Research and Application of Teaching Mode Based on Htc Vive Somatosensory Interactive Classroom

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Abstract: The teaching mode, which is based on HTC VIVE sematosensory interative classroom, combines human-computer interaction technology and uses mobile terminals to collect human motion data and scene data to drive virtual roaming actions, so as to realize the use of somatosensory feature recognition to operate human sports activities and complete teaching activities. This has become the future trend. This article starts with the system design flow of HTC Vive somatosensory interactive virtual reality technology, introduces the application of interactive classroom teaching mode, and finally puts forward suggestions for the future promotion and development of this teaching mode.

1. Introduction

With the development of multimedia technology and network technology, the application of artificial intelligence, virtual reality and other technologies, as well as the promotion of the "Internet +" concept, as the core of a new generation of information technology, virtual reality technology continuously promotes the reform of education. Based on the teaching research of virtual reality technology, we can find that virtual reality learning environment plays an important role in assisting and promoting students' learning. Traditional teaching mode can only convey knowledge to students through text and pictures. The teaching content is mostly descriptive text, or the chart of supplementary explanation. The teaching content is knowledge dissemination, which is based on the one-dimensional. The teaching of virtual reality technology has added video, recording and video to teaching. Based on the resource-optimized synchronous video teaching, the way of knowledge transfer has changed from a single text and supplementary explanation to rich and varied effects, which has added an active atmosphere to the teaching classroom. Teachers can use animation to simulate reality and use sound and video to disseminate knowledge. This can provide students with supplementary teaching that is closer to life, can provide students with a personalized learning environment, implement the "individual teaching" education concept, and give students active motivation to explore and interact, thus greatly promoting students' ability to actively study.

The somatosensory interaction needs to be input into the system through the information of the human body's behavior, and eventually, the interaction is realized. The somatosensory interaction is to obtain the depth of three-dimensional spatial information through a depth sensor. One method of extracting human motion information is to continuously collect human behaviors through a dynamic sensor and an infrared sensor handle device, and finally, the interaction is realized through contact with the corresponding receiving device. The other way is based on the former. Somatosensory interaction allows users to completely get rid of the interaction of device constraints, so that the users can perform various interactive operations more freely. The core of HTC Vive teaching software is a truly interactive experience. The realization of interactive technology is directly proportional to the teaching effect.

2. Htc Vive Somatosensory Interactive Virtual Reality Technology

The HTC VIVE somatosensory interaction is a computer advanced human-computer interface

characterized by immersion and interaction. It makes comprehensive use of computer graphics, simulation technology, multimedia technology, artificial intelligence technology, computer network technology, parallel processing technology and sensor technology, has sensory functions for simulating vision, hearing, and touch. By making people indulge in computer-generated virtual scenes and interacting in real time through natural ways such as language and gestures, the HTC VIVE somatosensory interaction creates a comfortable and humanized multidimensional information space. The somatosensory interaction system uses the sensing technology of the camera to capture participants' movements and images, and locates the infrared sensors to identify human behavior. The body sensory interaction system can also sense the movement characteristics of the entire person and then process the captured participant's behavior through the computer system. Visitors can interact with the screen content through their own body movements, which not only can experience different experiences, but also control the content through their own gestures. Modern somatosensory interaction systems not only capture the participants' movements, but also have features such as speech recognition. The modern somatosensory interaction system breaks the traditional mode of simple operation and makes the experience of the participants more interactive.

3. Htc Vive Somatosensory Interactive Classroom Teaching Mode

Most of the traditional teaching methods are full of indoctrination. Modern teaching teachers should pay attention to system analysis, rather than need concept bombing. We should emphasize teaching modernization, encourage teachers to use ppt teaching, encourage teachers to use ppt instead of the original blackboard writing teaching. But, the modernization of teaching that we emphasize is still the essence of traditional teaching methods, not essential changes.

