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Scene art design based on human-computer interaction and multimedia information system: an interactive perspective

Wei Liang[1]

Abstract

With the concept of the information superhighway being proposed, the educational model with the aid of information technology has developed rapidly. This paper uses constructivist learning theory to construct a new teaching model, including innovative teaching content and methods of change. Realizing the development of educational informatization and meeting the challenges brought by the information society to education has become an inevitable trend of today's education. The development and innovation of emerging technologies has become the main references in the field of teaching to help learners set up effective self-learning methods and develop the ability to continuously update knowledge. As a second-generation Web language, this article introduces VRML as a methodology. Combined with the characteristics of actual cases, this paper analyzes the application of VRML in virtual teaching environment and gives a concrete implementation method. In view of the application of virtual reality modeling language (VRML) in online teaching, this paper summarizes and analyzes the functions, basic features and development direction of VRML. This paper explores the basic theory of CAI and the principles of network teaching. We divide the online teaching mode based on VRML into two application methods and propose a network teaching mode based on VRML.

Keywords VRML · Virtual environment · Assistant · Computer teaching · System · Construction

1 Introduction

The rapid development of multimedia information technology and network technology has had a strong and far-reaching impact on the educational model. The network-based

✉ Wei Liang
    liangwei@dr.com

[1]   College of Arts and Media, Ningbo Dahongying University, Ningbo 315175, China

☷ Springer

teaching model has become a research hotspot. At present, the engineering graphics network teaching system has been developed for many years, but there are still some problems, such as the old content of the system and poor scalability, these drawbacks make the system is not conducive to the active learning of learners. The animation files are based on tic, mov or avi, which is too large for Internet transmission.

Aiming at the above problems, this paper tries to apply database technology and virtual reality technology to the development of teaching system, and proposes a method based on VRML. Based on the structure model of network technology and virtual reality technology, a network teaching system with multiple functions is developed. The system has solved the above problems well and created the conditions for the reform of the teaching methods and teaching methods (Figs. 1, 2, 3, 4, 5, 6, 7 and 8).

In the 1990s, with the introduction of the concept of the information superhighway, the development of informatization education had been rapidly developing. Using constructivist learning theory and forming a new teaching model, teaching content and methods of change have become the inevitable choice for today's education. With the advent of the era of information explosion and the rapid development of knowledge, the development of emerging technologies has become the driving force in the field of education. Using emerging information technologies can help learners build effective self-learning methods and develop the ability to self-renew knowledge. [6, 7, 18].

Most web pages currently contain only a few simple graphic structures and display teaching resources through text and images. In this case, it is difficult to simulate a real teaching environment to achieve dynamic interaction between the teaching environment and the participants. With the support of VRML language, it is convenient to realize the
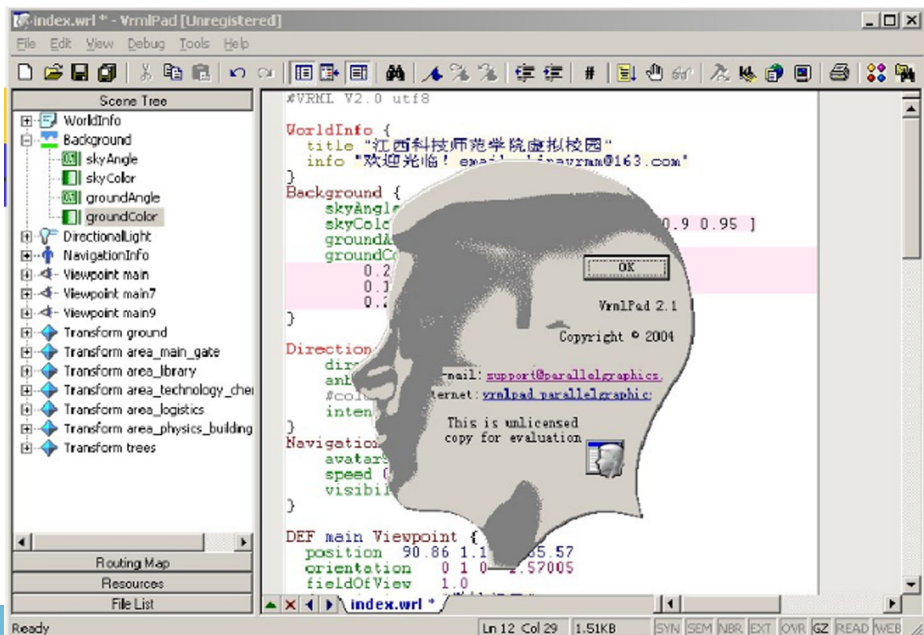
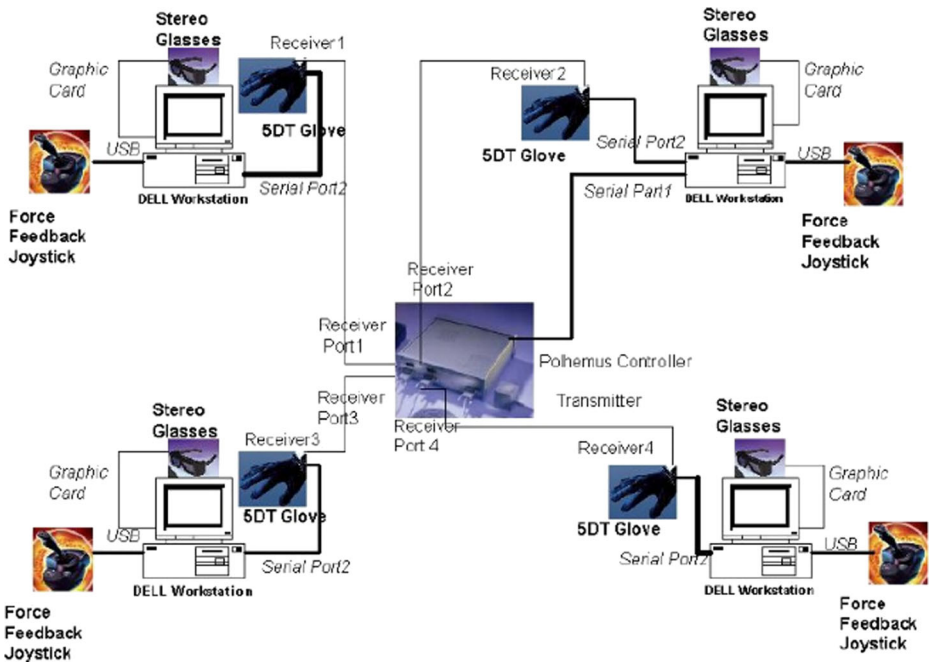

