Research on the Mechanism of Red Culture Transmission in Colleges Based on Virtual Simulation Technology

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Abstract. The research on the transmission mechanism of red culture is one of the new directions of interdisciplinary research. This study used virtual simulation technology, especially Unity3D software to set up virtual scenes to increase audience participation and solve the dilemma in the dissemination of red culture. Research findings: (1) Through the data conversion and virtual scene design of Unity3D software, a new path had been found for the dissemination of red culture. (2) The IP production of red cultural data required images, datas, and other contents. (3) The data conversion of Unity3D software required completing model format conversion, coordinate system conversion, scene visual simulation, and other tasks. The research conclusion updates the research on the dissemination of red culture in colleges. At the same time, it makes up for the rigidity of the traditional red culture teaching model. More importantly, through the virtual simulation platform, the data of red culture has been integrated and sorted out, enabling it to be understood, felt, and touched.

Keywords: Virtual Simulation Technology · Higher Education and Teaching · Red Culture Transmission

1 Introduction

With the development of computer science, virtual simulation technology has gradually entered college classrooms. In the 21st century, the application of virtual simulation technology in education, medical, chemical, machinery and other fields is becoming increasingly mature. In 2019, The CPC Central Committee and the State Council issued Several Opinions on *Deepening the Reform and Innovation of Ideological and Political Theory Courses in Schools in the New Era.* This document proposed that we should promote the application of modern information technology such as artificial intelligence in the teaching of ideological and political courses. And build a number of national virtual simulation experience teaching centers for ideological and political courses. By July 2022, the national virtual simulation experiment teaching project sharing platform had displayed seventeen ideological and political education projects. Virtual simulation technology provides a new piont for the communication mechanism of red culture

in colleges. At present, the combination of virtual simulation technology and teaching environment has become a new means of educational technology [1]. It can achieve the purpose of simulation experiment by virtualizing the real environment and experimental phenomena. In the virtual experiment teaching, students can use the experimental equipment to operate the virtual experimental objects in the virtual experimental environment to obtain the virtual experience of the real experiment. At the same time, using virtual simulation technology, students can experience situations that cannot be experienced in historical events. Virtual simulation relies on three key technologies to realize the construction of the historical scene of virtual red culture. These three aspects refer to the extraction of 3D data model, data structure, historical scene element data. Red culture is a spiritual force that has been condensed by the Chinese people and the Chinese nation in their history of striving for national independence and national prosperity since the Opium War. The red culture is the historical trace left in this grand historical process. For example, historical relics, museums, cemeteries, former residences of great people and celebrities, places of historical events, war sites and former sites of institutions that can be visited and studied by the public. At present, in order to achieve the optimization of the dissemination of red culture, it is necessary to play a good combination of boxing, promote a variety of transmission methods together, and make good use of the Internet digital platform. The virtual simulation platform provides a good digital platform for promoting the spread of red culture.

2 The Breakthrough of Virtual Simulation Technology in the Mechanism of Red Culture Transmission in Colleges

Virtual simulation technology includes virtual reality technology and simulation technology. Virtual reality technology is a rapidly rising computer technology. It can generate visual, auditory, tactile and other information of simulation through the combination of multimedia technology and simulation technology, so that participants can interact with the virtual environment in a natural way, and participate in the development and change process of virtual environment events, so as to obtain the maximum freedom to control and operate the whole event. The so-called *simulation* is the process of constructing a model to simulate the movement occurring in the actual system. This experimental technology based on the model system is called simulation technology. The application of virtual simulation technology in the dissemination of red culture is mainly through converting red culture IP content into text, pictures, and images. Set up virtual scenes based on the software, including characters, stories, props, etc. The application of virtual simulation technology to cultural communication mainly addresses two issues, the authenticity of events and the effectiveness of participation in the Red Culture IP. This is a question worthy of discussion. But before that, the virtual simulation platform has changed the traditional transmission mode in three aspects.