The purpose of the overall research and development ideas of the HTC VIVE somatosensory interactive classroom teaching model is to develop and construct interactive learning so as to realize the sharing of teaching resources. The HTC VIVE somatosensory interactive classroom teaching mode is more focused on the practical application of different disciplines than the traditional teaching mode. Based on the advantages of the Internet, we can analyze the implementability of the HTC VIVE somatosensory interactive classroom teaching model from the perspective of resource structure adjustment. HTC VIVE somatosensory interactive learning needs to establish correct teaching principles, make full use of the advantages of somatosensory interaction, define somatosensory interactive teaching goals, so as to increase student interest in participation and provide necessary theoretical support for the construction of somatosensory interactive learning mode.

According to the previous research, we can see that the current application of somatosensory interaction technology in education shows the advantages of setting situation and behavior assessment, which can solve the limitations of traditional teaching methods. In terms of teaching, teachers should focus on clear teaching objectives. In the observation of the status of implementation and teaching impact, teachers should adopt the means of intelligent interaction between "situation guidance+autonomous action+smart evaluation fusion" so as to continuously promote and enhance students' self-learning interest, so as to conduct self-discipline and create excellent cognitive thinking methods. In addition, according to the characteristics of students' physical and mental development, people engaged in education should adopt a method of somatosensory interactive games to reduce the impact of collaborative learning and improve the application of assessment tools for learning outcomes. At the same time, somatosensory technology should also be applied in sports and outdoor teaching to establish mutual cooperation, should be used to collect and evaluate the actual physical movements of the students, should use information and data to transform teaching methods. The procedures for establishing the somatosensory interactive classroom instruction are as follows: ①Teachers should be clear about course materials that are suitable for collaborative learning;②The teacher should compile learning software related to the sense of physical exchange; ③Teachers should further explore the specific operating procedures and data of the software they develop; ④The teacher should create practical examples

that constitute flexible audio and auxiliary materials; ⑤Teachers can take the results evaluation, case recalls, field surveys, expert review, and build a resource construction road map.

4. System Design

4.1 Workflow Design

The design of the HTC VIVE Somatosensory Interactive Classroom System consists of three parts: the establishment of a virtual environment, the capture of human information, and the interaction of virtual reality, as shown in Figure 1.

The establishment of a virtual environment includes the construction of teaching scenes, the creation of teaching equipment libraries and the setting of personas. We can adopt the environment modeling technology to obtain the 3D data of the real 3D environment, and then establish the corresponding virtual environment model according to the actual needs of the application. We can use the geometric system to deepen the design of the specific physical characteristics of the simulated object, such as the specific form, shape, color, and method of the object, and finally, we can form the application in the virtual world.

The capture of human body information is mainly the capture of the motion of the body movement and the instruction capture of the terminal operation. The role of the effect generator is to realize the hardware interface between the human and the virtual environment and the interactive device of the virtual environment, including the true feelings of people producing various output devices, such as helmet-type display devices, stereo headphones; and may also include an input device for determining the direction of the line of sight and hand movement, such as a head position detector and a data glove.

