

Research on the Application of “Model Series Practice Teaching” in Landscape Architecture Design Courses

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Abstract: Model making is an accurate teaching medium in practice teaching, which plays an important role in the teaching of landscape architecture design courses. According to the model types and application characteristics, it is suggested to carry out the teaching design of a whole series of models in landscape architecture design courses, focusing on cultivating students' ability, especially improving their practical ability, thinking ability and innovation ability, etc., and to explore the comprehensive intervention of models in different stages of course teaching and its role in promoting teaching.

Keywords: Landscape Architecture Design; Model; Practice teaching; Ability Development

1. Introduction

Model is a 3D form that transforms design ideas into entities, applies certain materials and constructs entities according to a certain proportion. As an important expression method of landscape design, garden model should use traditional handmade, modern science and technology or the combination of the two as a medium to realize the process of landscape design from 2D plane to 3D, and then deduce the optimal solution of garden design through three-dimensional composition, and finally present the design performance effect. Due to the high requirements for practical operation ability of landscape architecture specialty, it pays attention to the requirements of space scale, material texture, and the actual landing of design. The attribute of model making is consistent with the demand of landscape architecture specialty. It plays an important role in improving students' mastery of landscape elements and space control, design creation and three-dimensional space imagination ability, and enhancing team cooperation ability.

2. Application significance of model making in landscape architecture design courses

After breaking through the limitation of plane representation, model making has changed from hand-made 3D models made of wood or plastic materials to machine carving, and then to the application of computer-controlled output 3D printing models or virtual VR reality technology. The use of this technology makes it easier for students to understand the landscape spatial relationship and volume sense. It enables designers to master the spatial proportion relationship between different volumes, and combine the texture of materials and the choice of colors to show the texture and design sense of the background space of the site, so as to solve the problem that the drawing is just a point of view and bring people a more intuitive feeling.

2.1 Training students to transform their spatial thinking from 2D plane to 3D, and establishing a spatial thinking view (STV for short)

Taking the model as the medium, it helps the students to establish the practical teaching method of spatial understanding and construction ability step by step; From the previous mechanical drawing process of landscape

architecture design to the cultivation of students' creative thinking and active thinking ability, and then pay attention to the cultivation of students' 3D space imagination ability and space thinking concept. Thinking training from 2D plane drawings to 3D space on site is the difficulty of design disciplines. In practice, several projects from design drawings to the final landing construction are the most practical methods for many designers to establish the concept of space thinking. However, designers need to work or practice for a long time to understand, which takes too long. Through a certain proportion of simulation, students can construct a more correct spatial thinking in a short time.

2.2 Cultivating students' design creativity and hands—on ability, and establishing professional view of practice (VOP for short)

Through the design and production of the model, students' interest and enthusiasm in learning can be greatly mobilized, and the potential creativity and professional interest in learning can be stimulated. In the design course, we design suitable plots, design and draw drawings by ourselves, and design and make models. In the whole teaching process, students' sense of achievement is greatly satisfied, and it establishes their interest in learning and initiative of autonomous learning. The ability of hands—on and practical operation is cultivated, and the overall quality and ability of students are developed.

2.3 Cultivating the ability of combining rational thinking, vision and perceptual thinking of students, and establishing a holistic design view (HDV for short)

The model, as a 3D image of the entity, not only facilitates students to think about the design plan from macro to micro, from the whole to the detailed part, but also enables the students to combine rational thinking and aesthetic thinking effectively in this process, thus improving the ability of overall comprehensive problem—seeing.

3. Model making types and application characteristics

3.1 Hand made model (HMM for short)

Manual model refers to the process of transforming the graphic design into elevation by the design conception of the design sketch and the material collocation of the model. Manual model is generally divided into conceptual model and display model, so conceptual model is used to discuss concept expression, sense of volume, the relationship between the overall space, material selection, etc. , in the early stage and lower grade of design. After the project has been completed, the exhibition model is used to show the overall design results or exhibition publicity. It requires exquisite materials, excellent production, and complete lighting, light and electricity. It is suitable for senior design and graduation design.

3.2 Mechanical engraving model and laser engraving model(MEM&LEM for short)

Mechanical engraving model and laser engraving model refer to the model products made by mechanical engraving machine and laser engraving machine in computer engraving technology. Mechanical carving is the application of force on wood and other materials processing carving, (its principle is the interaction of physical forces) the application of engraving machine for model making, which helps students to be familiar with the design sketch idea to the actual model of each part of the production process, and then to the final model effect presentation. Compared with the manual model of time—consuming, long cycle characteristics, mechanical and laser engraving model production time is short, high efficiency, and even can be mass produced.

3.3 3D printing and VR simulation technology (3D&VR for short)

3D printing is a kind of rapid prototyping technology, which is based on digital model files and uses powder metal or plastic and other adhesive materials to construct objects by layer printing. Virtual reality technology is a kind of computer simulation system to create and experience the virtual world. It uses the computer to generate a simulation environment, and through the multi—source information fusion, interactive 3D dynamic scene and entity behavior system simulation technology. The application of VR technology in landscape design is to realize the landscape simulation scene consistent with the design scale. It has many advantages, such as comprehensiveness, intuitiveness, interactivity and real simulation. The application of VR technology in

landscape architecture design teaching enables students to observe from multiple directions and angles, experience the design through the interaction of multi-dimensional space, and get perceptual and rational knowledge, so as to deepen the concept and expand the ways of innovation and creativity.

4. Application course scope

Model making should be infiltrated into the teaching of landscape architecture courses from simple to deep, from easy to difficult, from simple to complex. The author suggests that the teaching of model series should be applied to the courses of landscape architecture (Table 1).

Table 1. Model application in landscape architecture design courses

Course name	Course content	Model type	The course meaning of application model making
3D structure	Form creation and modeling design	HMM	STV
Preliminary design	Terrain design or small courtyard simulation	HMM	STV, HDV
History of Chinese and foreign landscape architecture	Typical Chinese and foreign design cases	HMM, MEM&LEM	STV, HDV
Landscape architecture design	Building or structure	HMM, MEM&LEM, 3DP	STV, HDV
Landscape architecture engineering and technology	Each part and construction process of the project	HMM, MEM&LEM, VR	STV, VOP
Landscape architecture design	Various types of green space	HMM, MEM&LEM, VR	STV, VOP
Graduation project	Graduation project assignment	HMM, MEM&LEM, VR	STV, HDV

5. Conclusion

In a word, the comprehensive application of model series in all kinds of curriculum practice is an important part of the quality education of landscape architecture design professional through the curriculum. The design thinking, space cognition and overall control ability of model designers and producers will be significantly improved, and then they can easily be competent for the work of landscape architects. In the course of landscape design, the teaching of comprehensive application model series will not only improve the teaching quality, but also contribute to the designer's career in the future, so as to improve the teaching level of the whole subject.

References

1. Li L. Research on the application of working model in the teaching of landscape architecture space design. *Forestry Education in China* 2013; 31(3): 55–58.
2. Zhang S, Liu P. Discussion on the teaching reform of garden computer aided design based on the application of 3D printing and VR virtual reality technology. *Education and Teaching Forum* 2019; (49): 92–94.
3. Wen B, Zhou C. On the cultivation and practice of innovative thinking in landscape architecture undergraduate education. *China Gardening Abstract* 2015; 31(12): 213–215.