Application of Virtual Reality Technology in Experimental Teaching of Sports Human Science in Universities

Xia-fang Li[1,*], Lei Dai[1], Xiao-mei Zhan, Rong-sheng Liu
School of Physical Education, Jiangxi Normal University, Nanchang 330022, China
865126939@qq.com
*Corresponding author: 865126939@qq.com

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ABSTRACT: By using the method of documentation and data collection, this paper first analyses the limitations of traditional experimental teaching of sports human science and the characteristics of virtual reality technology, and then focuses on the advantages and research status of virtual reality technology in experimental teaching of sports human science, which intends to provide useful guidance for researchers in experimental teaching in virtual reality technology in sports human Science in Colleges and universities. which intends to provide useful guidance for researchers in experimental teaching in virtual reality technology in sports human Science in Colleges and universities.

1. Introduction

Under the background of "Internet plus education", how to make full use of the emerging science and technology to reform the traditional teaching mode has become a hot topic in current educational research. Sports human science experiment corresponds to sports human science theory course, aiming at cultivating students' innovative thinking, improving students' experimental ability and laying a foundation for sports teaching and training[1]. However, the traditional experimental teaching mode has many shortcomings, such as limited experimental equipment, limited experimental teachers, single experimental content, and so on. Experimental learning has not greatly improved students' practical and innovative abilities[2]. The application of virtual reality technology in sports human science experiment teaching can create a multi-sensory and interesting learning atmosphere for students, stimulate students' enthusiasm for learning, improve teaching efficiency and promote the realization of teaching objectives.

2. Limitations of Traditional Sports Human Science Experiment Teaching in Colleges and Universities

2.1 The teaching manpower and material resources are limited

The resources of full-time experimental teachers are limited. At present, many colleges and universities still need teachers to teach experimental teaching in one person and several courses, which makes teachers' teaching task heavy. The experimental cost resources are limited, such as some experimental equipment is fine, the cost is high, and there are many students participating in the experiment, so the funds can not meet the needs of carrying out this kind of experiment[2]。

2.2 The participation of teaching subjects is not strong.

Under the traditional experimental teaching environment, students' participation is not high, for example, some difficult experiments, usually only one student is invited to carry out representative experiments (such as maximal oxygen uptake experiment), while other students watch. At this time, teachers can not observe the learning status of each student, but only the active students can really participate in the experiment. Moreover, because of the low credit ratio of experimental courses and the widespread thought of "attaching importance to technical subjects and neglecting theory" among students majoring in physical education, many students do not attach enough importance to the

experimental course of sports human science, and mainly deal with it. They believe that they won't failed the class as long as the experimental report is submitted at the end of the term, and attend class on time and not hang up. Therefore, under this circumstance, there is no active teaching atmosphere in the experimental class of sports human science, and students' participation in learning is not strong.

2.3 Limitations in Teaching Content

The traditional textbook of sports human science experiment has a long publishing cycle and slow content updating. Teachers and students often focus on some routine design and validation experiment items in teaching[1]. However, there are too few comprehensive and design experiments around sports. Open experiments are carried out in form [2]. In addition, there are some operational experiments which are difficult and dangerous in human body exercise experiment. In order to avoid the unexpected risk caused by incorrect operation, this kind of experiment usually does not carry out teaching. Therefore, the content of traditional experimental teaching is outdated and can not keep pace with the development of the times[2].

3. Introduction of Virtual Reality Technology

Virtual Reality (VR) refers to a system simulation environment that uses computers to generate a three-dimensional dynamic scene and entity behavior simulation[3]. Users can interact with objects in the digital environment through the media of related devices, and gain a new experience of the corresponding real environment[4]. Virtual reality is generally composed of five parts: virtual world, virtual reality software, computer, input device and output device. It can be divided into desktop virtual reality, immersed virtual reality, augmented virtual reality and distributed virtual reality[5].

