Analysis on the Application of Innovation and Project Introduction in Model Design and Manufacture Course of Environmental Art Design Major

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Abstract: Model design and manufacture is the last link in the investigation of students' comprehensive ability in the whole undergraduate teaching of environmental art major. This course is to study the relationship of environment through the model of three-dimensional space. In the model design course, we try to introduce entity project constantly. On this basis, we put forward the teaching mode of project with innovation as the core, and conduct the design process into visualization and form research management of interactive teaching. From the existing teaching level, we analyze the current situation of model design and manufacture course of environmental art major, and then use project development model design, pay attention to the process of continuous research and in-depth, aiming to improve the lack of innovation process exploration in teaching, so that enhance the consciousness of innovation driving in teaching, and cultivate more applicable and practical environmental art talents for the market demand.

1. Introduction

The Outline of National Innovation Driven Development Strategy emphasizes that scientific and technological innovation is the strategic support for improving social productivity and overall national strength, and must be placed at the core position of the overall development of the country [1]. As for the training of future talents, it puts forward that “adhering to the innovation driven essence is talent driven, implement people-oriented, respect the value of innovation and creation, stimulate the enthusiasm and creativity of all kinds of talents, and accelerate the convergence of a large-scale, reasonable structure and excellent quality innovative talent team” [2]. Guided by such a policy, as an education base for cultivating talents, colleges should also lead the way. At the same time, environmental art education should be constantly improved under such environment.

2. Problems in Model Design Course

The curriculum of environmental design specialty is a comprehensive phased course to cultivate students' diversified thinking ability, analysis ability, practical ability and practical project starting ability. In particular, model design and manufacture is an important practical comprehensive course in the whole stage. The previous courses only focused on the study of model morphology and the feeling of model materials, but such teaching method is no longer suitable for the development requirements of today’s environmental design profession. After repeated thinking and summarizing the course, the following problems need to be solved in the course:

2.1 The Original Teaching Mode is Single and Pays Too Much Attention to the Representation of the Model Form

As shown in Figure 1, in 2018 and 2019, we will try to introduce practical cases into model design courses. Because it is in the trial stage, the student model is still in the exploration of the shape. The simple attention to the shape will directly affect the students' in-depth exploration and thinking of the

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spatial relationship model. Therefore, it is difficult to see creative thinking from the finished model by students.

Fig.1 Model by Students in 2017

2.2 Lack of Process Research and Insufficient Spatial Exploration Using Models

As shown in Figure 2, in the design and manufacture process, many students directly use CAD drawings as a template for making models. Such a model that does not analyze the spatial relationship of the model will have problems such as dull model in the final model expression, spatial congestion and lack of correlation.

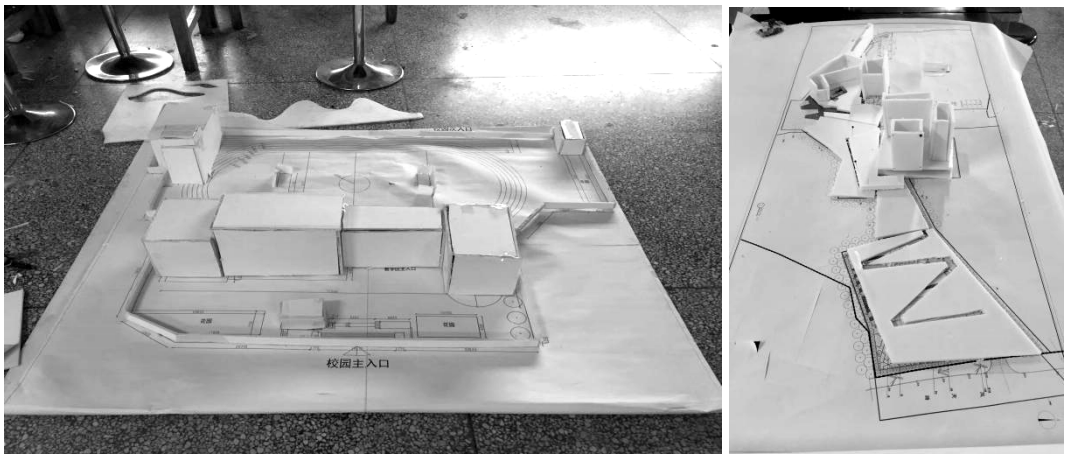


Fig.2 Draft Model by Students in 2018

2.3 Too Much Conceptual Model Learning But Less Physical Project Introduction, Students Are Not Interested in Exploring Deeply

As shown in Figure 3, most of the models use points, lines and planes, and lack of expression and reproduction of the real space in the overall application. The exploration process of the model is obviously insufficient, and the design of the real space lacks the purpose and the display of thinking.