Fig. 1 VRML editor's main interface

Fig. 2 Laboratory hardware of VR

three-dimensional scene on the ordinary web page to simulate the real teaching environment [2, 12].

Computer-aided instruction (CAI) is an important part of computer-aided education (CBE). CAI is a kind of teaching form, use computer function and characteristic, replace the teacher, but to the learner, make the learner realize more effective study. From the relevant theoretical analysis, VRML theory is based on real-world scenario models, or
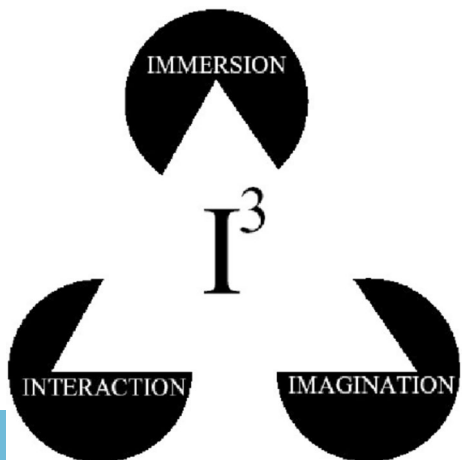
Fig. 3 Virtual reality triangle
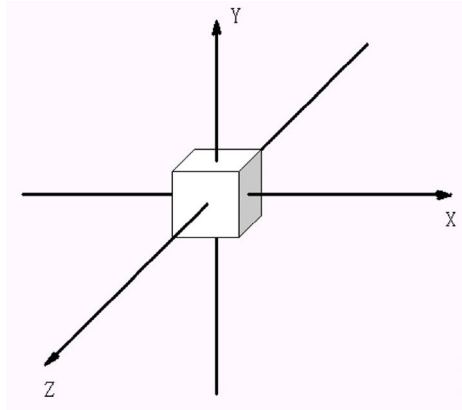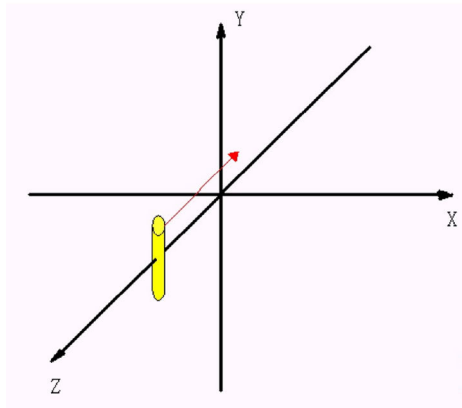
Fig. 4 TextureTransform area in VRML

(a)

(b)
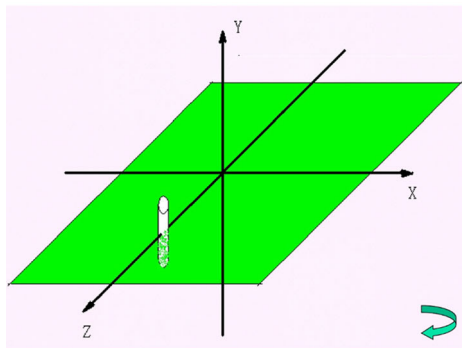
(c)

based on a virtual reality modeling language (UML), which means VRML has platform independence. With the development of technology, the computer assembly experiment based on VRML has been widely used. In the actual teaching process, the virtual experiment has a certain degree of interaction, which makes it play an important role in

