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Application of virtual reality technology in the space teaching of Landscape Architecture

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***Abstract*—This paper focuses on the characteristics of the contents, methods and means of landscape architecture space teaching, combined with the background , puts forwards that the virtual reality technology, as a means of interactive, immersive and ideal information technology, promoted the development of basic space teaching of the landscape architecture, changed the drawbacks of the traditional landscape architecture space teaching, and optimized the teaching effects of in the courses of basic knowledge learning, exploring learning and experimental training, improved the student's learning interest on the basic courses.**

Keywords-virtual reality technology; landscape architecture; space teaching

I. LANDSCAPE ARCHITECTURE OVERVIEW

Landscape Architecture is a comprehensive course to create a beautiful outdoor realm for human using science and art means. Some basic features of the landscape architecture course are generally acknowledged in the field of professional education, such as integration, space and practicality.

Integration means that this course involves in philosophy, literature, arts, fine arts and science areas, the specific content of the coverage is also wide, including urban planning, architectural design, landscape art, ecology, botany, public art, public space, facilities, urban sculpture, etc. It is an integrated design to the human survival environment from macro to micro.

Space means that the context of the landscape architecture design expands with the social development, but its carrier "space" is basically unchanged, still containing three aspects of relationship between thing and thing, person and thing, person and thing. The environmental ecology (nature) and behavior culture (humanities) respectively belong to the level of object and subject, the space environment is closely linked to man and nature.

Practicality is another fundamental feature of the landscape architecture course. Both the traditional garden and the modern landscape can not just stop at the level of description and analysis. It should complete the human understanding and life needs through the process of planning, design and construction, and turn the design ideas into the reality of space and form.

II. VIRTUAL REALITY TECHNOLOGY PARTICIPATING IN THE LANDSCAPE ARCHITECTURE SPACE TEACHING

A. Virtual reality technology

Virtual reality technology, also known as virtual environment technology, refers to the technology using computer to generate a simulated environment, through a variety of special equipment, allowing the user to "input" to the environment, realizing the direct natural interaction between the user and the environment.

The virtual reality technology is a brand new integrated information technology arising at the end of the 20th century. With the characteristics of interactivity, immersion, and ideal etc., this technology causes great concern in various fields of natural sciences and social sciences. Now Virtual reality technology is infiltrating into almost all fields of human society.

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B. *Space teaching in landscape architecture*

Space is one of the characteristics of the landscape architecture. It is an important segment to train the ability of the overall feeling of space and shaping of space, because the design process of a program is a process of space analysis, space creating and space implementation. Space is the main target of the landscape architecture study, also is the bridge and link to involve the creativity to the design objects and design requirements, so it should be an important part of teaching. In the process of teaching, the emphasis should be put on the training of the ability of space study and space control, and developing the overall space-oriented way of thinking.

The content of traditional space teaching is focused on surface morphology creation, space limit, space combination and space modeling. Now, with the teaching reform, space teaching is gradually developing into the awareness of "whole space teaching". Based on the traditional teaching content, some knowledge like "preliminary environmental awareness and experience", "spatial behavior", "spatial configuration" are added, to guide students in the space design process using a more holistic perspective to deal with the relationship between the space and the environment, thus breaking the one-side and isolation of traditional teaching.

Based on the reform of landscape architecture teaching, the teaching methods are facing new challenges. Traditional teaching methods are basically in two ways: one is the form of language, including the lecture method, the conversation method, discussing method and reading guidance method, the other is the form of practical training, including exercises method, experiments method and practice method. Traditional teaching methods can solve the students' mastery of the basic theory of space design, but it's difficult to promote the smooth docking of the basic theory and design practice because of the students' lack of control and cognition of the overall space. So now, space teaching gradually begins to pay more attention to space practice and demonstration method.

C. *Advantage of virtual reality technology to participate in the space teaching of landscape architecture*

Virtual reality technology has been used and developed in the landscape architecture design process, but rarely used and studied in the teaching process. The advantages of visualization and experimentation of virtual reality technology can bring a new experience for the teacher's "teaching" and the student's "learning".

