Research on Basketball Sports Training Based on Virtual Reality Technology

Haifu Li1,*

1P.E. Department of Henan Technical Institute, Zhengzhou, Henan, China, 450042

*Corresponding author e-mail: lihaifu@havct.edu.cn

Abstract. Physical education is an important part of teaching content, and basketball is an important part of physical education. Taking the effective way carries on the basketball sports training, may improve the student's physical quality effectively. This paper first explains the concept of virtual reality technology and the necessity of simulation technology, and at the same time the application of virtual reality technology is discussed for readers' reference.

Keywords: Virtual Reality Technology, Physical Training, Physical Fitness, Mood State

1. Introduction

With the development of information technology, virtual reality technology has been widely used in various fields. Virtual reality technology is used to build the scene consistent with the actual shooting, to establish a virtual environment, which can analyze the trainers' sports data, understand the trainers' physical and mental changes, and establish a modern basketball training mode.

2. Concept of virtual reality technology and necessity of simulation technology

2.1. Concept of virtual reality technology

Virtual reality technology is a technology that uses computers to generate a simulated environment (such as aircraft cockpit, operation site, etc.), and enables users to "invest" in the environment through a variety of sensing devices, so as to realize the direct natural interaction between users and the environment [1-3]. The simulated environment here is a computer-generated solid figure with surface color, which can be a real embodiment of a particular real world or a purely imaginary world. Sensor devices include three-dimensional helmet, data gloves, data clothing and other devices worn on the user's body and sensing devices set in the real environment (not directly worn on the body). Natural interaction refers to manipulating objects in the environment in a daily manner and getting real-time three-dimensional feedback.

To put it simply, virtual reality is a computer-simulated three-dimensional environment in which a user not only sees and listens in all directions, but also feels touch, feels tenderness, and even smells. Such explorations were made in simulated scenarios as well as in the real environment. Therefore, the
human-computer "interactivity" in virtual scenes is beyond the reach of print media. It can be said that virtual reality technology opens up a new field of human communication.

In the field of education, virtual reality technology has a wide range of roles and influences. Being experienced and felt is more persuasive than empty abstract preaching. There is a qualitative difference between active interaction and passive viewing [4-6]. No wonder education experts point out that new technologies will bring us new educational thinking, solve problems that we could not solve before, and bring about a series of major changes in our education. Especially in science and technology research, virtual simulation campus, virtual teaching, virtual experiment, educational entertainment and other aspects of the application is more widespread.

2.2. Necessity of designing virtual simulation system of basketball technology
Adopting scientific training methods and means can improve the training efficiency and athletic performance of athletes. China's basketball training level is relatively backward, China's basketball training adhere to the training ideas and methods based on experience. The coach guides the athletes' technical movements with experience, while the athletes can only master the technical essentials through repetitive exercises under the guidance of the coach. This training method seriously affects the training efficiency of basketball. The three-dimensional virtual simulation system of basketball technology can assist the traditional teaching very well. Through this system, the athletes can grasp and understand the key points and details of the top players' technical movements very well, and strengthen the athletes' visual training.

3. Application of virtual reality basketball teaching
The application of virtual reality technology can not only impart knowledge, but also complete the teaching of actions and skills. As long as there is an appropriate model library, students can put on virtual reality glasses and see the process of action in person. Moreover, because this process is controlled by computer, students can watch it repeatedly, slow down and watch it from different angles or even participate in the action process. Its application field can cover most of the content of basketball teaching, such as: basketball basic technology: dribble, pass, break, shoot, combination technology, etc. Basic tactics: offensive tactics, defensive tactics, etc. Rules and referees: rules introduction, referee principles, competition organization, etc.

In teaching, students can freely control the teaching progress and can choose the key content according to their own conditions, which not only realizes teaching students in accordance with their aptitude, but also reduces the burden on teachers, which can solve the problem of insufficient teachers' ability to a great extent.

4. Research on fixed point shooting based on virtual reality technology
4.1. Research object
The application of VR virtual reality technology equipment to the fixed point shooting training of basketball project.

4.2. Research methods
4.2.1. Literature method
Through cnKI, literature materials related to VR virtual reality technology, basketball training, sports psychology and so on are consulted to provide scientific theory and method basis for this study.