Fig. 5 Example of VR equipment

computer assembly teaching. In the process of computer assembly teaching, the teacher must make sure that the students understand the basic unit loading process. The research process of computer assembly experiment based on VRML can be carried out.
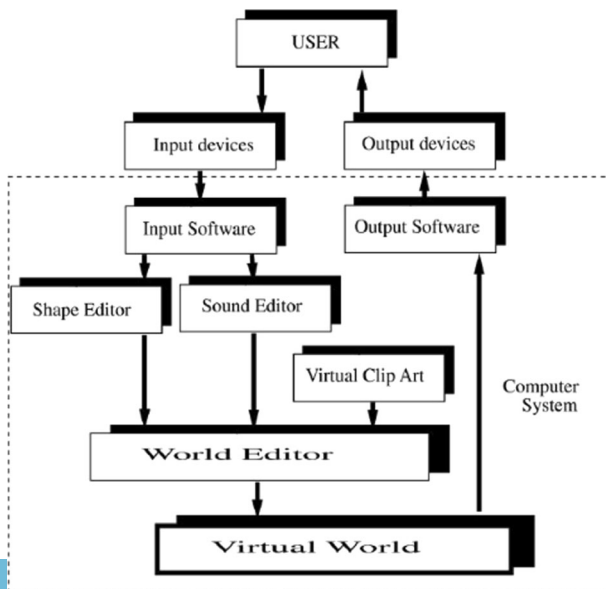
Fig. 6 Superscape VRT3 development system
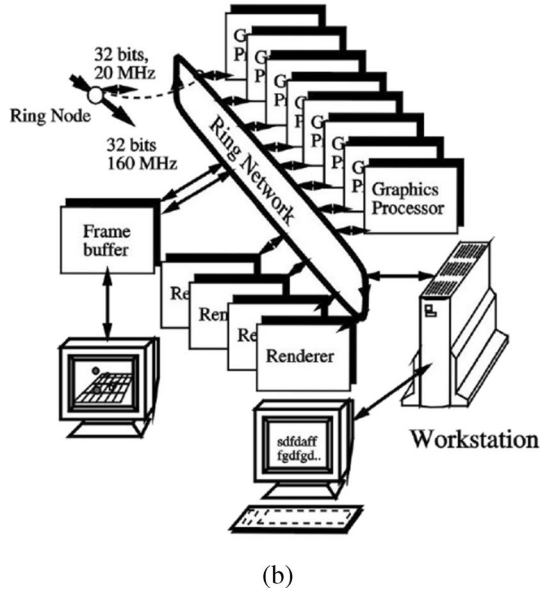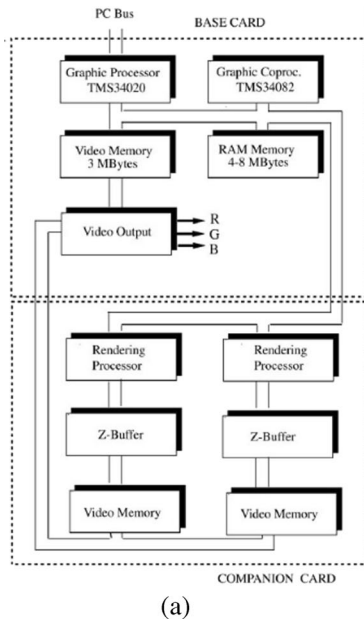
Fig. 7 Working flow

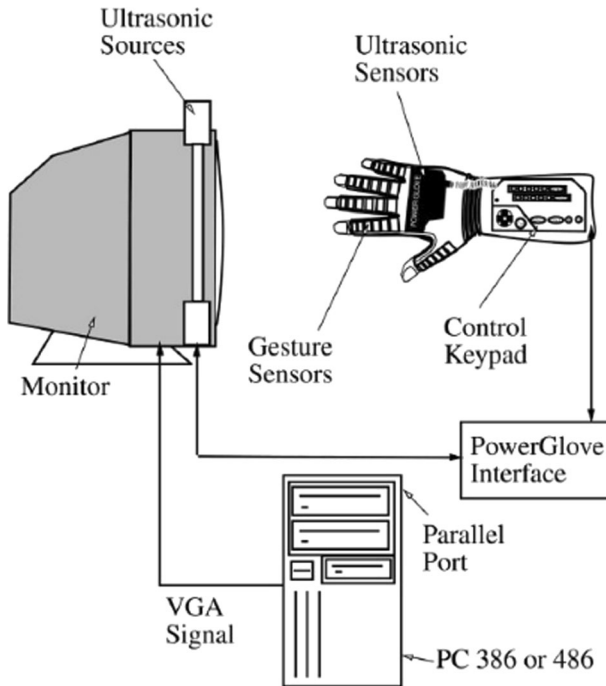Virtual reality technology (VR), also known as "spirit environment" or artificial environment, refers to a virtual environment with a specific scope that realizes realistic visual, auditory and tactile integration through computer technology. Users can immerse into the information processing environment through the necessary equipment to achieve human interaction with the virtual environment and gain an immersive experience. Users can not only experience the "immersive" realism experienced in the objective physical world through the virtual reality system, but also experience space, time, and break objective limitations to experience the experience that cannot be experienced in the real world. The main features of the virtual reality system proposed by Burdea.G in his article "Virtual Reality System and Application" at the Electr093 International Conference are strong "immersive" immersion, friendly and friendly human-computer interaction. The actual application of virtual reality

Fig. 8 Scene created with
Rend386

system can be divided into four categories: desktop virtual reality system, immersive virtual reality system, distributed virtual reality system, and augmented reality, also known as mixed reality system. Virtual reality systems typically include computer systems, helmets, data gloves, six-degree-of-freedom mice, joysticks, and sensors. However, expensive fees limit the use of virtual reality in education.