4. Advantages of VR Applied in Sports Human Science Experiment Teaching

4.1 Save the cost of teaching manpower and material resources

Based on virtual reality technology, virtual simulation laboratory can be set up, so that students can repeat virtual operations many times in the experimental class. This teaching mode can not only help students to familiarize themselves with the operation steps of the experiment, but also reduce the unnecessary consumption of materials in the laboratory, without requiring a large number of relevant experimental teaching assistants. For example, the measurement and evaluation of electrocardiogram (ECG) during quiet and exercise of human body need to be operated with the aid of ECG equipment in traditional experiments. ECG machine belongs to medical fine equipment, and its cost is high. In the virtual experiment, we can easily simulate the functions of electrocardiograph and other instruments with the help of computer, so that students can carry out virtual simulation operation in the computer, obtain real experience, and be familiar with the whole process of the experiment.

4.2 Enhancing Students' Learning Enthusiasm and Initiative

In the virtual experiment, knowledge is changed from text narration and picture display to virtual environment. Students can intuitively and vividly understand and grasp the experimental purpose, principle and operation process of the corresponding experiment, so as to enhance the intuition and effectiveness of the experimental teaching. For example, cardiovascular system observation experiment, with the help of immersive virtual reality technology, wearing VR glasses to watch three-dimensional, audio cardiovascular system video, will bring rich sensory stimulation to students, can enhance their experimental experience, greatly stimulate students' interest in learning.

4.3 Expanding the Teaching Content and Reducing the Risk of Experiment

With the renewal of knowledge, what we need to do is imported the improved and supplementary courseware content into the software system to update the experimental teaching content quickly. The content that is influenced by space-time factors, abstract and difficult to observe and verify in

practice is displayed, and then enrich the content of experimental teaching. There are also some high-risk comprehensive experiments in sports human science experiments, such as maximum oxygen uptake and individual lactate threshold experiments, which usually need to reach the limit load to obtain accurate data. Therefore, this kind of experiment has high requirements for experimental subjects and high experimental risk. The security of this kind of experiment can be improved by using virtual reality technology. For example, using desktop virtual reality technology to simulate individual lactate threshold virtual experiment, using computer desktop display, input equipment to control the experimental process, and observe desktop characters to carry out experiments step by step. There is no safety risk. Teachers can score students' performance through computer system. The overall experiment can achieve good experimental results.

5. Current Situation of VR Application in Sports Human Science Experiment Teaching in China

At present, there are few studies on the application of virtual reality technology in the experimental teaching of Sports Human Science in China. There are many studies based on theoretical research, and many concepts about the application of VR technology in the experimental teaching of sports human science have been made. The advantages of VR technology have been affirmed. However, due to the lack of practical case studies, the effectiveness of the application has not yet been confirmed. Li Lei[2] (2016) put forward a preliminary conception based on virtual simulation technology to explore the reform of experimental teaching of sports human science. Firstly, the main problems existing in the current experimental teaching of sports human science were analyzed. Then, the concept and characteristics of simulation of sports system and the advantages of experimental teaching based on virtual simulation technology were introduced. Finally, the experimental teaching based on virtual simulation technology was put forward. The experiment teaching reform of sports human science based on virtual simulation technology is conceived. Yang Liyuan (2019) theoretically analyzed the application of virtual reality technology in experimental teaching of sports human science, summarized the practicability of virtual reality technology in sports human science, and focused on the application of virtual reality technology. It is believed that the development of virtual reality technology coincides with the experimental teaching process of sports human science. Virtual reality technology provides a new opportunity for experimental teaching reform.

6. Conclusions and Prospects

The traditional experiment teaching of sports human body has some shortcomings, such as limited teaching manpower and material resources, insufficient participation of teaching subjects, and limitation of teaching content, so the effect of experiment teaching is not good. The application of virtual reality technology in sports human science experiment teaching can not only save teaching manpower and material cost, but also improve students' learning enthusiasm and initiative, expand teaching content and reduce experimental risk. Therefore, the application of virtual reality technology in sports human body experiment teaching has attracted much attention, but at present the domestic research is still rare. Most of the existing research is based on theoretical research. Although the advantages of VR technology are affirmed, the effectiveness of VR technology in experimental teaching has not been affirmed due to the lack of practical case studies. It is suggested that future research should be inclined to multi-directional empirical research. The effectiveness of VR teaching mode compared with traditional experimental teaching mode is tested through experimental comparison and measurement evaluation, so as to promote the extensive application of VR technology in the experimental teaching of Sports Human Science in Colleges and universities.

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