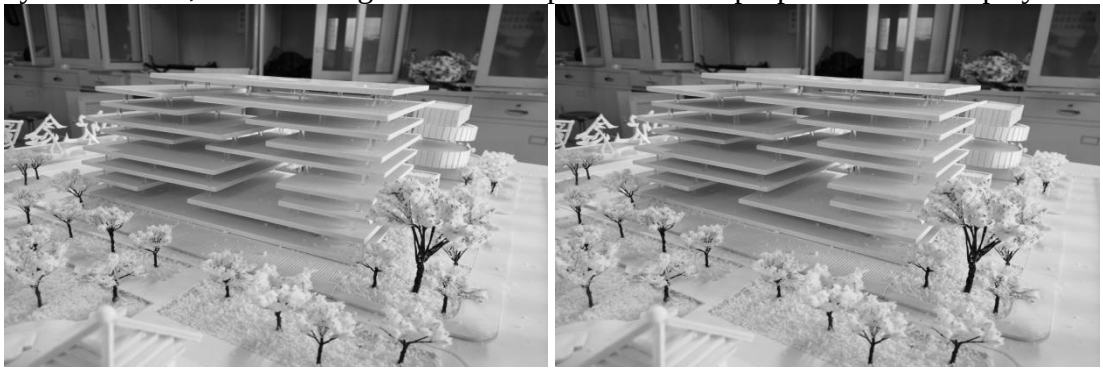


Fig.3 Model by Students in 2018

2.4 Outdated Design and Production Thinking, with Weak Innovation Ability

As shown in Figure 4, the elements expressed in the model are quite regular, without jumping out of the expression of the existing buildings, and the students' individual subjective initiative is not ideal.

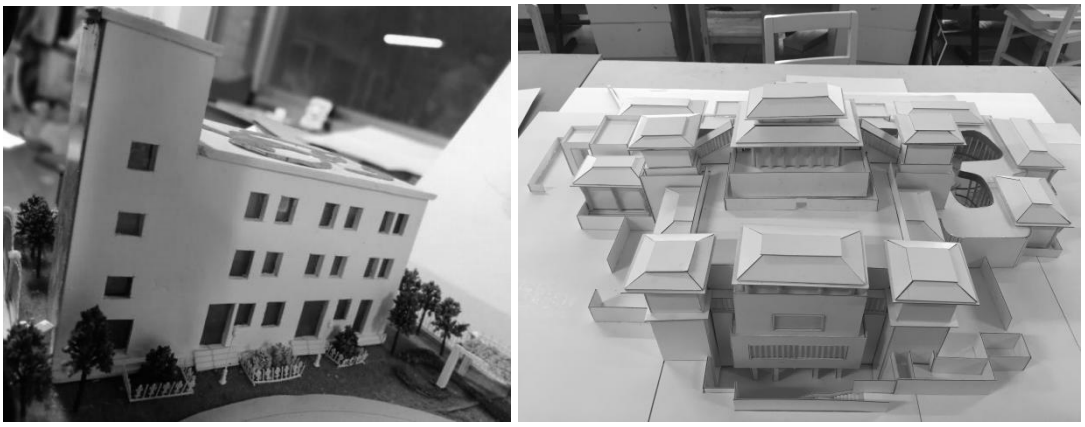


Fig.4 Model by Students in 2018

Through the above four problems, the relevance can be found that:

1) The traditional monotonous teaching mode of model design lacks the thinking of the design process, which leads to the lack of students' interest in inquiry, lack of challenge and no intention of innovation.

2) There is no actual space for reference and the process space of exploration is not enough. As a result, students have no chance to find problems in the design and manufacture of the model, so they can only make the model step by step.

Therefore, the specific project entity should be introduced into the teaching practice, increase the reference and authenticity of the model making course research, improve students' interest in inquiry, and encourage innovation will be the core of the later exploration.

3. Project Introduction and Curriculum Convergence

In the past two years of model curriculum reform and problem-solving teaching, it can be found that, after introducing the model course into the entity project, not only the relevance, integrity and explorative nature of the model course are far better than before, but also the homework after the model class has been greatly improved in terms of overall design and detail creativity. In addition, students' inquiry activities have changed from passive to more active. The reason is that the real environmental factors, the real data and the real design carrier provide a space for students to play. Such a model has a space to settle in, which is no longer the relationship between single material and shape, but the relationship of many possibilities in space.

4. Curriculum Reform and Innovation

4.1 Strengthen the Clear Teaching Objectives and Improve the Teaching Effect of Courses

Under the traditional teaching process, students are not aware of collaborative work. Therefore, in the process of designing using the project model, the members of the group assist each other, and under the professional information model provided by the teacher, they organize the design process by themselves, and the teacher conducts guidance and problem analysis. In this way, the subjective initiative of the students is well mobilized, and the collaborative design is carried out accordingly, which would improve the efficiency and the teaching effect [3].