Virtual reality interaction is a technology that uses touch to generate reactions. In the virtual reality system, the user can feel personal use of the virtual object, and then perceive the influence of the virtual object on the user in turn, so that the person can feel a place in it. This is the core component of the HTC VIVE Somatosensory Interactive Classroom System. In fact, it is a computer software and hardware system, which consists of software development tools and supporting hardware. Its purpose is to obtain and transmit the signals generated or received by the effect generator.
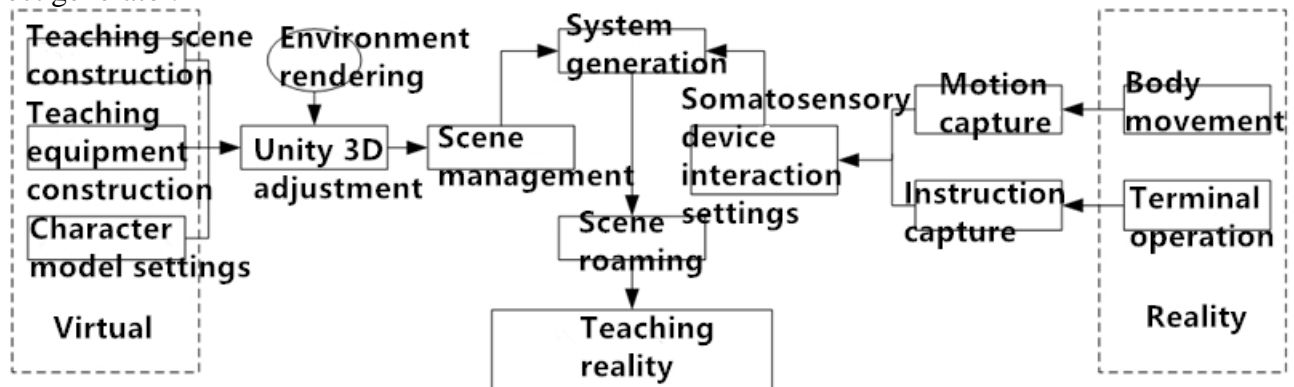

Fig.1 Htc Vive Somatosensory Interactive Classroom System Design Flow

4.2 Scene Construction

Scene construction can be achieved through VRML modeling and 3D SMAX modeling. For VRML modeling, we can use LOD technology, which can use a description method with different details to get a set of models. Without affecting the visual effect of the image, the LOD technology can reduce the geometric complexity of the scene by simplifying the surface details of the scene, thereby improving the efficiency of the drawing algorithm. This method usually creates geometric models of different approximation accuracy for each original polyhedron model. When drawing, the

method can select the appropriate hierarchical model to represent the object according to different conditions. In the construction of virtual scenes, it is appropriate to select the detail level model to speed up the scene display without losing the graphical details and improve the system response capability. Complex 3D models built using VRML are cumbersome, VRML only provides a simple virtual scene modeling method, so in order to use it to build teaching scenes, we must write long code to achieve.
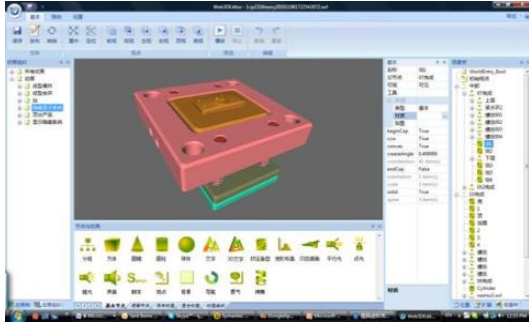

Fig.2 Ayout

Figure.3 Material Selection

3D SMAX is a powerful visual modeling tool. In the process of constructing a virtual scene, it can fit the user demand model, and at the same time can set the implementation scene, scene material design, animation scene settings, path settings, calculate the length of the animation, create a camera and adjust the animation. Teachers make full use of modeling methods provided by 3D SMAX in the construction of teaching scenes, such as creating geometric objects directly, which can greatly simplify the complexity of VRML programming.

4.3 Information Capture

Information capture system usually consists of two parts: hardware and software. Hardware generally includes signal transmission and reception sensors, signal transmission equipment, and data processing equipment; the software generally includes functional modules such as system settings, space positioning calibration, motion capture, and data processing. Signal emission sensors are usually located in key parts of moving objects, such as the joints of human bodies. The signal that is continuously sent out is received by the positioning sensor and enters the data processing station through the transmission equipment, is processed in the software to obtain the coherent three-dimensional motion data, including the three-dimensional space coordinates of the moving object, the six-degree-of-freedom motion parameters of the human joint, and then generates 3D skeletal motion data that can be used to drive skeletal animations. This is the universal workflow of the motion capture system. In order to realize the interaction between human and virtual environment and system, the teacher must determine the position and direction of the student's head, hands, body, etc., accurately track the participants' movements, and detect these actions in real time so as to feedback these data to display and control system.

