Discussion on the Construction and Innovation of College Sports Training Platform Based on Computer Virtual Reality Technology

Jun Wu(✉)

Jiangxi Vocational Technical College of Industry and Trade, Nanchang 330038, China
qtmd1123@sina.com

Abstract. With the development of economy and the progress of science and technology, the leading role of virtual reality technology has been highly reflected. It has been widely promoted in the military and medical fields. It is a product of many related disciplines. It integrates many information technology branches, such as digital image processing, computer graphics, multimedia technology and sensor technology, and has great application prospects. In order to promote the level of efficient physical education to a new level and provide strong backup support for the development of sports in China, we should give full play to its technical advantages, combine it with college physical training, and establish a modern physical education service system.

Keywords: Virtual reality technology · Physical training

1 Introduction

With the rapid development of computer technology, the application of virtual technology is more and more widely. "Virtual reality" technology is based on a series of high-tech technologies, such as multi-functional sensing technology, three-dimensional computer graphics technology, interactive interface technology and high-definition display technology, etc., Including computer equipment, image acquisition equipment, position tracking, interaction and display equipment, mainly through the use of sensors to capture the real scene, and through the computer system simulation and reproduction, the characteristics of the technology include perception, imagination, interaction and immersion, using the computer environment to reproduce a lot of work, can also simulate the real world, Realize physical and functional environment and things.

Since the 21st century, computer technology has been developing rapidly, and it has gradually matured the technology of simulating the real scene, which has been applied in all walks of life. It can be predicted that it will be widely used in the field of college sports training. Participants use their ability of perceiving and recognizing external things to exchange relevant information in the computer virtual environment, It can greatly promote and inspire the thinking ability of the participants, which is conducive to the

M. A. Jan and F. Khan (Eds.): BigIoT-EDU 2021, LNICST 391, pp. 133–139, 2021.
https://doi.org/10.1007/978-3-030-87900-6_16

participants to obtain all-round information around things. Therefore, under such virtual conditions, the athletes can get good training and learning, which is not only conducive to the athletes' whole-heartedness, but also can maximize the function of the athletes' sensory system, Optimize the ideal training effect and learning effect of athletes [1].

2 Computer Virtual Reality Technology

2.1 The Concept of Virtual Reality

Virtual reality (VR) has become a new term of high-end technology of advanced human-computer interface in the computer industry. It is committed to the interactive, immersive and imaginative construction of the network. At present, it has achieved success, enabling users to have an amazing experience. It uses a variety of high-end technologies, such as artificial intelligence, computer network technology, computer graphics and multi-sensor technology. The application of computer virtual technology in physical education has been regarded as a revolutionary development of educational technology. It creates a "self-learning" environment, changes the traditional teaching and learning, promotes learning in new ways to learn knowledge and skills, and provides learners with the transformation of learning mode through the interaction of information environment. The use of computer virtual technology to create a virtual sports equipment, most of the scenes are virtual, can be at any time, according to the needs of new equipment to constantly update the training content, so that training to keep up with the development of technology. At the same time, the interaction of virtual reality is very strong, so that students can play a role in the virtual environment, and wholeheartedly into the human environment, which is very conducive to students' skill training. There is no danger in the virtual training system. Students can practice repeatedly until they learn [2].

2.2 Characteristics of Virtual Reality Technology

Virtual reality (VR), also known as psychic technology, is the use of three-dimensional graphics generation technology, multi-sensor interaction technology and high-resolution display technology to generate three-dimensional realistic virtual environment. Users can enter the virtual space by wearing special helmets, data gloves and other sensor devices, or by using keyboard, mouse and other input devices, and become a member of the virtual environment for real-time communication Interact with each other, perceive and operate all kinds of objects in the virtual world, so as to obtain immersive feelings and experience [3].

Virtual reality technology has the following five main characteristics.

(1)Immersion makes the virtual environment created by it make students feel "immersive", and make them believe that people really exist in the virtual environment, and it can play a role from beginning to end in the process of operation, just like the real objective world.
(2)Interactivity is that in the virtual environment, students interact with the tasks and things in the virtual environment just like in the real environment, in which students are the subject of interaction, virtual objects are the object of interaction, and the interaction between subjects and objects is all-round.

(3)Conceivability is a kind of virtual reality. It is a creative activity that can inspire people. It not only enables students immersed in this environment to obtain new instructions and improve their perceptual and rational knowledge, but also enables students to have new ideas.
(4)Action refers to that students can operate the virtual system with the actual actions of the objective world or in the way of human reality, so that students feel that they are facing a real environment.

2.3 Construction of Virtual Reality System

Virtual reality technology is a system composed of a series of hardware systems and software systems, as shown in Fig. 1.

