The Construction Strategy and Application of Virtual Reality Studio for Art Design Specialty

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ABSTRACT
Virtual reality studio is helpful to create immersive design space and expand creative expression form, which has important application value in art design specialty in colleges and universities. Guided by the OBE concept (Outcomes-based Education), the studio construction is highly effective and consistent, and provides timely feedback that is lacking in computer-aided design or traditional media. It is helpful to enhance students' sense of space and experience, and has a strong auxiliary role in project practice.

Keywords: *Art design, Virtual reality, Studio construction.*

1. INTRODUCTION

From imagination and creativity to expression, communication and realization, designers should shorten the distance by various means to make the design works better expressed (Pérez-Gómez and Pelletier, 1997). The construction of virtual reality (VR) studio in art design specialty of colleges and universities can play an auxiliary role in many fields, such as resource or labor sharing in the initial stage of design, collaborative design supported by computers, design product expression and so on. VR can not only provide virtual resource library and novel design platform for teachers and students of art design specialty, but also performs well in researching, communicating design intentions and presenting design results.

Art design specialty is a comprehensive major. Combining with art creation, design thinking and technology application, it is to cultivate high-quality technical and skilled talents with strong art design ability who are engaged in art design, e-commerce art design, arts and crafts, creative design and production. Its curriculum contents are rich. In recent years, with the continuous development of digital technology, the combination of virtual reality technology and art design has been popular, which has attracted the attention of the market. The construction of virtual reality studio in art design specialty helps students to get in touch with cutting-edge technology and market trends.

The virtual reality studio of design specialty in colleges and universities refers to the studio with virtual reality equipment and technology. Its main direction can be divided into two categories, that is, to produce art design works with the use of virtual reality technology and carry out the design collaboration in virtual reality environment. These two directions have certain practical values for students majoring in the related majors. Virtual design studio provides a hybrid tool composed of design practice and engineering simulation technology (Pelken, 2013). Taking environmental art specialty as an example, architectural design in virtual environment has been widely used as a method of design simulation and display. In the field of education, virtual environment has also been successfully used to research, communicate and display architectural design (Marc, 2011). In the future urban planning process, the use of virtual reality (VR) model will continue to increase. (Suneson, 2008) At present, there are many related software platforms in the market, with a wide range of options. There are many free or low-cost platforms and material libraries to choose from, reducing the threshold of studio construction. For example, in order to attract more designers to use the VR software "Gravity Sketch", the core creation

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functions are open for free. This software allows designers to create 3D content directly in the VR environment. Previously, Ford Company used this software to design a concept car in VR, which took only 40 hours. Usually, it takes several months to use CAD and 2D design modeling.

2. THE SIGNIFICANCE OF CONSTRUCTING VIRTUAL REALITY STUDIO

2.1 Attaching Importance to Outcome

If the purpose of establishing the classroom is to impart knowledge and skills, the purpose of constructing the studio is to attach importance to the output of actual results. Different from ordinary teaching, it is often to select some students who are interested in the project when constructing studio, and these students can learn while doing in the actual project process. Therefore, the abilities of students can be improved, and at the same time, the relevant results will be completed.

Virtual reality is a technology that uses computer, electronic information and simulation technology to simulate a three-dimensional virtual space, and realizes a highly immersive sensory experience through the characteristics of virtual existence, multi-perception and interaction (Hu Fenghua, 2009). Virtual reality studio needs certain equipment and environment to create a better immersion effect. In view of the equipment and space needs, the studio should be set up reasonably according to the project content, and carry out personnel division and equipment setting by creativity design experience feedback. Virtual reality has the characteristics of multi-perception, telepresence, interactivity and autonomy, and the true simulation and display of design can be realized. (Wang Guangxin, 2010) This method is novel and highly operable, and also can help to stimulate students' initiative and increase the practicality and realism of design teaching.

2.2 Carrying Out Design or Design Collaboration in Virtual Reality Environment

In the past, design collaboration is carried out through virtual reality, mainly focusing on design simulation and display. In the environmental art specialty, virtual environment has been widely used to study, exchange and display architectural design, interior and outdoor design, etc. With the rapid development of digital technology, the threshold of related technology has been lowered. Through relatively simple setting and production, people can exchange or enjoy 3D space environment in a more free and novel way.

With the development of technology and the improvement of data platform, the design itself can also be completed in the virtual environment. Through the relevant software and resource library, students can design in the way of cooperation or sharing, and easily communicate, modify and backtrack in the design process. It is true that the changes of design platform, software and hardware will not change the meaning of design itself. However, immersive environment is helpful for designers to conceive, understand and communicate. Skilled application will also have a certain impact on the perception of three-dimensional space environment.

3. STRATEGIES FOR CONSTRUCTING VIRTUAL REALITY STUDIO

3.1 Carrying Out Studio Teaching Process Design Based on OBE Mode Design

The OBE (outcomes-based education) is student-centered and based on specific learning outcomes. In view of the core characteristics of OBE and the support that virtual reality studio can provide, it is found that OBE is highly relevant and can form a complete process of practice, achievement, feedback and improvement.