2.1 Solve the Dilemma of Losing Truth in the Spread of Red Culture

The history of the Red Revolution is real history. The most noteworthy thing is that the red spirit plays a role in motivating students. The spiritual temperament and character

theory contained in the theme of red history itself, the principle requirement for the spread of red culture is always to adhere to the restoration and reproduction of historical truth. On the other hand, in the process of spreading the red culture, we should emphasize the seriousness, avoid arbitrary exaggeration and never subjective imagination. Through the virtual simulation platform, students can experience typical events in the history of Chinese revolution through case study, 3D scenes, animation interaction, chart analysis and other ways.

2.2 Solve the Dilemma of False Red Culture Transmission

The combination of virtual simulation technology and red culture can solve the historical nihilism in society. Restore historical facts through virtual devices, including high magnification of historical stories. The implementation of this technology can solve the frequent problems in the anti-Japanese war drama. For example, in 2011, the State Administration of Radio, Film and Television (SARFT) released the Ruling of the National Filming and Production of TV Dramas for the Record and Publicity [2], which pointed out that when expressing the contents of the War of Resistance and the struggle against the enemy, individual dramas were divorced from historical reality and reality of life, making up nonsense without margin, and entertaining the serious War of Resistance and the struggle against the enemy. By building the red culture into Internet IP and relying on the virtual simulation platform, the historical authenticity will be restored to the maximum extent.

2.3 Enrich the Transmission Channels of Red Culture

Virtual device experiencers can touch historical characters and scenes in a three-dimensional virtual environment, while performing simple operations and obtaining real-time feedback information. This behavior is called human-computer interaction [3]. In this interaction, the experiencer and the subject interact with each other and exchange information with the subject of virtual things. Three-dimensional environment can break through the regional and space-time constraints, and restore the current situation of the event to the maximum extent. Such as the historical facts of taking the Long March road again. Through virtual simulation technology, we can have a comprehensive understanding of why the Red Army should carry out the Long March and finally win with the anxiety of the old squad leader on the Long March.

3 The Path of the Integration of Red Culture Communication and Virtual Simulation Technology

3.1 Development Software Description

The system takes Unity3D as the development platform. Unity3D is a software mainly used to create interactive graphical development environment such as 3D video games, complex scene visualization, and 3D animation. The compilation of software can be completed in various operating systems, and it can be easily released to various system

platforms. It can also use plug-ins to publish web versions, which are widely used in virtual reality related scenes. During the development of virtual reality using Unity3D engine, the model needs to be processed by third-party software and imported into Unity3D to complete the terminal development. Using Unity3D software for 3D visualization development has great advantages. During the development of the simulation training system, it can be compatible with the model attributes exported by a variety of 3D design software, and can be run directly on the client, with strong versatility. The physics engine of Unity3D can simulate the physical phenomena in the real world and make users feel better. It is a relatively simple development method under the condition of meeting the functional requirements of the simulation system at present.

