial intelligence, big data, and virtual reality play an important role in the development of education and the progress of society [1]. In particular, the development of virtual reality (VR) technology, in recent years, in the industrial, industrial, research or education fields, virtual reality technology is a well-deserved point. The "National Medium- and Long-Term Science and Technology Development Plan (2006-2020)" promulgated by the Chinese government in 2006 has made virtual reality technology a high-tech technology with priority development in the information field. In the "Virtual Reality Industry White Paper" released by the Ministry of Industry and Information Technology in 2016, in 2015, the market scale of China's virtual reality industry was 1.54 billion yuan. In 2016, the market size reached 5.66 billion yuan. In 2020, it is expected to exceed 55 billion yuan. Thus, in China, 2016 is defined as "the first year of VR", which is a milestone for the history of virtual reality technology. Professor Zhou Ming, the executive vice president of the National Virtual Reality and Industrialization Alliance and director of the Virtual Reality Application Engineering Center of the Ministry of Education, believes that the new definition of "VR first year" [2] does not mean the emergence of VR technology, but rather The meaning of China's virtual reality technology is rapidly developing due to its widespread concern.

2. The Overview of Virtual Reality Technology

Virtual Reality Technology (VR, Virtual Reality) is a computer simulation operating system that can create, develop, and experience virtual environments. It uses a computer to design a simulation environment to provide users with all-round sensory stimuli such as touch, hearing, smell, and vision. Users can interact with virtual environments through various modes such as head-to-head

interaction, handle interaction, gesture interaction, somatosensory interaction, and language interaction. Real-time interaction of virtual objects, characters and scenes brings a new immersive interactive experience [3].

With the support of computer systems, virtual reality technology can construct a realistic virtual world through three-dimensional design. The virtual environment designed by it is completely separated from the real environment, allowing users to freely roam the wings of imagination in the virtual world. Give users a better immersive roaming experience. Virtual reality technology mainly includes the following three types. 1. Desktop virtual reality system (Desktop VR), using a computer screen to present a three-dimensional virtual environment to the user, through human-computer interaction through mouse, keyboard, handle, somatosensory interaction, etc., using natural interaction, three-dimensional graphics and other emerging technologies, The interactive space of the three-dimensional virtual scene is generated, and the PC system is used as an effective way to monitor the virtual simulation environment, and human-computer interaction with the illusory world is realized through various I/O devices [4]. The desktop VR system has the following characteristics: low configuration requirements and low cost, so the application is extensive; the immersion is insufficient, and it is highly susceptible to interference from the external environment. The user may be immersed in the roaming process due to interference from the real environment. Experience; low application threshold, easy to promote and apply, has been widely used in indoor design, games, education and other fields. 2. Full immersive virtual reality system (Full-immersive VR), system users need to wear immersive output devices and face, head, body tracking equipment to ensure that the position of the body and the movement of the characters and the virtual environment highly match To make the user's sensory experience highly integrated with the virtual world, completely immersed in the virtual world. The fully immersive virtual reality platform has the following characteristics: high immersion, immersive virtual reality system uses diverse I/O devices to create a complete illusory world, and allows users to be highly immersed, completely separating users from the real environment, not Affected by the external environment; highly real-time, in the illusory world, let users feel the experience of approaching the real space, such as when the person moves, the spatial positioning system needs to be detected in time, and through the computer operation, realize the real-time of the virtual environment. Changes and this tracking change must be real-time, with no delay [5]. 3. Distributed Virtual Reality System (Distributed VR), which distributes distributed VR systems through cloud networks, adopts a unified database, protocol, standard and framework structure, and participants can interact and work together [6].

Perfect virtual reality technology should have all human perceptions, such as smell, vision, balance, taste, motion perception, hearing, touch, force (force feedback), but the current VR technology has only the perception function. Features such as touch, vision, force (force feedback) and motion perception have a certain distance from the perfect virtual reality environment.

Virtual reality technology enables users to have real-time feedback on object manipulation in the virtual environment and feedback from the environment, and can sense characters or objects in the virtual environment in real time. In a three-dimensional virtual environment, when a user grasps an object in a virtual simulation environment, the user should be able to perceive the weight, texture, and other characteristics of the object. At the same time, the object to be grasped can move in real time as the character moves, with feedback from the real environment. The information is the same.

Virtual reality technology allows users to feel that they are actually present in the simulation environment as the protagonist of the virtual environment. The ideal virtual environment should allow users to be immersed in the virtual simulation environment created by the computer. At the same time, everything perceived in the environment has a strong sense of reality, as in the real world. Feel the same [7].