First, the description of virtual reality systems to the landscape architecture design space is real-time, interactive, dynamic and proactive. So students can "walk into" the space at any time and at any stage, personally feel the scale, material, texture and even sound of the space. It's much easier than the use of two-dimensional teaching picture to grasp the concept of space, so it's favorable to strengthen the space modeling method and deepen the understanding of the space characteristics.

Second, virtual reality technology allows teachers to select a specific angle in real time to allow students to observe according to the needs of the lectures. For example, some important landscape node space could be booked in advance using VR technology, and the conversion of the scene can be positioned directly in space in real time via the mouse.

Third, the virtual reality technology allows the editing of the design elements of space. In the learning process, students can try creative changes in the existing space to increase the interactivity of teaching, and turn the space modeling in the design of the application process into a visual experience to enhance students' interest.

In short, if immersed in a more realistic learning experience in each circumstance, the students' thinking, creativity and interest will be greatly inspired. Virtual reality teaching formed by the virtual reality technology will cause benign changes in concept, content and means of the landscape architecture space teaching.

First of all, in terms of teaching concept, virtual reality teaching has broken the traditional teaching mode of "taking teachers as the main body". In that traditional mode, students will always be in the position of passive learning, and the active learning will be hindered. The environment created by

virtual reality teaching takes the course instructor as the students' thinking guide, so as to stimulate innovation, to educate students to complete self-thinking and self-exploration in their own visual space.

Secondly, in terms of teaching content, virtual reality teaching has changed the external form of the teaching content. Based on the external form of simple images, text and recordings, it added more vivid human-computer interactive and multimedia technology. To the abstract general concepts and principles, it uses three-dimensional real virtual technology to simulate the reality process, rather than the description with text and voice. The teaching content could be performed in the most effective way, and it overcomes the drawbacks of single media and difficulties in coordination.

Finally, virtual reality teaching showed us the advantages of "heuristic teaching", "interactive teaching" and "situational teaching". Virtual reality technology can be a direct transmission of information, creating intuitive image via real and self-controlled human-computer interaction, to enhance students' interest in learning, to stimulate students' active thinking, to meet the different space location and distance constraints, to take teachers in long distance and students in scattered locations in a common virtual space, even to complete the same space design training through common participation and collaborative operation.

III. USING OF VIRTUAL REALITY TECHNOLOGY IN THE LANDSCAPE ARCHITECTURE SPACE TEACHING

In the landscape architecture space teaching process, virtual reality technology can be effectively used in the segment of basic knowledge learning, exploring learning and experimental practicing.

A. Virtual reality technology applied to basic knowledge learning

Virtual reality technology can be used to effectively prove the space modeling principles and basic knowledge, to enable students to understand abstract and creating approach of space modeling in the shortest time. It can even turn the changes in space planning structure and design, difficult to observe in real life, to a vivid, realistic and emotional learning material, to help students solve the difficulty of learning the basic knowledge, to learn the application of knowledge more intuitively.

B. Virtual reality technology applied to exploring learning

Virtual reality technology can be used to simulate the various assumptions put forward by the students in the learning process, so that students can directly observe the result or effect of this assumption. Using this method, it can inspire students to dare to hypothesize the development of creative thinking, to develop students' ability to innovate.

C. Virtual reality technology applied to experimental Practicing

Virtual reality technology can be used to create a space experiment platform to test learning outcomes. The students can use a variety of factors and space modeling approaches learned in the space teaching, to create a space environment, and make it visualized through virtual reality technology. In the virtual landscape space laboratory, students can repeatedly modify and demonstrate their own landscape architecture, and study the four-dimensional simulation after adding the "time factor", to truly feel the art of time. They can also carry on studies of mutual impact of space and other factors, such as lighting conditions, climate characteristics and hydrological conditions. In the way, it will increase the contact of space-based teaching and other professional teaching, so students are able to establish the overall design concept.

IV. CONCLUSION

Virtual reality technology can provide us the perfect scene realization and human-computer interaction. These capabilities will open a new chapter in education and teaching, and make landscape architecture space teaching no longer a rigid, difficult course to grasp. With the development of virtual reality technology, there will be more progress in the teaching methods and means of landscape architecture.

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