Fig.4 Capture

Figure.5 Instruction Capture

4.4 Scene Roaming

Roaming in the virtual teaching process can be achieved through automatic roaming and interactive roaming. Auto-roaming is an animation of the teaching process, which is mainly achieved through triggering and interpolation techniques. Static virtual environment can not meet the needs of teaching. Students can interact with humans in a virtual scene during virtual scene learning, which creates an interactive tour. Due to the limited interactive features available in 3D SMAX, students can use EON to describe motion to provide more interactive and animated features. While the user is roaming, when the mouse moves to a virtual object with a sensor, the virtual object will change with the operation of the input device, thereby generating an interaction.

Fig.6 G Interactive Reality Scene

Figure.7 Roaming Interactive Virtual Scene

5. Suggestions for Popularizing Htc Vive Somatosensory Interactive Classroom Teaching Model

5.1 Technical Development Advice

The advantages of HTC VIVE somatosensory interactive classroom teaching model rely heavily on virtual technology. Virtual reality rendering technology has insurmountable defects: (1) The display device has a low resolution and refresh rate, which is easy to appear window screening phenomenon and visual retention phenomenon. This greatly affects the user experience, therefore, many users will experience vertigo. (2) The existing human motion tracking and infrared camera capture virtual reality systems rely on radio transmission devices, so that the user's degree of free activity is again limited by the hardware.

In the future, in order to achieve the promotion of the HTC VIVE somatosensory interactive classroom teaching mode, we must be able to bring a brand new experience that can be accomplished by other technologies. Somatosensory technology has revolutionary and irreplaceable features. Somatosensory technology allows people to naturally interact with peripheral devices or environments, which is indeed more advantageous than button interaction and touch interaction. However, the characteristics of somatosensory technology do not exist to replace the former two. Somatosensory technology can be more easily used by people, accepted and mastered, so that it is conducive to its popularity. Users put forward higher requirements for somatosensory interaction technology, and have higher requirements for accuracy and intelligence. Users will not pay for the flaws and deficiencies of technology. We need to reduce the cost of somatosensory interaction technology. The low cost allows this technology to be embedded in a variety of devices, enabling people to use it everywhere. The so-called interaction method means that the more people use, the more its value can be reflected, and there are enough people to use it to complete the so-called revolution.

5.2 Extended Scope of Application

In the future, HTC VIVE somatosensory interactive classroom teaching mode should not only be applied in the theoretical classroom, but also extend the scope of application. The HTC VIVE somatosensory interactive classroom teaching mode needs to be transformed into safety skill training and physical fitness training.

Security awareness self-protection simulation training. For the dangerous situations that students may encounter in school, family and society, teachers can use simulation technology to satisfy them. The teacher creates a safe environment that can generate access to learning. Students need to independently explore and make appropriate actions to promote the development of virtual scenes and generate causal feedback to achieve somatosensory interaction simulation exercises. Teachers should expand life education, cultivate students' survival skills, and enhance students' sense of survival and safety. It can be carried out in the following directions: fire escape, traffic safety resources. Fire escape is the simulated evacuation training software of virtual campus fire alarm system, which has the characteristics of practice and game mode. Traffic safety resources are simulation software that provides students with general knowledge in virtual 3D street scenes.

Physical training. The teacher can guide the student's movement through screen virtual scenes and statistics the movement data so that the game application form can be exercised at any time. Sports assessment relies on students' perception technology of body movements to capture students' movements, thereby realizing real-time detection, index selection, quantitative evaluation and result feedback.

6. Conclusion

With the continuous development of virtual reality technology, the immature development of interactive technologies based on HTC Vive virtual reality devices will gradually improve, which makes the exploration of new areas of virtual reality become an inevitable trend of future education development. The HTC VIVE somatosensory interactive classroom teaching model will be continuously developed within the scope of technology and use, and more kinds of interactive methods will be used in education and teaching. We have to follow the pace of the times and master the most cutting-edge development technologies. This has not only become the needs of the information age, it is also the need for future education development.

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