Scientific Application and Research of Computer Technology in Sports Training

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Abstract. With the development of economy, the role of computer technology in the field of education has gradually become prominent, especially the application of computer technology represented by multimedia technology has greatly promoted the quality of teaching. Computer virtual reality technology also provides a new teaching method for college physical education and promotes the improvement of college physical education. Based on computer vision technology, this paper constructs a systematic and complete virtual reality technology framework for modern physical education teaching, analyses in detail the realization of each key step in the framework, and provides technical guidance for the practical application of virtual reality technology in physical education.

Keywords: Computer technology, virtual reality, sports training, scientific application.

1. Introduction
Physical education mode is the link between physical education theory and practice, and has been widely concerned because of its important role. With the rapid development of science and technology in recent years and its application in physical education, it has influenced the development of traditional physical education models in a more scientific and practical direction. The simple formulaic teaching model can no longer meet the teaching requirements. In order to adapt to the changes of the times, colleges and universities must make changes in teaching concepts and teaching methods. Through the introduction of scientific and technological means such as virtual reality, the reform of education methods is promoted, the traditional teaching concepts and teaching methods are changed, and the development of the physical education teaching model to a new teaching model with stronger visibility and interaction [1]. Virtual reality technology can quickly solve problems in teaching, which is of great significance for increasing students’ interest in learning and improving teaching quality.

Virtual reality technology needs to use interactive equipment to complete the simulation of real-world behaviour. The user establishes a real-time interactive relationship with the virtual environment in a very natural situation, exchanges identities with the virtual object, and produces a sensory experience as if in the real environment. Applying virtual reality technology to physical education can achieve good training effects in a short time. In this way, students can improve their training consciousness, and can get the most intuitive and real feeling of sports training in a virtual environment. At the same time, this technology has played an important role in promoting the reform of physical education and leading the development of physical education models.
2. Virtual reality technology (VR) concept and technical characteristics

In the computer advanced human-machine interface industry, virtual reality technology (VR) is a representative of the frontiers of technology, involving sensing and measuring technology, Internet technology, and graphics recognition and processing technology, artificial intelligence and other fields. With immersion, interactivity, the conceptual development concept enables participants to get the same experience as the real scene. The detailed structure of the virtual reality system is shown in Figure 1.

![Figure 1. The basic structure of a virtual reality system](image)

There are four most basic characteristics of virtual reality: multi-sensory, immersive, interactive, and conceptual. Limited by the constraints of hardware conditions (such as electronic sensors), at present, virtual reality technology has several perception functions such as hearing, force, vision, touch, and motion, and can more comprehensively and comprehensively perceive the real environment [2]. According to different needs, users can communicate and contact with the simulated virtual environment naturally and truly through professional technical equipment, and even change various things in the virtual environment. Virtual reality technology can simulate things that can be achieved in real life or impossible to occur in objective imagination, opening up human imagination infinitely. Through the interaction with the virtual scene, the participants can actually exist in the computer virtual world with the feeling of the protagonist, and obtain an immersive sense of reality.

The combination of computer virtual reality technology and college sports training is a creative attempt and an important part of the reform of educational technology. The application of virtual technology has changed the past teaching mode and provided a broader scope for exploring new teaching methods and training knowledge and skills. Imagination space of the world, creating a "self-learning" environment that can be used anytime, anywhere, with the help of information technology to enable learners to obtain learning mode switching experience. Virtual technology can create the latest and costly sports equipment at a minimum cost. Different virtual scenes, the advantage of virtual technology is to update training content in the shortest time at the lowest cost and keep up with the forefront of technological trends. In addition, virtual reality technology achieves good human-computer interaction, and students participating in virtual sports training can fully engage in the role, focus and skill training. Virtual training technology provides a low-risk or even zero-risk solution for college sports training. Its biggest advantage is that it can carry out multiple repetitive exercises.