With the continuous improvement of the software and hardware platform, as well as the actual demand of the market, the enterprise projects mainly in the form of virtual reality technology are growing in recent years. The changes of the market lead to the updating of the professional ability requirements of relevant employees. The corresponding school-enterprise cooperative project, college students' entrepreneurship and innovation projects and various discipline competitions are also emerging. Taking the actual project as the main content of the studio, on the one hand, it can shorten the time for students to adapt to the workplace in the field of relevant technical ability; on the other hand, it can also concentrate the limited equipment and resources, which is helpful to cultivate students and improve the degree of completion in the actual project. (see "Figure 1")

3.2 Student-centeredness

Studio construction is in the form of a high degree of students' autonomy, instructors' guidance and enterprise cooperation, which is different from the general teaching classroom and can develop the ability of students more directly. The studio is equipped with professional equipment and teaching resources, and students can use at any time. In the form of diversified teaching participation, professional teachers and enterprise technicians are invited to guide students' specific problems, and there is no need to make distinction among disciplines, so as to give full play to the advantages of interdisciplinary integration. The studio allows students to carry out division of labor, self-management, project management in the form of enterprise and logic. Everything is centered on students' needs, scheduling available resources, and reasonably formulating management system and project process.

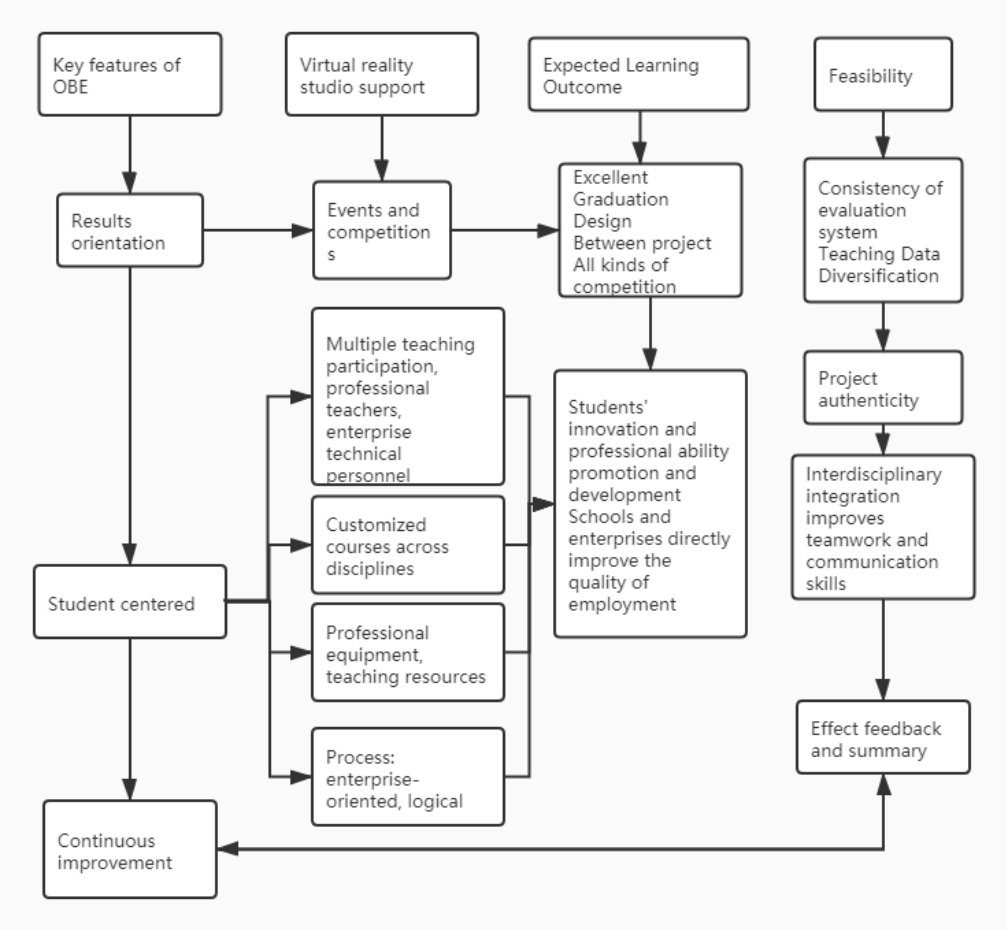

Figure 1 Consistency comparison between OBE teaching model and virtual reality studio.

3.3 Continuous Improvement

Studio is an established learning environment for design and art creation. Collaborative learning and design have been proved to be able to improve students' actual output efficiency and ability. In addition to fully mobilizing the enthusiasm and creativity of students, the fixity of the studio is very helpful for project retrospective and feedback. Virtual reality is a technology based on the sense of experience. Its related products and works of art focus on stimulating the sensory and psychological experience of the experiencer. It often needs long-term and large-scale experience feedback to test the quality of related results. The research on feedback data and project effect is helpful to reflect on the problems in project promotion and studio construction, and the efficiency and quality of the studio will be improved.

