Analysis on the Application of 3D Modeling Virtual Simulation System in Interior Design

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Abstract. Through the study of the present situation of interior design, using virtual reality technology, through 3Ds Max software for interior design model modeling, material and mapping, eventually import Unity 3D, through the script setting implementation 3 d rendering, and can through human-computer interaction, let a person feel immersive, students through the simulation system, can enhance the design concept in the field of interior design, improve the learning initiative and enthusiasm.

Keywords: Virtual reality; interior design; Simulation system; Unity 3D; 3Ds Max

1 Introduction

The interior design combines technology and art, focusing on practice, aiming to cultivate students' sense of space, artistic thinking, appreciation ability and basic skills [1]. Traditional interior design teaching is mainly two-dimensional design and relies on PPT and video. The development of 3D software has introduced 3D sMax into interior design teaching, realizing the 3D effect, but still lacking of multi-sensory stimulation, it is difficult to inspire design inspiration [2]. It is difficult for art students to understand three dimensions, and their teaching is challenging. With the development of technology, virtual reality technology has entered into interior design teaching, simulating real scenes and providing real sensory experience, thus making up for the deficiency of traditional teaching. Through the virtual simulation experiment system, students can operate virtual objects in the virtual space to improve their learning interest and overall design ability [3].

2 System design

In order to meet the professional training needs of interior design, the interior imitation real training system has been designed [4]. After the system login, it is divided into four modules: model construction, effect design, simulation demonstration and help interpretation [5]. The detailed design structure is shown in Figure 1.

ADDT 2024, May 24-26, Luoyang, People's Republic of China

DOI 10.4108/eai.24-5-2024.2350080

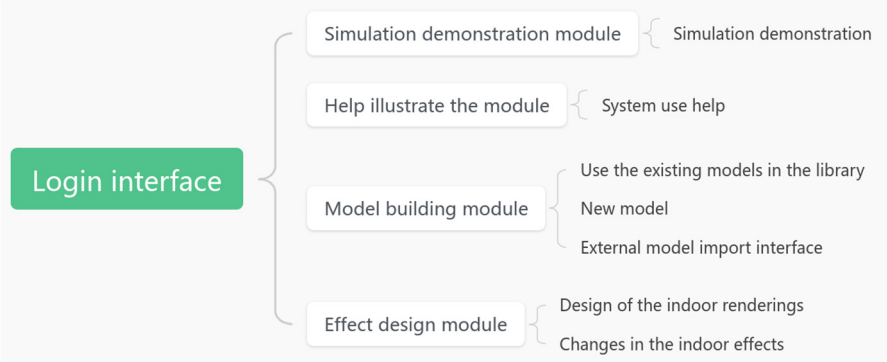

Fig. 1. Structure diagram of the interior design imitation real training system.

2.1 Model building module

In model building module, the main design indoor effect required model, in the system, we design some interior design commonly used model, students when using the system, can through the original model building indoor effect, can also be yourself through the model in 3DsMax software, and then import their model into the system, and provide can import from the external model interface, model is built, the material and map setting, to achieve the effect of the real model [6].

2.2 Effect design module

In the indoor model after all design, can according to the model in the room model, such as design the indoor effect of the sitting room, we can first design decorate the sitting room required sofa model, tea table model, TV model, lamps and lanterns model, etc., and then design the sitting room room model, including the ground, roof, ceiling, TV background wall, etc., and then decorate the living room model all combination, adjust the relative position of each model, set up the overall lighting effect, in order to simulate the real indoor effect.

2.3 Simulation demonstration module

Using the Unity3D platform, through the introduction of the model, and add some script control, in order to achieve the effect of virtual simulation, watch the 3D indoor effect while realizing the 3D scene travel around, and can realize the auditory and tactile simulation, to achieve the feeling of immersive [7].

2.4 Help illustrate the module

Set up the help description module for the system, mainly explaining the functions of the system. The use of the system includes the use of 3DsMax software and the use of Unity3D platform, so that beginners can have the initial conditions of interior design faster, and can also provide self-study entrance for students of other majors.

3 System implementation

3.1 3D model construction

The 3DsMax software is a key curriculum in the field of interior design, involving modeling, material mapping, lighting, rendering, and 3D animation technologies, providing the basis for interior design, film and television production, and game character development. In the training system, we design internal models using 3DsMax and then import Unity3D for interaction design. Interior design effects include the living room, dining room, bedroom, kitchen and balcony. Take the toilet basin model production as an example, first draw the cross section map, with the turning modifier to make the main body, create a cuboid as the handle and water outlet. The basin section is then drawn and the turn modifier is used. Create cylinders and drain holes with a Boolean-operated differential set, turn the basin into an editable polygon and squeeze the drain holes. Finally, create the cutting corner cylinder as a drain plug to complete the basin model, as shown in Figure 2.

In the process of making this model, the quality of the basin and the faucet cross-section is the key to the effect of the 2D line tool. We can use the vertex type and the editable split line tool to continuously modify the graphics to achieve the best results. The effect of the produced basin is shown in Figure 3.

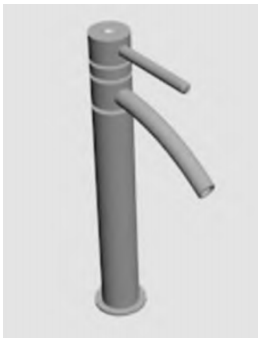

Fig. 2. Tap model.

Fig. 3. Facial basin model.