3. Analysis of various applications of virtual reality technology in sports

The use of computer virtual technology in physical education will undoubtedly bring stormy changes to the classroom. It will transform the physical education classroom from a single professor to the comprehensive training of sports projects. The teaching of physical education will also move from the word-of-mouth training experience between teachers and students to high-tech training. The
monotonous trend of competitive sports will also change. Virtual reality technology has been developed to varying degrees in all walks of life.

3.1. **Application in aerobics teaching**

Aerobics is a sport that combines gymnastics, dance, and music to pursue human health and beauty. It is highly artistic. In the teaching of aerobics, not only allows students to obtain exercise coordination and flexibility training, but also allows students to cultivate and develop their thinking ability. In traditional teaching, some content is difficult for teachers to describe in words and difficult for students to understand and must master [3]. The application of virtual reality multimedia technology can transform basic actions into video information, with annotations, repeating and explaining the actions taught according to the needs of teaching, plus the correct demonstration by the teacher, the students’ brains will be formed immediately with clear and complete technical movements, you can intuitively understand the essentials, master the movements faster, and practice more vigorously and actively. And be able to find errors in time, discuss the reasons for the wrong actions, prescribe the right medicine, and correct them.

3.2. **Application in volleyball teaching**

The traditional volleyball teaching process is mainly carried out through teacher's explanation and demonstration, and students' mastery of technology is affected by many factors. Teachers observe the students’ skills with the naked eye, which greatly affects the teaching effect. And virtual reality technology can provide a new environment for the entire teaching process. For example, when explaining the technical movements of frontal overhand serve, students can use virtual reality technology to observe the technical movements in virtual situations and communicate with the virtual human body. Feel the strength, sequence and range of the movement of each part of the body, and produce a sense of movement.

3.3. **Application in basketball teaching**

Traditional basketball teaching is mainly carried out through teacher's explanation and demonstration. With the advancement of science and technology, virtual reality technology is also used in the production of courseware and classroom teaching in basketball teaching. This can not only complete the teaching of knowledge, but also complete the teaching of movements and skills. It is mainly necessary to establish a simulation library and output it through an appropriate instrument, so that students can complete the training of the whole process through the virtual scene simulated by the computer [4]. Because the entire training process is monitored by computer, students can adjust their speed and progress according to their own situation. Teach students in accordance with their aptitude to truly realize personalized teaching and differentiated training.

3.4. **Application in diving training**

Diving is one of the dominant sports in my country, and it is also a sport that many swimming enthusiasts like to play. The use of computer virtual technology can display the details of each aerial movement of the athlete in the diving process, and use the three-dimensional coordinates to mark, thereby establishing a three-dimensional movement data processing system for diving. Use sensors to capture athletes’ movements during diving and compare them with standard three-dimensional motion coordinates, analyse the athlete’s mastery of technology in detail, and let them understand their own shortcomings, and make corrections through continuous repeated training.

4. **Design of sports simulation system based on virtual reality**

4.1. **System structure**

For athletes, based on VR sports simulation system can significantly improve the quality of training, thereby enhancing the overall strength of the athletes. Based on the motion simulation system, after
the introduction of VR technology, the training effect produced by the full integration of the two is excellent, and at the same time it can be refined into 3 subsystems, as shown in Figure 2 below:

![Figure 2. System structure diagram](image)

4.2. System function introduction

4.2.1 VR perception interaction model. In the competitive sports simulation system discussed in this article, targeted scene simulations can be carried out around various competitions under its action, and various sports data standards are covered at the same time, which is used as a benchmark to evaluate the actual actions of athletes. Clarify whether it meets the relevant standards. On the basis of the competitive sports simulation system, real-time communication of various data can be realized after the introduction of VR technology, and the detected data is transmitted to the corresponding equipment for analysis and then presented to the athletes [5]. Overall, the simulation needs to be authentic the characteristics of reliability and the interactive results of system functions can be seen in Figure 3 below:

![Figure 3. System functional interaction structure diagram](image)

4.2.2 Based on the function of VR in the competitive sports system simulation. Specifically, for the environment generator, it is a virtual technology, based on the user system, on this basis, it is adapted to high-quality computers and simulation managers and other equipment; for the output system, it is mainly composed of The effect generator and the signal converter are composed of two parts; the composition of the input system is more complicated, it involves the converter, the direction tracker and the glove input conversion equipment, which completes the action under the coordination of various equipment Detection and data input. Based on the above several parts, it can enhance the user experience and create a more realistic virtual environment.