E-learning allows students and computers to simulate learning situations through simulations of teaching environments, such as virtual classrooms, laboratories, virtual campus simulations, and virtual reality simulation teaching systems. This technology allows learners to experience the content of learning experiences and deep insights. Using graphic, image, text, audio and video and other comprehensive application techniques, we can make the teaching content more intuitive, this method can improve students' interest in learning. Learners can communicate with teachers and students through the Internet, obtain the required information, and further improve their learning ability, collaboration ability and innovation ability [4, 16].

At present, in the process of concrete implementation, e-learning is faced with the following problems: lack of corresponding integration standards; the electronic textbooks and electronic teaching materials used in the original teaching materials are printed; there is an obvious lack of interactivity and usability, lack of immersion, sensibility and straightness of learning environment; the online teaching model lacks a sense of reality; teachers are still the main body of the teaching, however, they are failing to realize the transformation from "subject" to "dominant"; "cramming" type teaching method is still used and so on. The remote education implemented in the network teaching environment can only be said to be satisfactory in teaching effectiveness, and it has not reached the expected state.

In the past research of e-learning technology, the application of multimedia technology and network technology occupies the main position, and partial information of virtual reality technology is limited. However, in terms of the development prospect, the integrated application of virtual reality technology and multimedia technology and network technology will surely play important roles in promoting the development of e-learning [3, 21].

2 VRML

2.1 Introduction of VRML

VRML (virtual reality modeling language) is a virtual reality modeling language. It can make three-dimensional objects and their movements through the network transfer to ordinary web pages. VRML has two standards, that are VRML1.0 and VRML2.0. VRML1.0 introduced how to create a variety of three-dimensional graphics. VRML2.0 enhances the interactivity on the basis of 1.0. It takes human actions as the main body of the browsing, and all performance changes as the behavior of the operator changes. VRML is an international standard. Its specifications are defined by the International Standards Organization (ISO). VRML is a descriptive language with nodes as its basic unit. We can use the 54 nodes provided by VRML to build the scene, map the body, attach the sound and write complex interactive programs [1, 11, 15, 19, 20].

The following is a concrete example: The output is to display a three-dimensional cube in the browser, and the position of the cube can be moved by dragging the mouse.

```
Group {

    children [

        DEF Demo—BoX Transform {

            children [

                Shape{

                    appearance Appearance{

                        material Material{

                            diffuseColor 1 0 0

                        }

                    }

                    geometry BoX {}

                }

            }

        }

        DEF BoX—Move PlaneSensor {}

    }

}
```

ROUTE BoX—Move.trackPoint—changed TO Demo—BoX.set—translation.

VRML program can be run on any platform, as long as the browser has installed the VRML plug-in which allows user browsing through the network transmission to the virtual scene. Using VRML nodes can create a model of simple without the use of other software. At the same time, VRML has a good interactive capability. In addition to its own scripting language, VRMLSCRIPT, it can also be combined with JAVA, JAVASCRIPT, HTML, and so on to

make the scene have outstanding interactive capabilities. The most prominent feature is that VRML has the good operational capability on low bandwidth. VRML generated animation is in text format. When dealing with scenarios, VRML is handled on a local browser, thus the browser opens up the virtual scene very quickly [8, 13].

2.2 Teaching application of VRML in virtual environment

Network teaching refers to the use of computer networks, which is combined with multimedia technology to achieve teaching mode. The users of online teaching consist of students. How to make Internet teaching resources on the Internet more suitable for most students is the most important issue. The design of teaching resources using VRML not only easily solve complicated model construction but also smoothly completes the design of interactive functions. More importantly, the scene constructed by VRML can simulate a real teaching environment, so as to better meet the requirements of students, to enhance students' interest in learning, and enable students to study autonomously in a more realistic teaching environment.

Taking a multimedia classroom presentation as an example, we use VRML instead of other software to implement model construction, scene design and interaction. The main function accomplished is to simulate the whole scene of the multimedia classroom. Students in this scene can be prompted to learn how to operate multimedia equipment in the classroom [5, 14].

The key to the construction of multimedia classroom demonstration scenarios is the efficient simulation of multimedia device functions and the realization of interaction.