4.2 Strengthen the Relevance of the Curriculum and Actual Design, to Expand the Connectivity of the Curriculum

In the process of model design, teachers streamline the process of model design, extract the key links, and let students understand the process of project model making. Carry out all design activities based on the project themes of each group, so that project-based teaching gradually replaces duck-filling teaching. At the same time, students can explore the design level and the law of students' design thinking in this way.

4.3 Promote the Unity of Students' Thinking and Action, and Enhance Their Ability to Solve Design Problems

Before the model design starts, students are divided into several project groups, and each member is assigned a detailed task. Through the division and cooperation of different tasks, the project team jointly completes the final overall effect. In the process of model design, insufficient connection and unsatisfactory personal tasks will affect the final results of the entire group, thus promoting the thought interaction of group members and enhancing the students' problem-solving ability.

5. Comparison of Model Related Data in Recent Two Years

As shown in Figure 5, in the model classes in 2017, 2018 and 2019, the total number of models is basically the same. From the research of five data: actual project, creative thinking, theme selection, appearance modeling, performance effect, it can be seen that the overall ability of students has been improved year by year in the teaching reform in recent years, and the data has been steadily improved from the initial imbalance to achieve the expected effect and purpose of the course.

Fig.5 Model Index Data

6. Display of Practical Case and Model Design and Manufacture Excellent Teaching Case

As more attention is paid to the research and connection of the process, the mutual influence of analysis and performance, the innovation of models and more information transmission in teaching, the following are examples of excellent models that have emerged in the continuous teaching reform. Three representative models were selected for case demonstration as follow.

6.1 Planning Type - Design of Micro Topography Landscape Model

The characteristic of this case is that the model study has strong planning and stage characteristics. In the making process, through the research and analysis of the spatial environment data of model

making, the direction of model design and manufacture is obtained. And then, through professional means, the sketch is transformed into CAD scheme, and the design scheme is displayed by model.

Stage 1: text scheme design display, as shown in Figure 6.

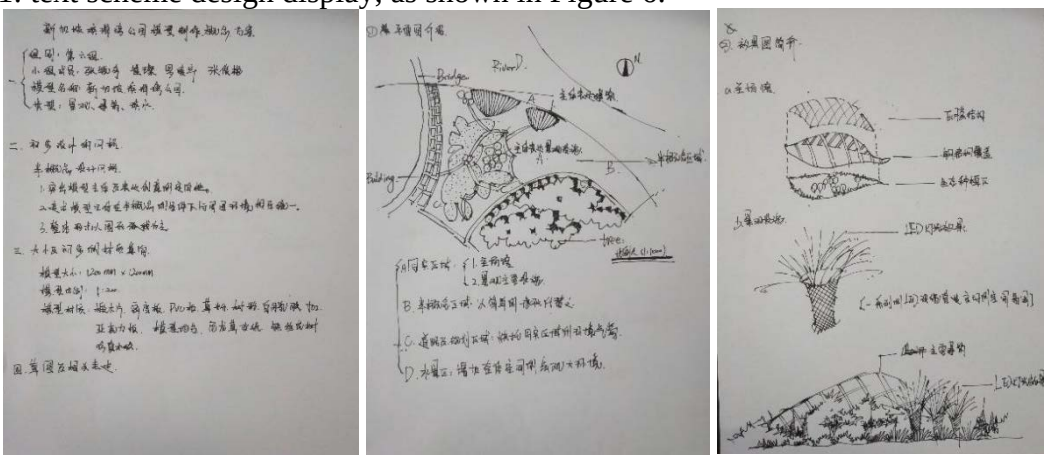
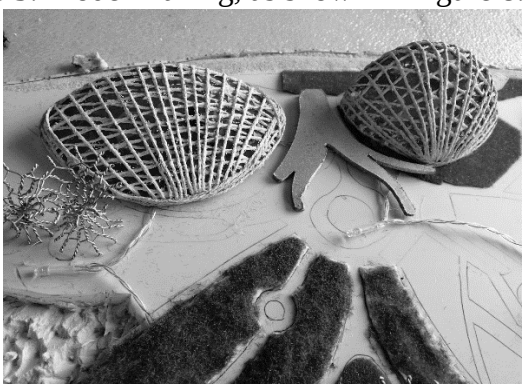


Fig.6 Design Scheme Text and Sketch

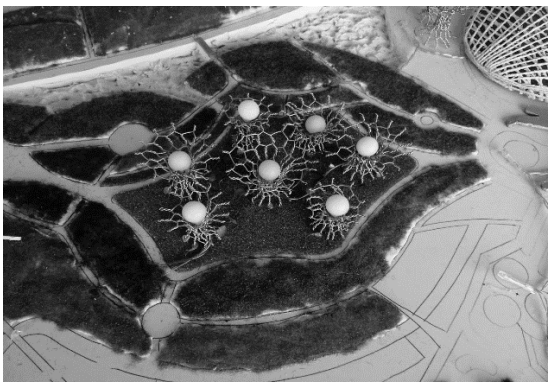
Stage 2: CAD scheme, as shown in Figure 7.

