Research on Virtual Simulation Technology in Environmental Design Major Course

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Abstract. The discipline structure of environmental design is relatively complex, with comprehensive, practical, artistic, scientific and technological characteristics. In the major of environmental design, various technologies such as immersion, interaction and experience can be applied in the practice of environmental design. By building an interactive virtual simulation practice platform and using modern technology to provide assistance for classroom teaching, the teaching objectives and contents of the three modules of design basic knowledge, implementation structure and space design are discussed, and different teaching methods and assessment methods are developed. Based on the characteristics of teaching practice, this paper discusses the teaching content from the aspects of teaching content, teaching method and evaluation [1].

**Keyword:** Virtual policy technology · Environmental design · Teaching · algorithm

1 Analysis of Characteristics of Environmental Design Practice Teaching

Virtual reality technology (VR) is a new technology appearing in the 20th century. It includes virtual reality (VR), virtual headset, virtual controller, and virtual system (virtual system, immersive virtual interaction system). It is characterized by immersion, interaction and structure, which is conducive to students' three-dimensional learning, interaction and experience. At the same time, it also has great promoting significance for the teaching and scientific research of environmental design, especially for some unknown problems, it can play a good role in promoting [2].

Environmental design is a highly practical art and art integration discipline, it has the characteristics of theory, art and science and technology. In actual teaching, in addition to teaching, a large number of pictures, videos and objects are also needed as teaching means, which must be carried out in actual teaching to achieve better teaching effect [3]. However, there are also problems such as safety hazards, students' difficulty in fully understanding the process in a short time, and the disconnection between the design effect and the implementation of economic input. Therefore, how to set up the practice course in the classroom, the way of teaching becomes particularly critical [4]. In terms of teaching methods, we should add new teaching methods, combine theory

Table 1. Basic course information

Category of Courses	credits	school	The theory of	practice	Nature of the Course
Basic General studies	13	292	62	230	Compulsory
Professional General studies	48	976	362	614	compulsory
Studio Course	18	324	96	228	compulsory
Focus on practice	18	470	68	402	compulsory
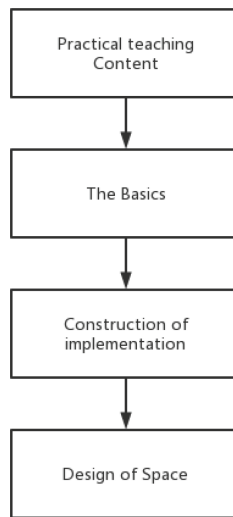
Fig. 1. Curriculum

with practice, combine educational resources organically, build interactive virtual reality practice platform, apply modern technology to teaching, so as to better meet the needs of current environmental design teaching. As shown in Table 1.

With the continuous development and application of information technology and network technology, the teaching methods and teaching methods of environmental design have also undergone great changes, gradually developing from classroom theoretical teaching, multimedia teaching (pictures, audio, video) teaching and social field trips to the teaching mode of "online + offline" and "physical + virtual". With the continuous development of computer network technology, the teaching of environmental design course also appears complex knowledge structure system, special teaching subject and diversified teaching forms. As shown in Fig. 1.

1.1   Complex Knowledge Construction System

This paper takes the interaction between human and nature as the research object. In today's world, with the rapid development of economy, the demand for environmental

design talents is increasing. Environment is the living space of human beings, which requires designers to have two important requirements: At the same time, designers should not only have a certain professional quality, but also have a certain sense of social responsibility, familiar with the local ecological environment, local landscape and urban planning. Therefore, the subject of environmental design covers a wide range, more comprehensive content, more discipline structure, and more complex discipline structure [5]. At present, the undergraduate courses in environmental design include: Basic General Studies, Professional General Studies and Professional courses. The teaching content of basic general courses includes modeling basis, form basis, artistic thinking and expression, etc., aiming to equip students with certain basis and foundation. This course includes: Hand-drawn design expression, preliminary architectural design and sketch design, design thinking methods and expression, Ergonomics, Fundamentals of materials science, interior design, Landscape design and other courses. This studio has a number of studios, according to the characteristics of the studio, set up the corresponding teaching content. The last step is to complete the graduation project, and the teacher should make a comprehensive judgment on whether they can complete their own works independently. This is the teaching method adopted by the environmental design department of most Chinese art colleges and universities. However, it is different because of its educational ideas and students' educational purpose. In the course of landscape architecture design at Harvard, there are skills course, visual studies course, history theory course, social economy course, science and technology course and so on. The elective rates of different professional courses have higher requirements, and the course selection can also be divided into compulsory courses and restricted elective courses [6].