4. STUDIO PRACTICE CASES

In order to confirm the above content, a virtual reality design project is set up to observe how

students learn effectively in the studio, and how to affect the design process and results. The project is named "virtual reality performance of urban square design".

During the project process, it is first to introduce VR cases, so that students can learn and experience in an immersive way; second, it is to guide the project, and students can understand the requirements of the project; third, it is to group and assign the person in charge, so that students can use the virtual design platform to exchange their creative ideas; after students submit the design scheme through the platform, the instructor will review it; when the design scheme is prepared, the students will be divided into groups according to the requirements, and the design and development on the virtual reality software platform will be carried out; after the completion of the project design, the works are displayed and released; finally, the instructor leads the students to give feedback and reflection on the project.

In order to practice the characteristics of virtual reality studio, the project members are divided into two groups in the design and development process, and the city square environment and facilities are established on the same platform. A student is appointed as the co-leader of the two groups to coordinate the design contents between the two groups. It is worth noting that most of the coordination work is done directly through online collaborative design on the virtual reality software platform. The platform has the functions of remote design and network synchronization. During this process, in addition to the application of VR headwear equipment for effect test, other design contents can be completed in any environment with computer software conditions, which improves the efficiency of project implementation. The project leader can check the project process and make the coordination and communication at any time through the terminal. (see "Figure 2")

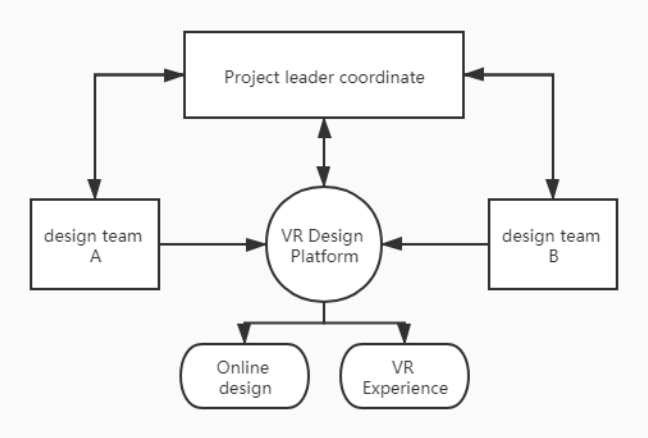

Figure 2 Project division and process.

Before the beginning of the whole project process, the members of the studio team have learned how to use the equipment and platform through training and teaching, and the members of the project team have basic design thinking and ability according to the division of labor. At the beginning of the project, the instructor introduced the project case and explained the technology. However, the main purpose is to clarify the ideas and specify the plan for the students. In the design process, the teacher did not provide special support and help for the creative communication and design development between them.

5. DISCUSSION

After the completion of the project, students' feelings and opinions on the implementation of the studio project will be collected and sorted out through the questionnaire survey. It can be seen that students majoring in environmental art specialty have the basis of making three-dimensional renderings and adapt to the virtual environment more smoothly. Compared with other students majoring in art design specialty, they may be more likely to accept this design method completely based on the virtual platform. The platform provides a rich model resource library, which is also convenient for students to improve the design efficiency and the design perception of drawing development.

Most students think that the virtual reality studio improves the efficiency of project completion, while a small number of students think that the initial familiarity with the platform is a little longer than that expected, but they finally adapt to it smoothly. The overall feedback to the virtual reality studio is positive. The virtual environment provides users with timely feedback that is lacking in computer-aided design or traditional media; and virtual reality environment is experienced through movement and interaction, which is helpful to improve students' sense of space and experience. Although this method will be restricted by the operation of hardware and software at the beginning of use, its effect will increase exponentially after forming a long-term stable design process and having a certain degree of proficiency.

6. CONCLUSION

In recent years, virtual reality design language has begun to show the characteristics different from that of traditional language, and its growing market and application mode also shows that designers are constantly developing new display methods and tools. In the academic and educational environment, this kind of exploration is also very obvious. Ten years ago, many colleges and universities did not allow students to use computer-aided design, and hand-painted drawings were considered as one of the "orthodox" design standards. Now, many software technologies have been known to students even before they enter the school. The restrictions brought by the technical threshold are gradually reducing, and the technological progress and mode innovation may not bring positive effect. However, the innovation of ideas and methods will not stop. These are also one of the driving forces of education reform and important factors that education practitioners cannot ignore. No matter which way is used to build the design studio, the aim of learning outcomes and student-centered improvement will not change, and the construction of virtual reality studio cannot deviate from this principle.

AUTHORS' CONTRIBUTIONS

This paper is independently completed by Dan Qian.

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