For the construction of the model, we have taken as far as possible the most basic nodes in VRML to construct the model. For example, in the construction of the entire classroom environment using only a few GROUP nodes and maps, the entire file size is only a few hundred bytes. For some complex and realistic model which requires a higher level, we use 3DMAX to complete the process. 3Dstudio MAX provides the function of converting the max format model into the VRML format, making some complex models in VRML, such as the projector, slide projector, etc. in VRML, or surface models difficult to be implemented in VRML. However, the biggest drawback of exporting 3D models is that a lot of space is sacrificed. As we all know, the complexity of a 3D space is determined by the number of polygons or triangular patches. According to our experimental analysis, we have the following relations:

$$1000 polygon = 100 Kbytes \tag{1}$$

This paper introduces a common standard model such as Geospler containing 320 triangular patches with 10Kbytes at least before optimization, effectively reducing the number of 3D model polygon patches can drastically reduce the size of the source file and speed up the VRML file Upload speed. For complex models, we use the model optimizer. For example, focusing on the above example, you can let the optimized number of patches be 200, the file size has been reduced to 6.4Kbytes, about half of the original, of course. This optimization process is to ensure that the original model will not affect our visual effects. Absolutely, 3D model optimization also includes map optimization. We can use the features in the VRML language to simplify 3D scenes. Other special models can be implemented with new nodes defined by PROTO. For different device models, such as projectors and video presenters, we construct different models separately when constructing the model. For the same type of different types of equipment, we have taken a common approach to construct a model that contains all the features of the model. When using the device, teachers can choose the type of device. You can also choose the default device type (including basic device features).

The design of the scene is based on a real multimedia classroom, which is completely achieve d through the VRML's own functions, integrated TRANSLATION, SCALE. The size can be debugged to determine where to put the location of the model in the scene. ROUTE with the sensor can be achieved with some of the basic interactive features (button color changes, changes in the location of objects). SCRIPT input/output can be used for complex interactions (signals sent by the console to drive changes between models). Scenario effects can be improved SOUND, TEXTURE, MOVIETEXTURE other nodes will sound, images, small movies added to the scene, and through the interaction to manage.

For the interactive presentation process, this article uses a combination of VRML and HTML. This article combines VRML files with regular flat web pages so students can view the steps of the presentation process in a browser and then learn how to use these devices directly in a virtual scene. In a virtual scene, students can use the operating system, which not only improves the learning outcomes of students, but also enhances their interest in learning.

The method of multimedia classroom presentation done in VRML language can be applied to other teaching environments, such as dangerous chemical reaction laboratory, you can use the scene created by VRML to vividly simulate the reaction process. This process can be interactive to control the output of the results. Students can try various possible responses and know the destructive consequences of misoperation. This will reduce the actual situation of the loss. VRML is actually used abroad to simulate the launch of satellites.

2.3 TextureTransform area

In VRML three-dimensional space, whether it is Beijing, the color of light, objects, their colors are combined by RGB.

Corresponds to three floating-point numbers, the threshold is [0,1], from the three primary colors into a variety of different colors.

Feature extraction is the extraction process of blocks from an initial image to obtain a feature map of the input image:

$$F_1(Y) = \max(0, W_1 * Y + B_1) \tag{2}$$

Where Y represents an initial HD image, $*$ represents convolution operation, and W_1 is convolution kernel and B_1 is neuron bias vector.

Nonlinear mapping transforms feature vectors can be transformed from low-resolution space to high-resolution space, and the process can be represented as follows:

$$F_2(Y) = \max[0, W_2 * F_1(Y) + B_2] \tag{3}$$

This HD image reconstruction uses the block-based output feature graph to generate the final HD image, and the process can be represented as follows:

$$F(Y) = W_3 * F_2(Y) + B_3 \tag{4}$$

Where W_3 can be regarded as a mean filter, and the whole reconstruction process is a linear operation process.

The parameter of SRCNN can be expressed as:

$$\Theta = \{W_1, W_2, W_3, B_1, B_2, B_3\} \tag{5}$$

The training process of the whole network is to estimate and optimize the parameters. Therefore, the mean square error can be calculated as follows:

$$L(\Theta) = \frac{1}{n} \sum_{i=1}^{n} \left\| F\left(Y_i; \Theta\right) - X_i \right\|^2 \tag{6}$$

2.4 Application of virtual reality technology

Virtual reality technology is widely used in many fields, such as military, aerospace, medical field, culture and entertainment, education, network, management engineering, urban planning and other aspects, especially in culture, education, entertainment occupy the mainstream status.

Relatively traditional teaching methods enable medical students to experience the virtual human body model in the virtual environment by feeling the gloves, trackball, HMD, etc., so that the students will understand the structure of the human body more easily than the previous teaching ways. Students can also practice the various procedures that cannot cause errors in reality and achieve the purpose of proficiency. Researchers Pieper and Satara built a virtual surgical trainer based on two SGI workstations in the early 1990s for leg and abdomen surgery simulations. This virtual environment includes a virtual operating table and surgical light, virtual surgical tools such as scalpels, syringes, surgical forceps, and virtual human models and organs. With HMD and sensory gloves, the user can perform surgery on a virtual mannequin. However, the system needs to be further improved. For example, it is necessary to improve the environmental authenticity and to increase the network function so that it can train multiple users at the same time.