Firstly, construct training scenes and equipment. The system is equipped with a wealth of sensors to complete data collection and sorting under the synergy of each other, and use mathematical models to establish a three-dimensional view. The VR sports simulation system can also provide a wealth of data for athletes. At this time, athletes can refer to them, analyse the advantages and disadvantages of
their own movements, summarize the non-standard movements, and then adjust the training methods to improve the substandard movements [6].

Secondly, capture sports data. Under the action of the sensor, the athlete’s movement data can be accurately captured, and then recorded, and the result obtained can be vividly presented under the processing of the computer. This method can capture all kinds of sports data of athletes in real time, analyze them with the analyzed data as a reference, and transform them into the real environment, which not only improves the authenticity of training, but also enhances its scientific.

Third, collect physiological, biochemical and psychological data. There are three levels of physical, biochemical, and psychological indicators to measure athletes’ competitive state. For different sports, the corresponding sensor types are not the same, and targeted devices can accurately collect corresponding indicators and physical and chemical data. For physiological indicators, it covers the various sports organs and metabolism of athletes.

Fourthly, repeat and show the action. The efficiency of the sports simulation system is closely related to the action reproduction function. Obviously, a good action reproduction effect cannot be achieved with traditional camera methods. Taking the sailing project as an example, the feasibility of the camera in the training process is obviously insufficient, but the introduction of the sports simulation system can change the disadvantages of the traditional method. The development of competitive sports requires continuous innovation of actions. Based on the sports simulation system, the athletes’ various actions can be reproduced in a high-precision manner. Based on the full grasp of the current actions, it can be better to innovate in an intuitive way. Feel the technical points of the action, and this is also a basic guarantee for the athlete's health training [7].

Fifthly, analysis and adjustment of technical training. Under the action of the sports simulation system, while presenting the standard simulation actions, it can also show the various movements of the athletes during training, which can all be realized on the same screen. On this basis, coaches conduct a difference analysis to more easily discover the deficiencies of athletes’ movements. The system can quantify the athletes' technical actions, and then convert them into intuitive image forms to present them more vividly, which has positive significance for improving the training effect.

Sixthly, conduct scientific selection of materials. My country has a large population and a large number of athletes with excellent athletic talents. However, due to factors such as experience selection, many athletes have been buried. This also illustrates the shortage of athletic reserve talents from the side. When virtual reality technology is introduced, it can be used in athlete selection tests. Under the impetus of diversified data, athlete models can be established in a targeted manner and used as the main selection basis. Collect the data of all personnel participating in the selection, and then compare it with the standard indicators of virtual athletes, thereby screening out plastic talents in an objective manner. This method can get rid of the disadvantages of experience selection, and can fully discover potential athletes.

5. Conclusion
The vision-based virtual reality system is simple in design and low in cost, but has a relatively high degree of informationization and requires high algorithms. It is an important direction for the development of virtual reality technology. Incorporating virtual reality technology based on computer vision into the physical education process allows participants to clearly understand the completion of their actions and give objective evaluations. In addition, it can help participants avoid certain sports dangers and break the limitations of traditional teaching venues, allowing participants to perform their favourite sports activities anytime, anywhere. This article analyses the key technologies of virtual reality technology in the application of physical education from the perspective of computer vision, which can be used as a technical support for the construction of virtual reality application systems.
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