3. The Application Environment of "Virtual Reality + Education" In College Practice Teaching

In the Ministry of Education of China, "Several Opinions on Further Strengthening the Practice

of Educating People in Colleges and Universities" (Teaching Sizheng [2012] No. 1) and "Several Opinions of the Ministry of Education on Improving the Quality of Higher Education in an All-round Way" (Teaching [2012] No. 4) Putting forward practical teaching in several documents is a core component throughout the process of talent training in colleges and universities. It is an important part of improving the quality of professional talents training. It is an important means to improve the innovation ability and practical ability of college students. It is to cultivate professional quality and implement professional professions. Strengthening the practice of teaching is an urgent requirement of the state for the cultivation of talents and an inherent requirement for the development of higher education [1]. Throughout the practice process, students gain professional knowledge from practical operations and use professional knowledge to further guide practice innovation and ultimately achieve the process of unifying the knowledge learning and practical skills. With the continuous deepening of practical teaching in colleges and universities, students' self-practice awareness has been continuously enhanced, and the requirements of their own creativity and independent experiment are constantly presented. The practical teaching of colleges and universities is gradually transformed into a student-designed experimental program, self-set experimental variables, and self-control. Under the guidance of teachers, students use instruments and equipment to reconstruct the original level of professional knowledge, further understand and demonstrate professional theoretical knowledge through practical teaching, and innovate in practice [1].

Virtual reality technology provides a strong technical support for practical teaching in colleges and universities. In the process of practical teaching in colleges and universities, due to the high risk and high price of experimental equipment, practical teaching can not be carried out effectively. It can only be based on teacher theory teaching, which greatly reduces the effectiveness and quality of practical teaching in colleges and universities. . In the practice teaching process of colleges and universities, the virtual reality technology is fully utilized to construct a virtual simulation experiment training environment for students, so that students can experience and practice the teaching content, which will greatly stimulate students' interest in learning and enhance the effect of practical teaching. At the same time, students can fully experience the dangerous training environment in real life, so that students can master professional skills in practice. Therefore, the application field of virtual reality technology in college practice teaching is extremely extensive, and "virtual reality + education" is gradually becoming the mainstream of future education.

4. The Application Characteristics of "Virtual Reality + Education" in College Practice Teaching

"Virtual reality + education" can improve the safety of experimental teaching in colleges and universities. Practice teaching in colleges and universities often requires a full-fledged environment, which is largely dangerous. Such as the "Fire Escape and Rescue" of general education, the "maintenance of electrician application technology" of electrical majors, and the "human anatomy" of medical professions have certain risks, such as improper operation, it is easy to cause safety accidents. Through the effective application of virtual reality technology, it can not only meet the needs of professional teaching, but also enable students to effectively improve their professional skills in the virtual simulation environment.

For example, in the "Fire Escape and Rescue" course of general education, students often cannot fully understand and learn the dangers of fire and escape skills in traditional fire drills due to factors such as venue, funding, and safety hazards. Different from traditional education methods, VR fire drills can simulate high-risk special scenes. Under the protection of personnel safety, students can be completely immersed in fire simulation exercises, and can repeat training at any time, greatly improving the training effect. VR simulation teaching can be placed in the real environment, through the visual guidance, voice guidance, correction counseling and other techniques to correct students' false consciousness and wrong behavior in the virtual environment. Participants wear VR glasses in the virtual scene, through the VR helmet can see the environment in the simulation scene, use the function keys on the handle to understand and learn the function and use of the fire

extinguisher, so as to more effectively enable students to have high pressure Early warning of fire in the environment, improve on-the-spot resilience, and timely rescue from danger.

"Virtual Reality + Education" will solve the problem of insufficient investment in practical teaching in colleges and universities. At this stage, the vast majority of colleges and universities are composed of government investment, research and development, tuition income, etc., subject to the limitations of funding sources, some professional experimental equipment is expensive, hundreds of thousands of equipment investment, often only for two Door course service, low equipment utilization rate, high consumable loss rate, and low cost performance. Using virtual reality technology, it can simulate the full real training environment for students, reduce the number of professional equipment purchases, reduce the consumption of consumables, save the teaching cost of colleges and universities, and improve the quality of teaching. For example, in the "Sensor and Internet of Things" course of electronic information engineering technology, the course training requires complete high-end sensors, the price is high, the training process is cumbersome, and students are difficult to master. After combining virtual reality technology, students can operate sensors in the virtual simulation environment build an IoT communication system, and immersive operation experience, so that students can truly master the professional technology through experiential teaching. Digital Media Application Technology's "Digital Modeling Foundation" course, combined with virtual reality technology, allows students to digitally create and design in a three-dimensional space, unfolding the wings of imagination, and exerting artistic creativity and drawing three-dimensional color pictures. The "Crop Cultivation Technology" course of seed production and management, because of the long growth cycle of crops, it is difficult to observe the cultivation and planting effects in practice teaching. Combined with virtual reality technology, students can master the sowing and cultivation of different crops in the virtual simulation environment. The whole process of watering, fertilization, pest control, and picking has greatly improved the practical teaching effect.

