Research on Interior Design Strategy Based on Optimization of Computer Renderings Production Process

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Abstract. Interior design is the use of visual language to disseminate information, which is often expressed on the basis of aesthetics and visual psychology. Aiming at the problems of weak modeling accuracy and low versatility, this paper uses computer technology to optimize the rendering process, that is, by optimizing the computer modeling process, changing the production steps, comprehensively considering lighting, materials, etc. for rendering, from actual needs To set out, make renderings more suitable for interior design, effectively improve the speed and quality of interior design renderings, enable students to master more practical production methods, and improve the effect of teaching.

Keywords: Interior Design, Computer Renderings, Process Optimization

1. Introduction
With the rapid development of social economy, interior design has gradually become one of the popular research directions, and renderings is a professional course for interior design majors [1]. Architectural interior design is very practical. Establishing an interactive relationship between teaching and practice is an important part of cultivating interior design talents. Learning from the engineering education model, the basic theory teaching, professional practice and curriculum design in teaching activities are all Combining with engineering practice allows students to learn in an active, practical, and organic way between courses, and cultivate students' engineering practice ability [2-4].

Computer renderings have become the mainstream choice for interior design renderings with the advantages of rapid drawing and real simulation. Compared with paper graphics, they have gradually become a professional compulsory course for interior design. The usual process implementation method is to first evaluate the model size, build the model according to the size, then use the plug-in to set the model material, render the result map according to the lighting effect, and use Photoshop for post-processing. However, in the whole process, problems such as inaccurate modeling and low efficiency of drawing may be caused by problems such as accuracy and operation sequence [5, 6].

Therefore, this article attempts to use computer technology to decompose the modeling process and steps and consider factors such as lighting and materials to solve the problems of model inaccuracy and slow drawing speed.
2. Principles of software project curriculum system setting
In accordance with the vocational education goal of "employment-oriented, service-oriented", students are trained to have good professional ethics and professional qualities, proficient professional skills, and have the ability to sustainably develop after taking a professional position. According to the production process of indoor renderings, the software course system is reconstructed, structured courses are built, and the post groups in the architectural decoration industry are effectively connected.

2.1. Task-driven principle
According to the internal connection between the various software courses, following the teaching rules and the construction sequence of students' experience, the various software courses are rationally arranged and combined to form an organic course system. Combine theoretical knowledge and technical knowledge with tasks as much as possible, compile knowledge and skills into project courses as much as possible, and express work tasks in the form of "nouns + verbs" to make the goals of the course clearer. Stronger sex, and closer to the job requirements.

2.2. Project decomposition principle
Combining specific projects, the task of making indoor renderings is further divided into several courses for setting, such as SketchUp interior design performance, 3D Max interior renderings production, Photoshop program performance and layout design three courses, which integrates "interior design, Model creation, material rendering, post-processing" 4 tasks. The courses obtained after splitting the tasks in combination with the project have more project curriculum characteristics, and the content of their learning is more specific, which is more conducive to cultivating students' professional ability.

2.3. The principle of progressive experience
The project curriculum requires that the curriculum be arranged in accordance with the principle of students’ progressive experience. An important problem to be solved in the vocational education curriculum is how to combine the curriculum with the students’ own experience so that the curriculum can truly become a student’s curriculum. Students love these tasks from the bottom of their hearts, and happily follow their teachers to complete these tasks, and in the process improve their ability to discover, analyze and solve problems, and at the same time learn relevant knowledge, develop relevant skills, and cultivate collaboration and innovation capabilities. Generate a sincere sense of accomplishment and self-confidence.

3. Optimization of computer renderings production process
This article has made improvements to the shortcomings of this process: Import CAD drawings, "build models in 3DMAX, to help students understand the correspondence between drawings and models; change the original order of setting the material first and then setting the light to first Set the lighting and then set the material, so as to be suitable for the production of indoor renderings, and improve the students' ability to observe the scene; separate the lighting and material tests to deepen students’ understanding of the rendering parameter function; when the pictures are officially released, use "run “Small picture, big picture” method can improve the rendering speed of large pictures, and help students master practical skills to improve efficiency; after rendering the picture, save it into a better quality TIF format, and use the material conversion plug-in to generate the channel picture to overcome the self-defense of TGA format. The channel map with only 24 kinds of material shortcomings, so that students can master the general drawing format and drawing method. Figure 1 is the improved flow chart. In order to better illustrate this process, the author uses a project to make a bedroom Take the effect drawing as an example, explain in detail how this process can improve the drawing effect and improve the quality of teaching.
3.1. Increase the import of CAD drawings to improve the accuracy of the model

The first step in making renderings is to build a model. When modeling with 3DMax in the textbook, the size of the bedroom model is determined by looking at the CAD drawings. However, there are many design drawings (plan, elevation, section, detail, etc.), manual searching is time-consuming and laborious, and if the size value is wrong, the model made will be wrong. Therefore, the author adopts a more direct method: import CAD drawings into 3DMax, and build models based on the drawings. In this way, time is saved and the accuracy of the size can be ensured.

