Research on Physical Education and Training Based on the Theoretical Teaching of Computer Three-Dimensional Animation Technology

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Abstract. At present, the teaching methods of physical education in China are still based on the traditional face-to-face skills. However, with the rapid development of the computer field, computer-based three-dimensional animation technology is considered to be a better teaching method. This study discusses the advantages, current situation and specific application methods of three-dimensional animation technology in the field of physical education at the present stage. The results show that the establishment of three-dimensional animation simulation demonstration teaching is of practical significance and is worthy of great development.

Keywords: Physical Education, 3D Animation Technology, Computer Technology

1. On the development process of three-dimensional animation of sports movements

Human's understanding of "dynamic" desire and animation has experienced a long period of emergence and development of human civilization. At the beginning of the 20th century, the chalk talk show "the humorous appearance of the funny face" created by Blaxton was recognized as the first animated film in the world. Cole is the first pioneer to use screen photography to combine animation and human action, and is known as the father of animation. In the 1970s, the representative of the computer simulation modeling method of human motion, the sports biomechanics expert of South Africa, solved the optimization problem of kick action by using the leg model of 3 degrees of freedom of two rigid bodies and five muscles. This creates a new era for sports action technology animation and three-dimensional simulation[1].
In China, since the reform and opening up, domestic animation teaching institutions and social animation production institutions continue to emerge. The level of design and production of three-dimensional animation has developed rapidly, and the technical design and production of sports movements in domestic cartoons have reached a very high level. In recent years, very popular computer sports games and game console sports games dynamic design exquisite. Players can choose different sports or their favorite characters to carry out unique sports simulation, increasing sports awareness and sports skills in the game. Some researchers have developed a software platform for the special module of human body simulation and a three-dimensional human motion simulation and video analysis system for sports training, which provides a feasibility study for the production of three-dimensional animation and the application of three-dimensional simulation in physical education and training\textsuperscript{[2]}. 

2. The importance and advantages of the application of computer three-dimensional animation technology in the field of sports

2.1. The importance of 3D Animation Technology

3D animation motion image analysis technology mainly studies the computer simulation technology of digital 3D human motion, provides quantitative assistant analysis tools based on 3D human motion simulation technology, and improves the level of sports training and the content of science and technology in our country at the same time. Compared with the traditional visual training methods, the high-level technical animation produced by computer has obvious advantages in simulating difficult and new movements, demonstrating tactical processes, reproducing typical errors and so on. It has become a development trend in the future to use realistic technical and tactical animation to assist coaches in analysis and training\textsuperscript{[3]}. 

In the technical training, the three-dimensional animation motion image analysis technology can help the teacher in many aspects. The camera can record the whole process, and then use the three-dimensional animation software to make the whole motion process into a three-dimensional image. After that, the completion of each action can be observed through the image. Through many records, we will be able to compare the poor and good results in all aspects, so as to improve every detail of the movement.

The analysis technology of three-dimensional animation motion image can enlarge the local part so that any subtle technical action can be seen clearly. This technology can make a certain motion process into a three-dimensional animation, realize the switch between the whole-body action and the local action by zooming the animation, and adjust the visual angle through the rotation tool. enable students to watch the complete process and every detail action from all directions and angles.

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2.2. Advantages of 3D Animation Technology
2.2.1. Enhance students' interest in learning

3D animation technology is accepted and loved by people all over the world because of its exquisite pictures, shocking audio-visual effects and other advantages. The introduction of three-dimensional animation technology into the classroom teaching of sports laws can enhance students' interest in learning. Compared with the traditional teaching and demonstration teaching methods, three-dimensional animation technology can bring students into the virtual three-dimensional scene and feel the technical movements of the character model intuitively in the virtual three-dimensional scene. The audio-visual effect of three-dimensional animation can attract students' attention and make them interested in learning.

2.2.2. Panoramic viewing angle

In the traditional teaching of the law of sports, teachers' action demonstration and model's action demonstration are indispensable parts of the intuitive teaching method in teaching. A large number of demonstration movements can enable students to observe the unique movements of sports more directly, so as to better understand the movement characteristics of sports and master the standard movements more quickly. It is difficult for traditional teachers or models to observe from the perspective of looking up and down, which restricts the scope of teaching to some extent. In 3D software, people can use multi-view switching, 3D full view rotation and other technical operations to achieve specific observation of the model, and achieve multi-angle, multi-line-of-sight panoramic observation.