1.2 Special Teaching Subjects

In the new period, reform of our education teaching system has the new request to the human-centered school goal and the request. With the rapid development of information technology, the training of environmental design talents has ushered in new opportunities. Due to their special vocational characteristics, students should be trained with artistic aesthetics, spatial cognition, practice and innovation and other comprehensive qualities, so as to improve their ability of independent thinking and vocational practice. First of all, we should pay attention to students' art cultivation and professional quality; The design major of the Academy of Fine Arts has the advantages compared with other colleges because of its enrollment characteristics. It sets sketch, color, sketching, introduction to design, case analysis and other basic courses, and integrates basic fine arts with professional courses to cultivate its design ideas, and cultivate its basic fine arts aesthetics and professional quality. Second, pay attention to the students' spatial understanding. It teaches students to master the principle of space form composition, master the knowledge of space form and function, scale and materials, environment and color, so that the students of the Academy of Fine Arts can exert their imagination and creativity in the formal beauty, and guide them to build more personalized space. Thirdly, focus on cultivating students' practical ability. In the course design, adhere to the organic unity of "theoretical knowledge" and "practical action"; In teaching, teachers guide students to carry out practical operations on the basis of teaching, so as to deepen their understanding of the theory. Arrange students to visit the site, learn
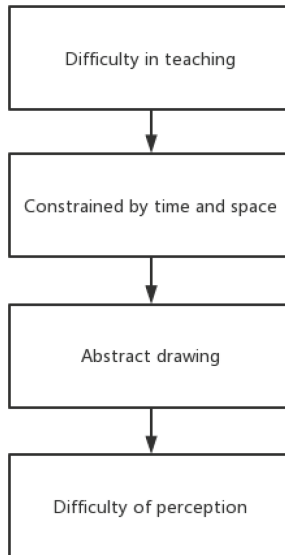
Fig. 2. Teaching difficulties

about the new materials and new technology, and guide the students to carry out site investigation, broaden their creativity. Fourth, pay attention to students' personalized and creative development. In the process of teaching, students are individualized and taught according to their aptitude, so that students can give full play to their creativity under the same theme, discover and propose problems, and stimulate their creativity through the collision of their thinking [7]. As shown in Fig. 2.

1.3 Diversified Teaching Forms

In the teaching method, because of its strong professionalism, strong design subjectivity, teaching method is unique [8]. At present, with the popularization of multimedia technology, teachers' teaching methods have changed from the past single classroom teaching to a more intuitive classroom. In the teaching process, teachers should adopt teaching, discussion, interactive and heuristic teaching methods, use multimedia courseware and video materials, show the scene photos, design cases to the students, so that they can concentrate more attention; Design team activities, through the students to discuss the design direction, theme, space form, material selection, etc., through the team to achieve a design plan, to train students cooperation and mutual assistance; By means of group discussion, on-site assessment of pictures and in-class report, students can communicate, communicate and discuss with their classmates to create a harmonious learning atmosphere. After class, teachers can also arrange students to do field research, so that they can better understand the local topography, architectural forms and customs; Renowned professionals at home and abroad will be invited to hold academic seminars and seminars to impart the latest research results to students, and exchange with students

about the development trend in the field of environmental protection, so that students can have a comprehensive understanding of their major.

2 Design of Practical Teaching Content

2.1 Abbreviations and Acronyms

In teaching, theoretical knowledge should be organically integrated with practical application, so as to avoid being limited to the learning level of "what is" and push it to the actual level of "how to use". In the past, some teachers used words, pictures and animations in their teaching, and then carried out practical teaching activities. This teaching method has its shortcomings: first, some students simply rely on the abstraction of images, can only see the surface of things, it is difficult to understand and understand deeply; Second, due to the limitations of the site and time, students are not able to study abroad and visit activities. The safety of the site makes it difficult for students to study flexibly and independently. Third, the content of the design is very abstract, students only use their imagination to feel, it is difficult to experience the complete combination of internal materials, structure, craft, design and art. In the current environmental design practice, the use of virtual reality technology for practical operation, and formulate the corresponding teaching plan, can achieve the purpose of twice the result with half the effort. As shown in Fig. 3.

In the class of space design, teachers can refer to several typical space examples: The virtual space can carry out space roaming, virtual somatosensory interaction, virtual panel interactive manipulation, virtual panel interactive manipulation, etc., and can also design the space at will, using the campus immersion device to create a similar effect to the real space, so that students through tactile, visual, auditory and other senses, let them
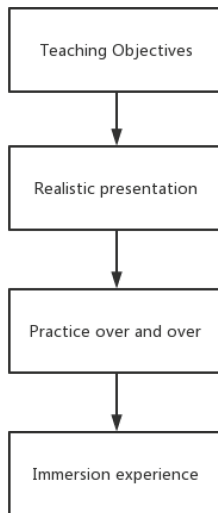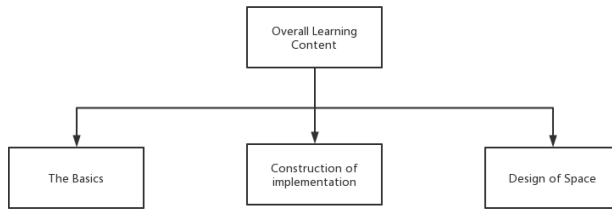

Fig. 3. Teaching objectives

Fig. 4. Learning content

have a sense of being there, let them have a sense of being there. Let them understand the design intention, design effect, cultural connotation and other aspects of emotional resonance.