1) Delete the redundant parts in the CAD drawings and save the drawings as CAD files respectively.

All the drawings of this bedroom are placed in a CAD file, which is very complicated. To build a model of this bedroom, you need to know the dimensions of the bedroom's plan and elevation, so keep 1 plan, 4 elevations, and 1 ceiling plan. Other content irrelevant to this, such as dimensions, text descriptions, door and window drawings, detailed drawings, etc. are all deleted. Then, save the retained graphics into 6 CAD files.

2) Import CAD drawings into 3DMax and build models according to the drawings.

Run the 3DMax software and use the "Import" command under the "File" menu to import the previously saved CAD files into 3DMax one by one. Special attention should be paid to the
placement of the plan, elevation, and ceiling. The floor plan is aligned up and down with the ceiling map, the west elevation is aligned with the front and back of the east elevation, the north elevation and the south elevation are aligned left and right, and the four elevations are aligned with the floor plan and ceiling map.

Next, make the ground according to the plan, make the walls, doors and windows according to the elevation, and make the ceiling according to the ceiling picture, so that a model of accurate size can be made. The 3D solid model of the bedroom in Figure 3 is the 3D solid model of the bedroom built based on 6 imported CAD drawings. Observing each face of this model, they can be consistent with the corresponding CAD drawings, so the model made by this method is accurate.

This method connects CAD drawings with 3DMAX modeling, so that students learn how to build models with the correct size, help students intuitively understand the relationship between two-dimensional CAD drawings and three-dimensional models, and understand their drawing and modeling capabilities. The improvement is very useful.

3.2. Change the order of setting lights and materials to make the settings of lights and materials more intuitive

After modeling, we faced the problem of setting materials and lighting. In the textbook, we used the method of setting the materials first and then the lighting. The author found that this sequence has a shortcoming when processing the bedroom renderings: the perspective of the bedroom is inside the model. Although 3DMAX has two default lights, since the model we built is an entity, the light of the light cannot penetrate the model. There is no light, and the bedroom is completely dark, so even if the material is set, it is invisible.

Furthermore, as a beginner, students don’t know how to set a material to show its texture. In addition, you can’t see the effect of the material in the scene, so even if you follow the steps in the textbook to finish the material setting, it’s just a picture of a cat. That's it. Therefore, in the teaching, the author uses the lighting to illuminate the interior of the bedroom first, and then sets the material. In this way, when there is light in the bedroom, the material can be seen, and students can directly observe the setting situation in the scene view when setting the material, so that they can have a more intuitive experience. Moreover, this setting sequence applies to all indoor renderings.

There are n materials \( u_1, u_2, \ldots, u_n \) to be evaluated. A multi-index evaluation system composed of \( m \) indexes \( x_1, x_2, \ldots, x_m \), \( x_j = x_j(x_i) (i = 1, 2, \ldots, n; j = 1, 2, \ldots, m) \) is the evaluation data matrix (decision matrix) of the evaluated material \( u_i \) with respect to the index \( x_j \), which can be expressed as equation (1):

\[
y_j = f(x_{i1}, x_{i2}, \ldots, x_{in}), i \in N
\]

Among them, \( f \) is a positive transformation function; \( y_j \) is the comprehensive evaluation value of the evaluated material \( u_i \), and \( u_1, u_2, \ldots, u_n \) is sorted according to the value of \( y_1, y_2, \ldots, y_n \) from large to small to complete the comparison of the advantages and disadvantages of \( u_1, u_2, \ldots, u_n \).

3.3. Set different rendering parameters for different test purposes to improve test accuracy

When setting lights and materials, we often encounter many problems: light exposure, the color of the object is too dark, etc. Before the official release of the picture, these problems must be solved by adjusting the lighting and materials. In order to discover these problems in the textbook, a set of rendering parameters with relatively low values are set in the VRAY renderer to test the effects of lighting and materials, and adjust them according to the test results.