After making the model, you need to add the appropriate materials and maps. You can use the default material of 3DsMax or the Vray renderer to create more realistic effects. Take the basin model as an example, first install the Vray renderer and set it as the default. Create the VrayMtl material in the Material Editor, set the diffuse to black, high gloss, and reflected gloss, and the reflected channel to light gray. Apply this material to the faucet model to get the stainless steel faucet effect, as shown in Figure 4. Then create a VrayMtl material for the main body of the basin, using the ceramic map as a diffuse map, setting the reflected luster and depth, and the reflected channel is gray. Finally, apply this material to the basin body, as shown in Figure 5.

Unity3D Standard and multidimensional materials for 3DsMax. To ensure the import effect of Unity3D, we performed model rendering and special processing in Vray. In the Vray

rendering map, we saved the diffusion and highlight rendering and used the standard material for the new model, the diffusion map and the highlight map implementation.

Fig. 4. A stainless steel faucet.

Fig. 5. Ceramic basin.

3.2 Unity3D Interactive implementation of the platform

Import 3D model. Simplify the interior design model in the 3DsMax software, set the material and map, and export to (*. FBX) form. In Unity3D, import this file to the Assets folder, and Unity automatically processes it as game objects, grid objects, etc. When used, drag the model into the window and adjust the components and locations.

Problems in the model import process. The difference between the 3DsMax and Unity3D software system settings can cause problems when importing 3D models. The following is a summary of the problems and solutions: ① The model size is inconsistent. When modeling in 3DsMax, setting the system unit and the display unit to centimeters can avoid the problem of size inconsistency after importing Unity3D. ② The model direction is inconsistent. When modeling in 3DsMax, by selecting only affecting the axis through the hierarchy panel, rotating the axis by 90 degrees, and then modeling, the problem of inconsistent direction after importing Unity3D can be avoided. ③ material lost. When exporting 3DsMax, the shader mat file name should be consistent with the map name, otherwise material loss may occur. If lost, it can be added manually and the pilot is put into the project, otherwise the model may be overall gray and the effect is not good.

Interaction design. In Unity3D, the main interaction modes include: rotation, translation and zoom of the model; model selection; model animation operation, add audio and text to the scene; model rotation, translation and zoom operation can be operated with the mouse or the touch screen; in the animation process, usually use the code JavaScript and C#, or use the Unity3D animation system to realize.

For the example of rotation, translation and zoom interaction of the model, the method of interaction design in Unity3D is briefly introduced. If on the PC, the mouse can be used; if on the mobile terminal, it needs to be combined with the touch screen. Part of the code is as follows:

```
public class Pingyi
{void Update( )
{now Time = System. DataTime. NOW ;
System. TimeSpan py1 = new System. TimeSpan (old. Ticks);
System. TimeSpan py2 = new System. TimeSpan (now. Ticks);
System. TimeSpan py = py2. subtract (py1) . Duration( );
if (py. seconds > 8&&!  Input. anykey)
{flag_Roable = true ;
old = System. DataTime. Now;}
if (Input. touchCount > 1)
{if (Input. GetTouch (0) . phase == TouchPhase. Moved || Input.
GetTouch (1) . phase == TouchPhase. Moved( )
{vector2 temp1 = Input. GetTouch (0) . position; vector2 temp2
= Input. GetTouch (1) . position;}
if (isEnlarge (old1, old2, temp1, temp2)
{float oScale = transform. localScale. a ;
float nScale = oScale * 1.025f ;
Transform. local = new Vector3 (newscale, newscale, newscale);
}}
else
{float oScale = transform. local. a ;
float nScale = oldScale / 2.025f ;
Transform. localScale = new vector3 (newscale, newscale,
newscale)}}}
```

4 Evaluation and analysis of the teaching effect

Students majoring in interior design usually have the foundation of graphic design, but in the 3D model design, some students are difficult to fully understand all angles of the model due to the limited 3D spatial thinking ability. Although a single model is simple to make, the complex rendering design is poor. After the introduction of the system, students can use the self-made or system library model to simplify the 3D space understanding through interaction design, overcome the lack of abstract ability, make the rendering design learning simple, and stimulate the independent learning ability. In order to quantitatively compare the design effect of 3D modeling virtual simulation system, one-way analysis of variance was used before and

after the design implementation (see Table 1). Before the implementation of the design was 80.26, which is higher than the average score of the design implementation of 77.80, indicating that the mixed teaching reform of the course has a good learning effect.

Tab. 1. Descriptive statistical results.

Contrast item	Sample number	Mean	SD	SEM	CI (95%)	Skewness	Max	Min
Traditional teaching	134	77.80	10.57	0.91	[76.0, 79.6]	-3.060	95	58
Using 3D virtual simulation teaching	129	80.26	7.82	0.69	[78.9, 81.6]	-0.268	97	61

5 Conclusion

Students majoring in interior design have a good art foundation, but they have shortcomings in 3D space abstraction ability, computer software operation, network technology and programming scripts. In order to improve students' professional skills and meet the needs of society, we have been adjusting the training objectives and curriculum. Virtual reality technology is introduced in the teaching, and the simulated virtual reality experiment system is built, providing an independent, open, interactive and scientific learning platform, breaking through the 3D space restrictions, enriching the teaching forms, and reducing the difficulty of teaching. The system can be used for the preview, classroom interpretation, review and integration stages of 3D modeling courses, support external 3D model import, and enhance learning flexibility and interactivity. Students can control the scene through the mouse or external equipment, to obtain an immersive experience, improve the learning effect, and stimulate their interest in learning.

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