4.2.2. Test,
(1) Experimental subjects. Twenty freshmen male students from the basketball special class of education College of Beijing Sport University were selected as experimental subjects. The experimental subjects were randomly divided into two groups with 10 members in each group, one
group being the control group and the other the experimental group. The experimental group received VR equipment training intervention for 4 weeks, 3 times a week, 5min each time. No intervention was conducted in the control group, and all subjects trained normally every week. Before the experiment, all the players were tested by one fixed point shooting. After the experiment, all the team members were given a shot test and a questionnaire.

(2) Experimental equipment. VR virtual reality hardware devices use HTC VIVE devices; VR Sports software is selected. VR Sports software is a VR Sports software with 7 Sports contents in the body, including basketball, football, bowling and other Sports. In the basketball training, the fixed shooting will automatically switch the shooting position during the shooting process, and you can choose different degrees of difficulty.

(3) Test indicators and methods. Shooting test: According to the shooting positions in VRSports, select 2 0°, 2 45° and 90° fixed points outside the three-point line, 5 balls at each point, and record the number of goals scored. Concentration measurement: All subjects wore eeg test equipment and recorded the data during the experiment. Training interest and enthusiasm: Short form POMS (mood state Scale) was used to fill in the questionnaire after the experiment. The simplified POMS scale is considered to be a good tool for studying emotional state and the relationship between emotion and motor performance. Among them, tension, anger, fatigue, depression and panic are indicators of negative emotions, while energy and self-esteem represent the positive side. Although these two potential changes cannot be directly measured, there is also a certain correlation. POMS is an effective tool for evaluating athletes' potential and a good way to predict athletic performance.

4.3. Result analysis

4.3.1. Field goal percentage comparison
As can be seen from Table 1, the VR group's average shooting percentage was 43.2%, while the control group's average shooting percentage was 45.2%.

| group         | Shooting percentage (%) | T value |
|---------------|-------------------------|---------|
| VR group      | 43.2                    | 2.7     |
| Contrast group| 45.2                    | 1.2     |

4.3.2. Comparison of mood state scale
The mood state scale is considered as a good tool to study the emotional state and the relationship between emotion and motor performance. Among them, tension, anger, fatigue, depression and panic are the indicators of negative emotions, while energy and self-esteem represent the positive side.

As can be seen from Table 2, the average score of the mood state scale in the VR group was 81.9, and that in the control group was 98.8. According to the scoring criteria of the mood state Scale, the lower the score was, the more positive the mood was after the training. Therefore, it can be seen that the VR group has more positive emotions and higher enthusiasm for the fixed-point basketball shooting training than the control group, and the difference between the groups is significant.

The state of mind scale is an effective tool to evaluate athletes' potential and is also a good method to predict sports performance. In this experiment, the evaluation of the state of mind scale is mainly to evaluate the psychological preparation state of the subjects and the control group before completing the experiment, so as to ensure the validity and authenticity of the experiment. As can be seen from The data in Table 2, although the performance of the experimental group is better than that of the control group, it cannot be ruled out whether the emergence of VR equipment in the new situation has a certain impact, which still needs to be proved by long-term experiments.
Table 2. Comparison of mood state scale between the experimental group and the control group.

| group          | mean value | standard deviation |
|----------------|------------|--------------------|
| VR group       | 81.9       | 13.5               |
| Contrast group | 98.8       | 19.8               |

4.3.3. Comparison of concentration

The focus of training is one of the key factors that affect athletes to complete training goals better and fostered devices detected that the athletes' brains were in a higher state of concentration during the VR intervention. As can be seen from Table 3, the average initial value of the VR group was 53.9, the average experimental value was 59.6, and the concentration increased by 5.7 units (the unit value refers to the reading between 0 and 100 obtained by the Fourier transform of the micro-voltage value read by an EEG device). The average initial value of the control group was 54.7, the average experimental value was 56.2, and the concentration only increased by 1.4 units. This shows that VR training can improve athletes' concentration. In addition, as can be seen from Figure 3, the concentration of the VR group was always higher and fluctuated less than that of the control group during the experiment. According to the paired sample T test results, there were significant differences between the two groups. To sum up, VR equipment does improve the concentration of team members in the fixed-point shooting training, so that the training effect is proportional to the concentration data.

Table 3. Comparison of eg values.

| group          | Initial value | Test value |
|----------------|---------------|------------|
| VR group       | 53.9          | 59.6       |
| Contrast group | 54.7          | 56.2       |

5. Conclusion

To sum up, through the application of virtual reality technology in basketball sports training, it is concluded that virtual reality technology is beneficial to improve the competitive level of training athletes. Therefore, virtual reality technology can be used reasonably in basketball training to improve the effect of basketball training.

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