Through virtual reality technology, the government planning department, project developers, engineers and the general public can better understand the effect of the planning and can reasonably avoid the risks in the design and detect the defects in the design so as to reduce the problems caused by the planning problems.

Virtual reality technology has demonstrated its advantages in areas such as education and training, such as virtual campuses, simulation labs, special education industries, and professional training. In simulation teaching and experimentation, we can simulate complex experiments, such as high-risk chemical experiments. In special education, people with disabilities can use other sensory organs to express their ideas. VR technology can help people with cognitive disabilities acquire new skills.

2.5 Virtual reality system

Virtual reality (VR) system refers to the use of a variety of advanced hardware and software technologies and tools designed to enable users to use reasonable hardware and software and interactive ways to achieve multiple-sense interaction and can manipulate the virtual world [9, 17].

The function of the virtual environment generator is to process the information generated by other devices and establish a virtual environment to determine the user's actions, location and tracking. This method can achieve the purpose of imitating the real scene.

The helmet display is used to display the foreground of the user's vision. When the range of the real system, the horizontal vision is 180. Vertical vision is 150, which can produce immersive feeling.

The function of the sensor is to feed the attitude of the objects in the scene to the user, thus providing the information required in the virtual scene. The sensor is installed in the key points of

user perception, such as head, hand, eye, etc., which is an important part of the whole virtual reality system.

The functions of sound synthesizer, voice localizer, a speech recognizer, electronic display, touch and visual system are to form a response system with the purpose of controlling the sensor. The user can obtain the necessary feedback information and real-time 3D display through the sensor, and then observe and control the 3d scene to achieve the purpose of human-computer interaction [10].

2.6 Virtual reality system classification

Desktop VR Desktop virtual reality using personal computers and low-level workstations for simulation and the computer screen as a window to observe the virtual realm. Full interaction with the virtual reality world through a variety of input devices, including a mouse, trackball, torque ball, and more. It requires participants to use input devices to view the virtual realm through 360 degrees on a computer screen and manipulate the objects in it, but at this time, the participants lack complete immersion because it still can be disturbed by the surrounding real environment. The biggest disadvantage of desktop virtual reality is lack of actual experience, but its cost is relatively low and the scope of use is wider. Common desktop virtual reality technologies include VR based on static images QuickTime VR, VRML, desktop 3D virtual reality, MUD and more.

Immersive VR Advanced virtual reality systems provide an immersive experience that makes users feel like they are in a virtual world. It uses a head-mounted display or other device to enclose the participants' vision, hearing and other senses, and provides a new virtual sensory space, and uses location trackers, data gloves, input devices, sounds, etc. to provide participants a feeling of immersion. Common immersive systems include helmet-based display systems, projection-based virtual reality systems, and remote presence systems.

Augmented reality technology uses virtual reality technology to simulate the real world and simulations in the real world and uses it to enhance participants' perceptions of the real environment. A typical example is a heads-up display used by pilots, where all data can be projected onto the screen in front of the pilot, which allows the pilot to read the data in the cockpit instrument without having to lower the head.

2.7 Virtual reality modeling language

Virtual Reality Modeling Language is a three-dimensional modeling and rendering of the graphics description language. Similar to the HTML language, VRML is an ASCII code that is interpreted by the browser. Through the application of object-oriented technology, a computer is used to construct a virtual three-dimensional scene that is close to reality, establish three-dimensional objects, render virtual scenes, and interact with the virtual reality world through sensors of various perceptions, thereby enabling the user to feel immersive. The virtual reality modeling language is platform-independent and is an interpreted language for WWW-based 3D interactive websites.

The virtual reality modeling language integrates many technologies such as multimedia technology, computer graphics and image technology, simulation technology and sensor technology, and covers many technical fields such as artificial intelligence, computer network, multimedia, nature and social sciences and philosophy academic area.

Unlike virtual reality technology, virtual reality technology requires the use of various interactive devices (such as sensory data gloves, helmets, etc.) to allow users to enter the virtual three-

dimensional world. Virtual Reality Modeling Language (UML) is a 3D modeling and rendering of a graphical description language. Beyond the HTML is that before the VRML, web pages are based on a two-dimensional plane, although can through the Java and JavaScript to add web effect, or by flash makes the static web page more vivid, but overall still stays in the phase plane. VRML creates more three-dimensionality for the three-dimensional world. The visual scene in the virtual scene changes as the user's position changes, so it is more interactive. By installing a VRML browser, users can access the virtual reality world through the network. Therefore, the difficulty of WEB-based virtual reality technology is not high. VRML has become the standard and core technology of 3DWeb.

2.8 VRML features

For the three-dimensional scenes and objects displayed on the Internet, VRML is described using the file format standard, and any editor can be used as a compilation toolUsers who want to enter the virtual reality world only need to access the VRML browser and download graphics, audio and video resources on the server. Thus, VRML has portability and does not require a platform.

In addition, when a user interacts with an object in real time in the virtual world, VRML renders the graphic in real time. VRML provides 6 + 1 degrees of freedom, that is, rotation and movement in all three directions, and anchoring with other 3D spaces so that users can intuitively feel the impact and change of self-behavior on the virtual world.