The entire system adopts a hierarchical design method, and the platform development is shown in Fig. 1 [4]. The rendering layer is based on the 3D graphics rendering library OpenGL, providing the generation and rendering of basic geometry. The model layer includes storage models, behavior models, and constraints. The storage model is responsible for constructing three-dimensional modeling of virtual scenes and virtual objects, using an object-oriented hierarchical structure. The behavior model is responsible for constructing various basic behaviors of virtual objects. Constraints are used to associate a storage model with a behavior model. The virtual environment simulation engine is responsible for rendering arbitrary scenes and interpreting the behavior of virtual objects. When developing virtual environment applications, users need to create virtual scenes and objects that conform to the development platform through the C++ API. The simulation engine will automatically generate virtual objects on the computer screen and control their behavior.
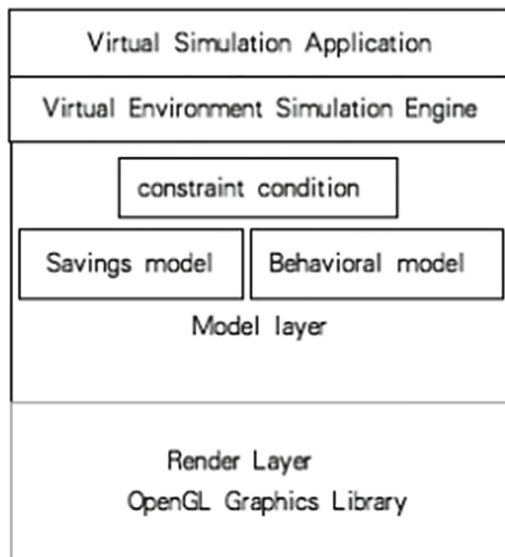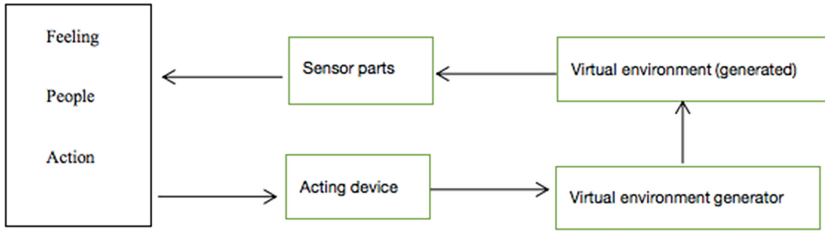

Fig. 1. Virtual world

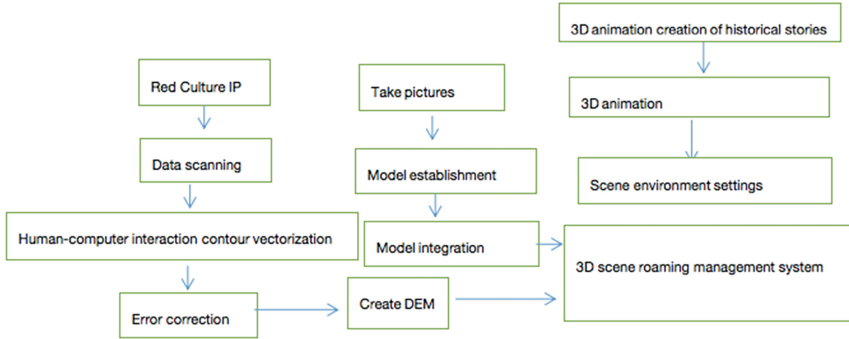**Fig. 2.** Virtual reality system model

Fig. 3. Data input model construction

3.2 System Application Process

In the process of applying virtual simulation technology to learn red culture, students can obtain information mainly by using mobile phones, computers or virtual simulation equipment. That is, through human action, the device in contact interacts with the environment in the past few years, and then integrates into the virtual environment, and outputs it to the sensor device, transforming it into human feelings. As shown in Fig. 1.

Then, Fig. 2 shows the form of data input in the system. First, organize the red culture that needs to be disseminated into an IP, that is, a data packet containing images and text. At the same time, human-computer interaction contour vectorization is performed. After calibrating the error, generate a DEM and input it into the 3D scene management system. At the same time, 3D animation creation and scene environment settings will be performed for historical stories. In addition, there is a need to model image data materials. Finally, input it into the 3D scene roaming system management (Fig. 3).

The specific action mechanism is shown in Fig. 4.

3.3 Student Operation Experience

Users can view the stories formed by 3D virtual characters. At the same time, click one of multiple options on the system display interface, select the correct meaning, and the system will judge the user's selection result. Through an intuitive and concise process, users can better integrate Chinese red culture stories.
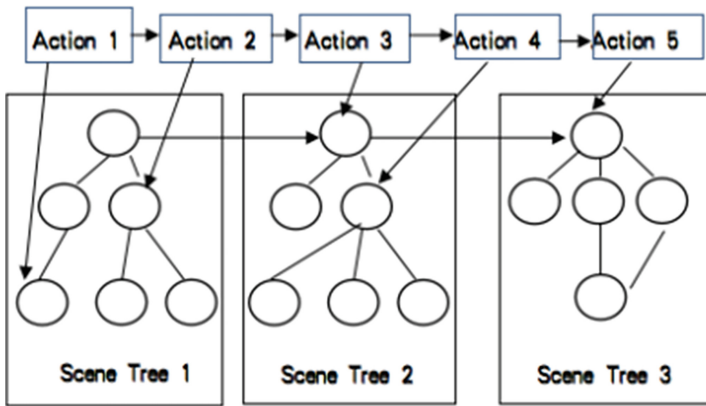
Fig. 4. Action mechanism diagram