2.2 Design of Classroom Teaching Content

In the teaching process, the use of virtual technology for teaching can be divided into basic knowledge teaching, virtual demonstration of implementation construction and virtual experience of the scene. The teaching of basic knowledge is mainly to enable students to have a basic understanding of the classification, characteristics and application of various materials. Virtual technology is used to build a three-dimensional, display various types of three-dimensional inside, provide text and pictures and other materials, so as to form a basic knowledge base. The realization of virtual display of structure is an important step to understand architectural technology. By combining with the teaching materials, students can master the basic theory and procedure of architectural structure, and can simulate the relationship between the structure and structure of the wall, ceiling, ground and other buildings, or split, assemble, etc., to lay a solid theoretical basis for the future course learning. It is also the main teaching content to improve the operability of the project. Through the situational experience and space design of virtual reality, it can effectively overcome the traditional difficulties of simply relying on abstract senses. By establishing immersive and experiential space scenes, students can carry out spatial roaming and visual experience indoors. Interactive equipment such as helmets and gloves can be used to properly combine furniture, lamps and decorations. So as to achieve their favorite scene effect [9]. As shown in Fig. 4.

2.3 Teaching Methods

Through the use of "virtual" technology, the traditional "teaching", "concrete", "independent operation", "feeling" and other teaching means, break the traditional "traditional" teaching mode, and according to the characteristics of "course", design different teaching forms [10].

Through network simulation, teachers can set a set of relevant questions to enable students to actively think, so as to change the traditional classroom teaching mode, and realize the dual learning of reality and virtual reality through network simulation and reality simulation. During this period, the learning process changed from "passive" to "active" teaching, which made learning more active, more vivid, more profound to
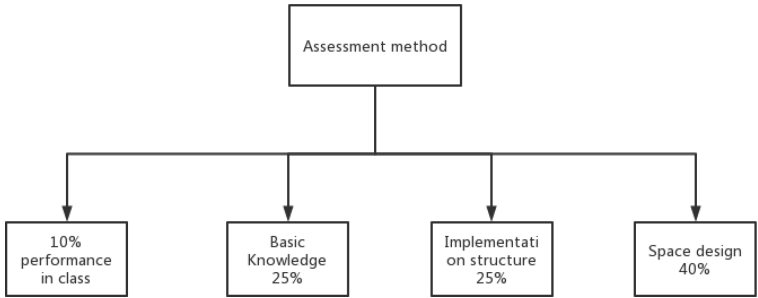
Fig. 5. Assessment method

remember and understand, learning difficulties, breaking the limitations of time and space, making the learning process more complete, intuitive and vivid [11].

3 Effect Analysis of Practice Assessment

3.1 Assessment Setting

In the assessment process, teachers adopt a combination of objective and subjective methods, and develop an assessment system of knowledge, skills and application based on the three aspects of teaching content. As shown in Fig. 5.

The spatial design test is a subjectivist method. The teacher draws up a design theme and the students complete it by themselves. The design results are uploaded to the Internet for teachers and students to watch. Teachers adopt the method of online interactive teaching and online teaching, and score according to the pre-set scoring criteria. Ultimately, depending on the size of the credit, the system determines the final score. In view of the comprehensiveness and difficulty of the examination, teachers should not score 0 for any of the four factors of classroom performance, basic knowledge, implementation structure and spatial experience, otherwise, the score is 0.

3.2 Effect Analysis

At present, the "virtual simulation" practice has been adopted in the basic course of materials Science for undergraduate students of environmental design, and 48 class hours of practice have been carried out among 35 undergraduates. For the first time, for two weeks, we will use virtual reality technology in a simulated classroom to help them develop their interest and understanding of the game. After the implementation of this project, teachers will use virtual simulation to extend the practice, so that students can wear equipment and apply materials in a virtual environment, and can get the feeling experience of materials in the space environment immediately, and use rich situations to train their creativity. In a sense, it reduces the overinvestment of educational funds, also reduces the risk of physical transformation of design schemes, shortens the gap between the realization of design concepts and works, and makes teaching and design

truly achieve "thinking and seeing", which greatly improves students' learning interest and creativity.

$$yt = \text{argmax}P(yt) = T\,t - 1\,p(yt|\{y1, y2, \ldots, yt - 1\}, C).$$

The hidden state of the decoding phase is represented by h t, and its calculation is shown in the following equation:

$$h't = f(h't - 1, yt - 1, C).$$

4 Conclusions

In the teaching process, through the use of virtual technology for teaching, it can not only save teaching funds, but also change the traditional teaching objectives, content, methods and methods, expand the scope of teaching activities, so that students can carry out independent teaching anytime and anywhere, the teaching and interaction of offline teaching to online teaching interaction, expand the communication and interaction of teaching; In this case, teachers can freely wear equipment for virtual experience in class, which effectively improves students' desire for knowledge, and enhances their subjectivity and subjectivity, thus improving their level of independent thinking. Through many years of teaching, there have been some achievements in teaching. However, with the rapid development of science and technology in our country and the new requirements of the environment design talent under the new situation, the curriculum reform of virtual simulation technology and environment design has to be carried on continuously to break the traditional education mode to adapt to the new development. Project Fund: Environmental Art Design major credit bank pilot project, project number D101.

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