At the same time, based on the built-in nodes, VRML can be extended in script scripts using Java and JavaScript languages, supporting custom nodes for more powerful interaction.

The text of VRML is in ASCII format and can be quickly transferred on the Internet. When the user is using, a large number of three-dimensional scenes are implemented and rendered on the client. Therefore, the operation can be achieved under low bandwidth.

VRML browser, in theory, can handle multiple objects distributed on the Internet, and secondly, either a good performance or a poor performance of the machine can achieve better work. VRML-based technology can mimic what the human eye observes in real life. As the object moves further away from the object, the details of the object become blurred; but as the object approaches, the details of the object become clean. The selection criteria for VRML-based technology is that from a geometric perspective, the system selects different levels of LOD based on distance. The "inline" node provided by VRML allows the current virtual world file to be linked to other virtual worlds by address so that virtual objects can be ported. In this way, we can make a number of scenarios that will be used multiple times as a separate file, using inline nodes to reference.

2.9 VRML file creation method

We can use a text editor to write VRML files directly. Use this method to build simple object models and scenes. However, when creating large, complex scenes, the above method has high requirements for the author and it is difficult to achieve accurate modeling.

Use other visual editors such as 3D Studio MAX and save as *. WRL format to implement the model. This method can effectively help the system to easily complete more complex model settings and scene creation. We don't need to enter a lot of code, we can use the visual editor to complete the corresponding operation. This method is used to model and set up the scene during the process of building the system.

Use the transformation tool to convert other graphics formats. This method has certain limitation. For example, the texture mapping and illumination of the converted file will be invalid.

3 Construction and modeling of teaching system

In the process of setting up the virtual teaching environment, after completing the model, the file format is saved as *..wrl format so as to be used later to modify and add interaction with VRMLPAD. In the modeling of various teaching devices, there is a large number of interaction processes in this part. If you use VRML language manually, it will be a very huge project. Therefore, we chose to use CULT3D for interactive design. For this section, create a good device model in 3DMAX *.C3D format to facilitate the use of subsequent steps.

We put the built-in files into VRMLPAD to reduce redundant code, use JAVASCRIPT to optimize files, and finally add interactive applications.

Use the Cult3D plugin to add interactivity and save the file as *.CO. The last use of Authorware6.5 establishs system level.

3DS MAX is a 3D animation software developed by Autodesk. The software creates realistic models and uses powerful rendering capabilities to render real-world graphics. At the same time, 3DS MAX can also complete 3D animation, architectural design, game character design, product design, game design, etc. according to the set conditions.

We use 3DS MAX to build a 3D model. If the accuracy is too high and the effect is too realistic, it may cause the system running slowly, delay, and other situations, and it is difficult to guarantee the system operation effect interactively. If the 3D modeling accuracy is too low, it will directly affect the immersion problem in the user's use. Therefore, we need to ensure the authenticity of the model's appearance, and also to ensure that the model can be displayed smoothly in the system.

3.1 System interaction and integration

To create a linear keyframe animation that is played with a mouse click, you need to combine the TouchSensor,
TimeSensor, PositionInterpolator, ViewPoint, etc. to achieve.
Use TouchSensor to create objects for moving, dragging, clicking, and more, using PlaneSensor,
SphereSensor, CylinderSensor, VisibilitySensor, ProximitySensor, Collision and other nodes for the object to add various types of perceptions in order to achieve the user through the mouse to achieve the purpose of control and interactive objects.
If VRML built-in nodes cannot meet the complexity of interaction, use Script nodes to embed Java or JavaScript to further extend the functionality.

This paper takes the multimedia teaching system constructed in the virtual teaching environment as an example to analyze the application of VRML in the virtual environment. This paper designed a multimedia control system and set up the switch button, video booth, video player and signal switching control buttons. The user can press the switch button to turn on the multimedia control system. In this system, a player button can realize three different signals switching and use a projector to project a virtual world.

Written by VRMLPAD, the main steps are as follows:

(1) Complete the multimedia console visible part of the system console appearance, PC, system shutdown button, system open button, VCD player button, video booth button settings and add TouchSensor node to interact with the mouse. The main code is as follows:

```
                    DEF Controller Transform{

                     }

                      DEF PC Transform{

                          translation . 0 . 1 52 O 0 . 0429

                          children{

                               DEF TouchPC TouchSensor{)

                               }

                    DEF SystemOff Transform{

                    translation 0 . 1 44 O 0 . 0429

                          children{

                               DEF TouchSysOffTouchSensor{}

                    }

                    DEF SystemOn Transform{

                          translation 0 . 082 0 0 . 0429

                          children{

                               DEF TouchSysOn TouchSensor{}

                          }
```

(2) In order to realize the different projection of the screen by clicking different control buttons on the screen, the switch node is used to define the different image contents projected on the screen, which can be controlled by the choice's return value.

(3) The console computer monitor opens and does not open corresponding to two states, defined by the switch node.

(4) Through the Script node, use JavaScript to control both the states of the system switch, as well as when the system is off, when the system is open, the PC button on the console, the state of the signal switcher, and the condition of the PC's DVD player.