However, the author believes that the focus of lighting and material testing is different. For different test purposes, the test is divided into two: After setting the light, set the parameters in Table 1 (related to light calculation) to test; set the material and test.
Table 1. Main parameters of lighting test.

| Rollout          | Parameter name         | Value               | Features                                           |
|------------------|------------------------|---------------------|----------------------------------------------------|
| Indirect lighting| First rebound          | Luminous map        | Calculate the first diffusion of indirect lighting |
|                  |                        | 1.0                 |                                                    |
|                  | Second rebound         | Exhaustive          | Calculate the secondary diffusion of indirect lighting |
|                  |                        | Calculation 0.9     |                                                    |
| Glow map         | Current preset         | Low                 | Calculate the indirect lighting of a specific point in the scene |
| Color mapping    | Types                  | VR-Reinhard         | Control exposure                                   |
| Global switch    | Alternative material   | Check it and drag a blank shader to the "NOTE" button | All the materials of the model are replaced by blank materials to speed up light calculation |

By setting two sets of test parameters, students can better understand which parameters in the renderer are used to calculate lights and which are used to calculate materials. In the future use process, they can set the corresponding parameters according to different purposes.

3.4. Increase the rendering of small photon images to improve the output speed of large images

To make the solid model of the bedroom into a two-dimensional rendering, it needs to be rendered and output with a VRAY renderer. The calculation process of the VRAY renderer is to first calculate the photons, also known as rendering the photon map, also known as running light, or running GI, and then perform other calculations, and finally generate an effect map. Among them, the time spent in the process of calculating photons is closely related to the size of the graph (the smaller the graph, the faster it runs), and the size of the graph does not affect the result of the photon calculation. It is time-consuming to run the big picture rendering directly in the textbook. According to the law of running light, first use the small image to calculate the photon, and save the calculation result as a photon image file. When officially rendering the big picture of the bedroom, directly call its photon map file, so that there is no need to calculate the photons of the big picture, saving the time of running the big picture.

The method is: 1) Save the photon file: open the "rendering settings" panel, after setting the rendering parameters according to the textbook, uncheck "render final image", and control the image ratio of the photon image to the larger image within 1:5, such as final. The size of the rendered large image is 1500×1125, then the photon image can be set to 500×375, set the photon image file name, and then render and save. 2) When the image is officially rendered, set the final output size in the output size, and then call the photon image file to render the large image.

For graphics with a large number of models and complex materials, the speed of running small images is much faster than running large images. The small picture runs out, and the method of rendering the big picture is a very practical way to improve the rendering speed. It helps students master practical skills and is also a purpose of teaching.

3.5. Save the effect map as a TIF file, change the generation method of the material channel map, and adapt to the production of other effect maps

The rendered renderings generally have the shortcomings of dark colors and low contrast. The processing process of the textbook is: save the rendering result of the model into TGA format and channel map, and then modify it in PHOTOSHOP. The reason for using this method is to consider two factors: TGA file is a lossless compressed file with good image quality; Moreover, TGA format has channels, and the channel map will be automatically generated when output to TGA files. However, the TGA format is a video format. Compared with other image formats, the definition will be lower;
furthermore, the channel that comes with TGA can only set up to 24 materials. If there are more than

3.6. Materials in the model
This method cannot be used. So it cannot be applied to all situations.

In order to solve these two problems, first change the file type after rendering to TIF format with better image quality in the renderer settings. But the TIF format does not have a channel, how to solve this problem? The method is to use the material channel conversion plug's to convert the material into a channel, and then become a channel map after rendering and output. The specific operation of making the material channel map is as follows: download the channel converter from the Internet and become a 3DMax plug-in after installation. When in use, select the "MAXScript" menu "Load Script" to run the plug-in, you can convert the material into a channel, and finally render the channel map and save it. It should be noted that this conversion is irreversible. You must save the 3D file before converting to a channel. When you close 3DMax after saving the channel map, choose not to save the file, so that the channel conversion operation will not be saved. Woke up.

Put the channel map and the effect map in the same PS file, use the channel map to help pivot the map, and then process the brightness and saturation of various materials respectively. After processing, the entire effect map is in color brightness, light and dark contrast, and clarity And other aspects have been greatly improved. This method has a wide range of applicability and can be used in situations with more model materials.

4. Conclusion
With the development of social cultural life and commercial information activities, graphic design has increasingly shown its outstanding vitality and broad development prospects, especially in the application of interior decoration. This article attempts to use computer technology to optimize the modeling process by decomposing the modeling process, comprehensive material, lighting and other parameter adjustments, starting from actual needs, and making renderings suitable for interior design.

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