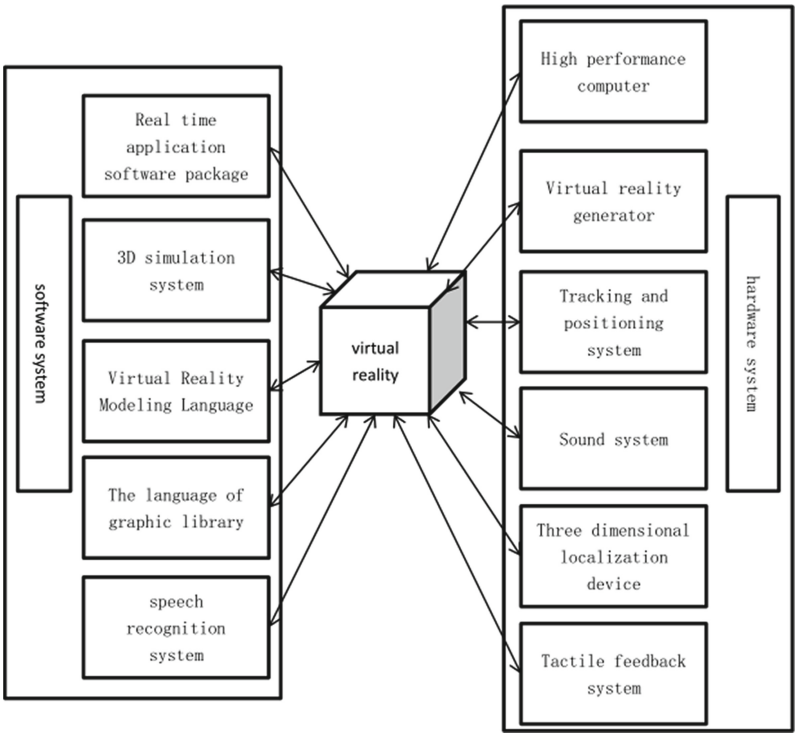

Fig. 1. Virtual reality technology system

The main components of the software system are: software package for building real-time 3D graphics application system; high fidelity 3D modeling and simulation system, which is a modeling software integrating 3D modeling, landscape and instrument graphics display; a language virtual reality modeling language (VRML) which can be used for online virtual world description; A language that can build a graphics library, and a speech recognition system supporting sound.

The hardware support needed for virtual reality mainly includes: high-performance computer, considering realistic generator, head, eye, hand, position tracking and positioning system, sound system, 3D space localization device, tactile and dynamic feedback device, etc. virtual reality generator is essentially a high-performance computer system which includes virtual world database to generate images. The database includes the description of the image of the object in virtual reality and the description of the object motion, behavior and collision. The sound system includes a sound synthesizer, a 3D voice localizer and a speech recognizer. The system can collect natural or platform sound signals, and use special processing technology to "stereoscopic" the sound signal in space; To combine other feelings, head, eyes, hands and body tracking positioning systems of the subject: in order to interact with virtual reality, we must perceive the human vision (i.e. tracking the position and direction of the head) and track and observe the position of each limb, so as to make people feel immersed. Tactile and dynamic system: virtual reality system must provide tactile stimulation of the object, such as the surface texture of the object, and also feel the movement resistance, but it is difficult to realize. Helmet display: provides a means to observe virtual reality, which must support two display sources and a set of optical devices, which can send images to the front of participants at predetermined distance, and enlarge the graphics to widen the viewing field [4].

3 The Role of Virtual Reality Technology in College Sports Training Platform

3.1 Building a Digital Human Body Model of Simulation Motion

In the process of studying virtual reality technology, virtual digital human plays an important supporting role. In the virtual reality system, virtual human model uses three kinds of node methods, which are human joints, gravity center and bone segment, The virtual human body is constructed into three structural layers, namely muscle, skin and skeleton. On this basis, the virtual digital human is studied and constructed. The human skeleton layer can be divided into three parts, namely joint part, human center of gravity and skeleton part. In general, the virtual human model is composed of surface model and skeleton model. In the virtual digital human model, no matter which part is around its joints, it can realize all kinds of movements according to certain degrees of freedom, By standardizing and determining the posture of the model, the fidelity and visualization of the model can be greatly improved, which is closer to the real human body.

3.2 Comparative Analysis of Virtual and Real Technical Movements

In the field of simulation, computer analysis and Simulation of human movement have always attracted much attention. In the process of analysis and research of sports technology, simulation technology plays a very important role. No matter what the project is, virtual simulation athletes can accurately imitate their standard movements, which is conducive to athletes' understanding of the details of ideal movements from different directions and angles, It is beneficial to improve the athletes' own skills, And the motion

data is displayed in the form of three-dimensional human body animation, which is called "virtual" action. We record the video of athletes' real action as "real" action. 4. Through the special processing of virtual and real technology, we can maintain the consistency of viewing angle and viewpoint of simulation action and video motion display, and display them on the same screen at the same time, It can display the observation effect more accurately and intuitively.

3.3 Get 3D Information of Athletes

In the process of research and analysis of human 3D motion, the key and foundation is 3D information, including 3D coordinates and posture displayed by human body through bone joints from different angles in the whole process of human motion, as shown in Fig. 2, The human motion tracking method based on video is non-contact, which was first proposed by Wang Zhaoqi, a researcher of the National Academy of Sciences. Aiming at the disadvantages and technical problems of pasting special identification points, a better solution was put forward. This kind of motion tracking method is to arrange multiple sets of video capture equipment in the athletes' competition site or training place, The whole process of athletes' movement is captured from all directions and angles, and then all captured motion videos are processed by professional software, and all kinds of parameter data are provided to the follow-up three-dimensional human motion simulation research.