Model Format Conversion. Students are able to experience mainly data based processing and the use of platforms, as follows. Unity supports a wide range of model formats, and is suitable for current mainstream modeling software such as Maya and 3D Studio Model formats such as Max, Blender, and Unity3D Studio are supported, including, 3ds, fbx, obj, dae, dxfMaxl, xl, jasl, c4dl, blendl, and other formats.

The supported model formats and attributes are shown in the following Table 1.

Coordinate System Conversion. Different 3D modeling softwares and 3D engines use different coordinate systems. 3D Studio Max modeling software uses a right-hand coordinate system while Unity3D uses a left-hand coordinate system. The coordinate system of the model can be determined using the left hand rule and the right hand rule, respectively. When the X axis and Y axis have been determined, the difference between the two is actually only the orientation of the Z axis. When importing a model that has undergone 3D Studio Max conversion into Unity3D, if the right hand coordinate system is not converted to the left hand coordinate system. Problems may arise when setting the offset of sub objects or special effects attached to the model in Unity, which requires coordinate system conversion before importing the model into Unity 3D.

Scene Visual Simulation. The initialization of a simulation scene mainly includes the loading of models and the creation of light sources and backgrounds. Unity3D is very convenient to load a model, just drag and drop the 3D model into the Hierarchy view and adjust the location parameters of the model. Light sources are an indispensable part of a simulation scene. Newly created scenes often have no light sources, so the entire scene is black, and the entire scene looks blurred. To make the scene clear and clear, you must add a light source component. The shape of the scene is determined by the mesh model used to create the scene model, the texture of the scene is determined by the material texture of the scene model, and the atmosphere, color, and brightness of the scene are determined.

Table 1. Unity Supported modeling software and model formats

variety	network	material quality	cartoon	skeleton
Maya's. mb and. Mal formats	✓	✓	✓	✓
The. Maxl format for 3D Studio Max	✓	✓	✓	✓
Cheetah 3D in. Jasl format	✓	✓	✓	✓
The. c4dl 2 format for Cinema 4D	✓	✓	✓	✓
Blender's. blendl format	✓	✓	✓	✓
Carraral	✓	✓	✓	✓
COLLADA	✓	✓	✓	✓
Lightwavel	✓	✓	✓	✓
Autodesk FBX. Dae format	✓	✓	✓	✓
XSI 5 in. xl format	✓	✓	✓	✓
SketchUp Prol	✓	✓		
Wings 3Dl	✓	✓		
3ds format for 3D Studio	✓			
Wavefront. Obj format	✓			
dxf format for Drawing InterchangeFiles	✓			

4 Conclusion

At present, virtual simulation technology has brought unprecedented space for teaching reform in colleges and universities. And at the same time, it has also produced many problems and misunderstandings. This paper analyzes the application of virtual simulation technology in the dissemination of red culture, and proposes how to integrate red culture into the virtual environment for human-computer interaction. The research of cultural communication using virtual simulation technology is still in its infancy. A great deal of experience and methods and skills in the use of functions and applications of the software need to be summarized. Virtual simulation technology is based on digital intelligence technology in the process of building red culture IP [5]. This research focuses on practice. Of course, regardless of the emphasis on practice or research, the two are inseparable and affect each other at the same time. This technology platform has narrowed the distance between the educated and the knowledge disseminator, and also made the user experience of the educated more comfortable.

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