3.2 Scene optimization

In the process of optimizing the scene, two aspects are mainly considered in this paper: 1. To achieve faster download and control the size of the file; 2. Guarantee the rendering speed and quality of the real-time image. Therefore, we use the following methods to optimize VRML scenarios.

(1) This article uses example techniques to simulate virtual objects. There are many objects in the scene, such as benches and lights in the system. This article uses DEF as its name, and then we use USE to implement the invocation of the instance to achieve the purpose of the code.

(2) Use compression tools to achieve file compression. The common use of VRML is zipped compression, the tool can compress the size of the file to 1/10 of the original one-tenth and can be automatically recognized by some browsers.

(3) Using LOD technology. According to different distances, this paper divides the model into high-level detail model, general detail model and low detail model. The system automatically displays different levels of image texture quality based on distance.

(4) This paper uses geometric models to model to avoid excessive use of complex nodes, group nodes, and spatial transformation node nodes to adjust the scene.

(5) The complex details in modeling are represented by textures, and this article uses small-scale textures to show the connection of the object scene.

(6) Divide the scene. Divide large-scale files into small-scale files to increase rendering speed. The inline node allows the browser to read the contents of the small scene without having to preload it through the URL.

3.3 Virtual teaching equipment construction technology

After modeling the teaching media, this article chose Cult3D, developed by Swedish company Cycore, was chosen to add interaction, movement, etc. to objects. It is a new 3D network technology, but also the most advanced Web-based browsing technology, and its production of documents with high image quality, small size, suitable for network transmission and many other features.

It is precise because Cult3D's excellent performance is widely used in e-commerce, online games, distance learning, networking products, project descriptions and many other applications. Especially in the major e-commerce website, you can see a number of demonstration products produced by Cult3d. Its application in the teaching process is also very suitable,

allowing users to be more intuitive, more realistic access to the information which helps users better understand the need to understand the object. Cult3D even developed a full set of final exam system and received wide acclaim.

Due to the built-in high-quality data compression and streaming features, the Cult3D output files are small enough to be transmitted over the network and play across platforms. During the download process, the imaging process is gradually accumulated according to the data download volume.

Through the use of the platform, teachers will be familiar with a variety of teaching environments, such as computer rooms, offices, studios, multimedia classrooms and so on, especially the multimedia classroom environment. In this paper, through the operation of the virtual system to simulate real-world switching, projection and other operations, users can observe the virtual world from different angles. Combined with the teacher's explanation, the user can skillfully use the multimedia teaching system, which helps the user solve the usage problem, understand how to use it, and repeatedly practice, explore and actively collect information to realize knowledge construction. In addition, the cost of the system is lower, which also reduces the cost of the experiment. If we can develop a distributed virtual learning platform based on this, learners will get more help to improve the teaching effect.

3.4 System characteristics and operating environment

According to color theory, the choice of color is divided into warm and cold colors. Warm colors such as yellow, orange, and red can visually energize objects because warm colors have outstanding visual effects. Cool tones include blue tones of RGB, such as green, cyan, blue, and the like. Using cool objects can give more information to the target scene.

In order to achieve the purpose of the introduction, in the process of interface design, this article did not add too much pattern design. The font selection of the system is more uniform, the main interface and the sub-interface are clear, and the sub-interface of the same level has a consistent interface design, which is in line with the design principle. The entire system looks simple and generous.

3.5 System operating environment

Run this system, users need to download VRML browser. The system uses BS Contact VRML browser, users can login Bitmanagement company's Web site to get access to free download address. To play Cult3D files properly, user need to download the plug-in provided by Cycore.

The system tested in this paper is Pentium D 2.66G, the memory is 1G, and the graphics card is GeForce 7300G. The system uses an integrated sound card, and the playback effect is smoother, but distortion occurs in some complicated scenes. Due to the system has some graphics and more complex virtual animation, it is recommended to use the same or higher-level configuration.

4 Conclusion

The application of virtual reality technology in education has become more widespread. It is precise because of the development of virtual reality technology that also provides a vast new technology platform for teachers to further optimize the educational resources and improve the

teaching level. This paper constructs a virtual reality teaching system. Under the guidance of constructivism, combined with the latest online learning ideas, this paper combines subject education with virtual reality technology. This article uses existing mature virtual reality technology to implement the various interactions mentioned in the article. In this process, we effectively control the production cost, which can provide users with immersive and interactive virtual reality system and effectively help teachers and students complete the teaching process.

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Wei Liang , Associate Professor, Dean of Visual Communication Design Department, Member of Art Education Committee of Zhejiang Higher Education Association. The direction of research is brand visual image design. I have presided over 1 minister-level subject, 8 city-level subjects and 2 bureau-evel subjects, published 10 papers in the core journals, and more than 10 papers in the ordinary journals, 1 monographs and 2 teaching materials, taking chage of the subject of Visual Communicaiton Design, which is the key subject in Zhejiang province. I have won the second prize of City-level Education Teaching Achievement, second prize of school-level teaching achievement, third prize of city-level scientific research.