2.2.3. Visual demonstration

Many sports are very difficult to demonstrate in class. Due to the restriction of classroom demonstration, the teaching effect of this part of sports law is often not satisfactory. With the support of three-dimensional animation software technology, the difficulties of classroom demonstration of this part of sports projects have been easily solved. Teachers can create projects or scenes that cannot be moved into the classroom in 3D software and bring them into the classroom to present to the students. With the help of three-dimensional animation technology, the teaching effect of these projects which are relatively difficult to demonstrate in class will undoubtedly be greatly improved.

2.2.4. Controllability

In the intuitive demonstration teaching method in the traditional classroom teaching of the law of sports, there are many movements that cannot be controlled in real time for students to observe, no matter the demonstration of teachers or models. The disadvantages of traditional demonstration methods in a variety of complex sports are more obvious, such as long jump and many aerial movements in gymnastics. The movements of shot put and weightlifting equipment that affect the center of gravity of athletes cannot be manipulated in real time to allow students to decompose and observe in the traditional demonstration teaching method.

In 3D animation technology, these teaching difficulties will no longer exist. The teacher brings the role models and actions into the classroom and presents them to the students in the form of courseware. Teachers can use three-dimensional software technology to control the action of the role model at any time, and issue instructions such as pause, replay, replay, angle switching and so on, so that the role can complete the demonstration of technical action according to the teaching requirements. In this way, the difficulty of students' observation and learning of specific movements in the traditional demonstration method is solved.

3. Practical application of three-dimensional animation technology in physical education

3.1. Software related to 3D Animation Technology

Computer three-dimensional animation software is a three-dimensional space-time information for character design as the main software. Its feature lies in its powerful editing function for three-dimensional character modeling. Using the template of 3D animation software for follow-up
processing and design, it is more likely to make good works. No matter in the need for dynamic or static animation, it can leave a broad imagination space for designers\(^5\).

3D animation software is an effective tool for posing and activating human portraits. It is a perfect supplement to other 3D tools or human animation tools. Using 3D animation software, you can select a human portrait from a large number of pre-built models in the library and add colors and textures. It also takes the pose in the portrait of the human body as the Keyframe of the animation, and can render the human body as a still portrait or animation to create a realistic animation.

![Figure 2. The module of animation design software.](image)

### 3.2. Components of the software

#### 3.2.1. Document window
A place where the human body is observed and posed. It can move and switch lights between cameras to get different perspectives of the human body. Teachers can adjust the document window according to their best needs.

#### 3.2.2. Editing tools
Adjust the position of all parts of the body. Each tool moves the human body in a different way. Using these controls at the same time, you can create countless poses.

#### 3.2.3. Animation control
This section can quickly Keyframe the animation. The timeline not only lists all keyframes, but also uses this panel to fine-tune the animation.

#### 3.3. The application method of software in practical teaching
In order to design and produce computer animated short films for teaching and training of three-dimensional effect graphics, the research team should first study the ideas, methods and techniques in the steps of three-dimensional modeling, composition, material, lighting, late effect and so on. Then the PE and art teachers fully select and take pictures of the frame decomposition of the movement skills of elite athletes. For the movement techniques in physical education teaching and training, it is necessary to select and take pictures of the frontal axis, vertical axis and other multi-angle and multi-directional photos. Then the teachers who are proficient in the new 3D software design and produce short animated films of sports action technology teaching and training by using the basic flow of computer 3D effect drawing, and effectively simulate real characters and real scenes. This makes the content of the animated short film more perfect and has more obvious intuitive, objective and authentic effect\(^6\).

### 4. Conclusion
The three-dimensional animation technology applied in the field of physical education is a multi-disciplinary system of education, physical education and computer technology. The promotion of this technology can comprehensively improve the comprehensive quality of PE teachers, and
cultivate teachers' ability to use computer 3D animation technology, so as to promote the wide application of educational information technology.

Teachers should also be fully aware of the importance of modern information technology, absorb and master new knowledge, and be able to clarify the relationship between it and traditional teaching. This makes modern information science and technology play a good auxiliary role in physical education, so as to better enrich teaching means and improve teaching quality.

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