Fig. 2. Schematic diagram of angle and posture during human arm movement

4 Analysis of the Application of Virtual Reality Technology in the Field of Sports

The use of computer virtual technology in physical education will undoubtedly bring stormy changes to the classroom. It will make the physical education classroom from a single Professor into a comprehensive training of sports, and the physical education teaching work will also change from the oral transmission of training experience between teachers and students to high-tech training, so the monotonous trend of competitive sports will also change. Virtual reality technology in all walks of life have been varying degrees of development. The application in physical education training mainly includes the following aspects, as shown in Fig. 3:

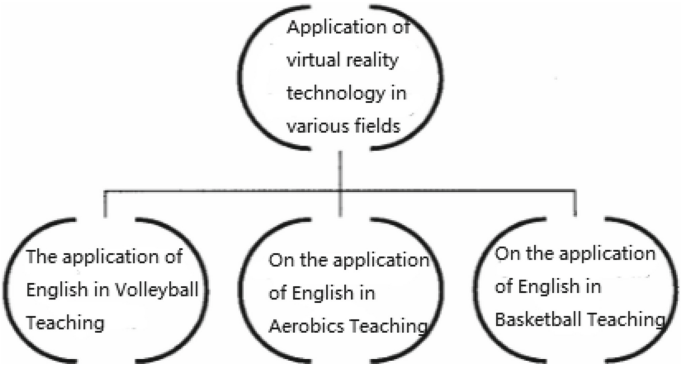

Fig. 3. Application of virtual reality technology in sports training

4.1 Application in Volleyball Training

The traditional volleyball teaching process is mainly through the teacher's explanation and demonstration, students' mastery of technology is affected by many factors. Teachers can observe students' mastery of technology by naked eyes, which greatly affects the teaching effect. The virtual reality technology can provide a new environment for the whole teaching process. For example, when explaining the front hand service technology, students can use the virtual reality technology to observe the virtual situation of the technical action, while communicating with the virtual human body body body language, feel the strength, order and range of the force of each part of the body, and produce movement synesthesia.

4.2 Application in Aerobics Teaching

Aerobics is a sport which combines gymnastics, dance and music to pursue the health and beauty of human body. It is highly artistic. In the teaching of aerobics, students not only get the training of coordination and flexibility, but also develop their thinking ability. In the traditional teaching, some contents are difficult for teachers to describe and students to understand and must master. The application of virtual reality multimedia technology can transform the basic actions into video information, with notes. According to the needs of teaching, the actions given can be played and explained repeatedly. With the correct demonstration of teachers, students will immediately form clear and complete technical actions in their brains. They can intuitively understand the essentials of actions and master actions faster, Practice will be more energetic and active. And can discover the mistake in time, discuss the cause of the wrong action, suit the medicine to the case, correct.

4.3 Application to Basketball Training

In basketball training, the traditional way of training is the coach to demonstrate and explain, but at present, virtual reality technology is gradually introduced in classroom

training and courseware making. It can not only teach knowledge, but also teach skills and actions. First, the simulation library is constructed, and the virtual scene is displayed to the athletes through the instrument. The computer can monitor the whole training process, Therefore, players can adjust the training progress and difficulty according to the individual and human conditions. In basketball training, through the use of virtual computer technology, each action of players can be captured. According to the technical understanding of players, coaches can inform players of technical action errors by way of examples, At the same time, the virtual technology can also demonstrate the tactical cooperation. By showing the classic cooperation tactics, the outstanding technology in the cooperation action can be marked in the video, which is helpful for the athletes to observe the details of each movement. Teaching students in accordance with their aptitude can truly reflect the differentiated training and personalized training.

5 Conclusion

In the process of sports development, sports training is one of the important ways. From the perspective of athletes, it can effectively improve the technical movements and better grasp the technical and tactical cooperation. Through the application of virtual reality technology, the training platform can transform the action explanation into video information, and can also carry out playback and detail explanation, which can not only teach knowledge, but also teach action and skills at the same time. Therefore, the use of computer virtual reality technology can not only help athletes master the details of sports, but also effectively improve the efficiency of sports training.

References

1. Jianhui, W., Dengyue, L.: Discussion on using “virtual reality” technology to assist college physical education. Years (next ten days) **2**, 36–38 (2012)
2. Zhongxiao, W., Zhongxiang, W.: Research on the application of virtual reality technology in continuing education. Contin. Educ. Res. **11**, 69–70 (2010)
3. Tao, Z.: Discussion on the application of computer virtual technology in modern sports training. Electron. Test **11**, 264–265 (2013)
4. Wei, H.: Research on the application of virtual reality technology in difficult and beautiful skill event group. J. Jilin Inst. Phys. Educ. **3**, 95–97 (2010)