"Virtual Reality + Education" will enhance students' interest and enthusiasm for learning. In the traditional experimental teaching process, it is difficult for teachers to fully cover all members and provide adequate guidance for each student. Through virtual reality technology, students can interact with "virtual teachers" to present their physical postures and movements in a live manner, greatly improving the quality of teaching in practical teaching. At the same time, it is also possible to communicate, discuss, and collaborate with "virtual classmates" to realize collaborative experiments, and to carry out experiments that are boring, boring, and difficult to complete by virtual collaboration, making the experiment interesting, efficient, and easy [8]. For example, the "Water Conservancy Construction Management" course of the water conservancy engineering profession, because the water conservancy project is a large-scale project at the government level, as a beginner, it is almost impossible to access the specific water conservancy project construction, pure theoretical teaching, paper discussion, and the learning effect is not satisfactory. After combining virtual reality technology, students can be immersed in the virtual simulation environment, understand and operate the water conservancy related equipment according to the process. The operation will be full of accomplishment and students' interest in learning is very strong.

5. Application Strategy of "Virtual Reality + Education" in College Practical Teaching

Mayer (R.E.) believes that knowledge includes the following three types: one is declarative knowledge, the other is procedural knowledge, and the third is strategic knowledge. Among them, procedural knowledge can achieve ideal learning results through the "virtual reality + education" learning model [9]. Through the leadership of teachers in the learning process of virtual environment, students are allowed to combine practical operation with theoretical knowledge, and implement professional practice teaching to achieve effective transmission of effective knowledge. The teacher should set up the experimental process for the students, build an open experimental framework, lead the students to follow the experimental steps in an orderly manner, gradually correct the wrong experimental operations through the procedural experimental process, and

consolidate the correct experiments through the prompts and guidance of the virtual simulation environment. Ideas, through the open experimental environment to enhance students' sense of innovation, organically combine theoretical knowledge with practical operations.

The virtual experiment based on virtual reality technology can visualize the Abstract teaching content. Students can operate experimental equipment from multiple angles, multiple directions and multiple levels, thus stimulating students' interest in learning. However, the virtual experiment of helmet and handle operation is completely different from the real experiment. At this stage, the virtual experiment can not achieve the experimental experience (including force feedback, gravity feedback, pain feedback, etc.) that is completely consistent with the real experiment. Students are easy to relax their vigilance during the repeated operation of the same experiment, and think that the operation error is not big. Obstruction, etc., but it is dangerous to change to the real experimental environment. Therefore, teachers should adhere to the principle of "combination of virtual and real" in the teaching process. If the conditions permit, after the virtual simulation experiment training is completed, the students can follow the correct process in the real experimental environment under the guidance of the teacher, in order to implement the experimental teaching in college. For example, in the "Fire Escape and Rescue" course of general education, after students complete a series of escape drills in the virtual simulation environment, they must try the fire extinguisher in the real environment and experience the whole process of fire extinguishing, in order to truly give the results of virtual experiment learning. Consolidate and improve, and finally achieve a solid grasp of skills.

Pay attention to the effectiveness of virtual simulation experiment instead of virtual reality technology. Compared with traditional experiments, virtual simulation experiments will have certain gameplay and fun, but in the process of virtual simulation experiment construction, it is necessary to ensure that the effectiveness of professional practice teaching is the primary task, and should not be too much for the fun of experiment. Too much emphasis on the fun of virtual simulation experiments is counterproductive. In order to get rewards and experiment, it will lead teachers to fail to achieve the virtual teaching classroom. Students can't cultivate solid practical ability, which is not worth the candle. For example, in the design process of the virtual reality platform of Wenzhou Seed Seedling Science and Technology Park of "Smart Agriculture Digital Application Project", the design team pays more attention to the detailed introduction and experimental operation of each functional area of the Science Park, presenting three-dimensional and all-round seed seedlings for customers. Science and Technology Park to enhance the effectiveness of project design.

As an emerging technology, virtual reality technology is still in the initial stage of education. "Virtual reality + education" not only emphasizes the development of equipment, terminals, application systems, platforms and content provided by the virtual reality industry for the education field. Emphasize the transformation and development of the form of education. The application of virtual reality technology in college practice teaching is not only reflected in the application of new technology, but also in the transformation of teaching mode and teaching methods. This is the future development trend of "virtual reality + education". I believe that with virtual reality The development of technology and the deep integration of educational concepts in the new era, "virtual reality + education" will play a pivotal role in the future development of the global education industry.

Acknowledgements

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