Fig.7 Cad Plan

Stage 3: Model making, as shown in Figure 8.



a) Building monomer made of hemp rope;



b) Square lamps made of wire;

c) Overall planning layout

Fig.8 Model Making

In the making process, many innovative combinations of materials were used, e.g. the use of soft hemp rope to make the building form, the use of iron wire to make lighting fixtures, etc.

6.2 Creativity Type - Design of Amusement Park Landscape Model

The characteristic of this case is that the student could chose a very interesting and creative topic. Under this premise, the teacher do not communicate too much on the subject, but focus on the subsequent process. Although the sketch is very simple from a professional point of view, it shows very good results in the end.

Stage 1: effect sketch, as shown in Figure 9.

Fig.9 Hand-Painted Sketch

Stage 2: material creativity.

For the overall creativity of the model under this theme, the material becomes the most interesting way of expression. Since the selected shapes are more specific and vivid, light mud has become the first choice of materials in the entire model making. Using the simplest materials could also convey the best expression effect. In addition to a variety of rich shapes, acrylic paints are used for drawing decoration, and the painting techniques, sculptures, and models are integrated to make the overall design full and vivid.

a) Three-dimensional shape made by light mud

b) Three-dimensional shape made by MDF

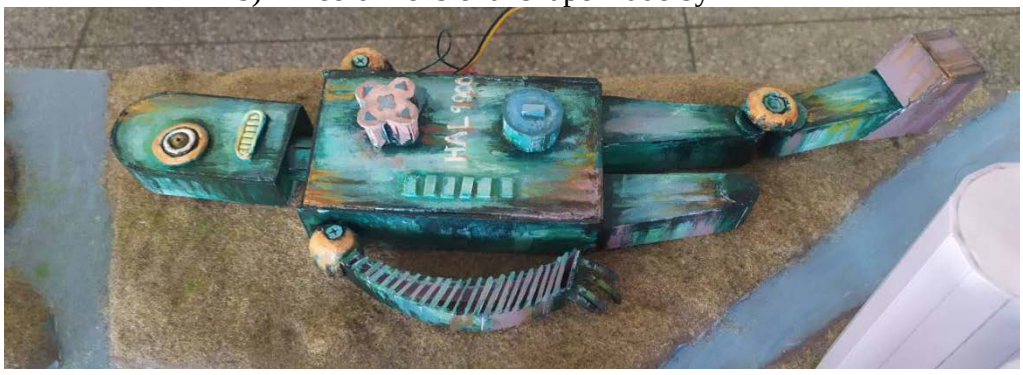


Fig.10 Material Creativity

Stage 3: final effect, as shown in Figure 11.

a) Overall arrangement

b) Top view of finished product c) Local form

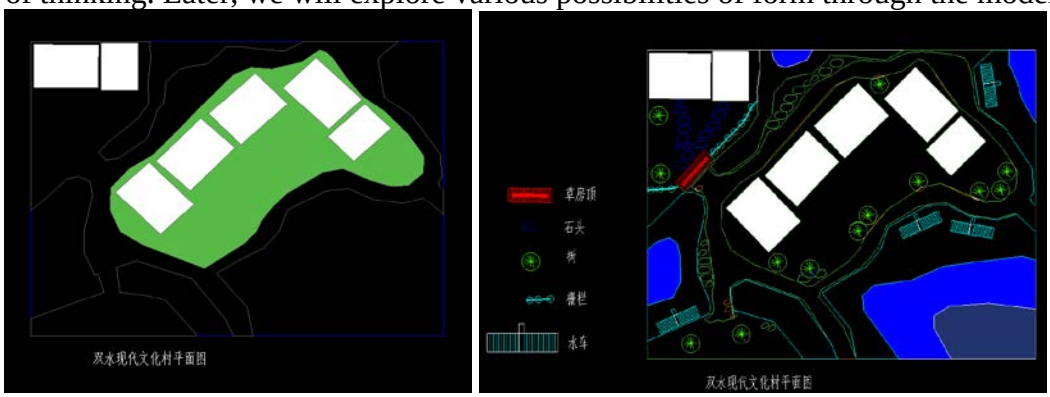
Fig.11 Finall Effect

(3) Ecology type - design of “Shuangshui Village” landscape model

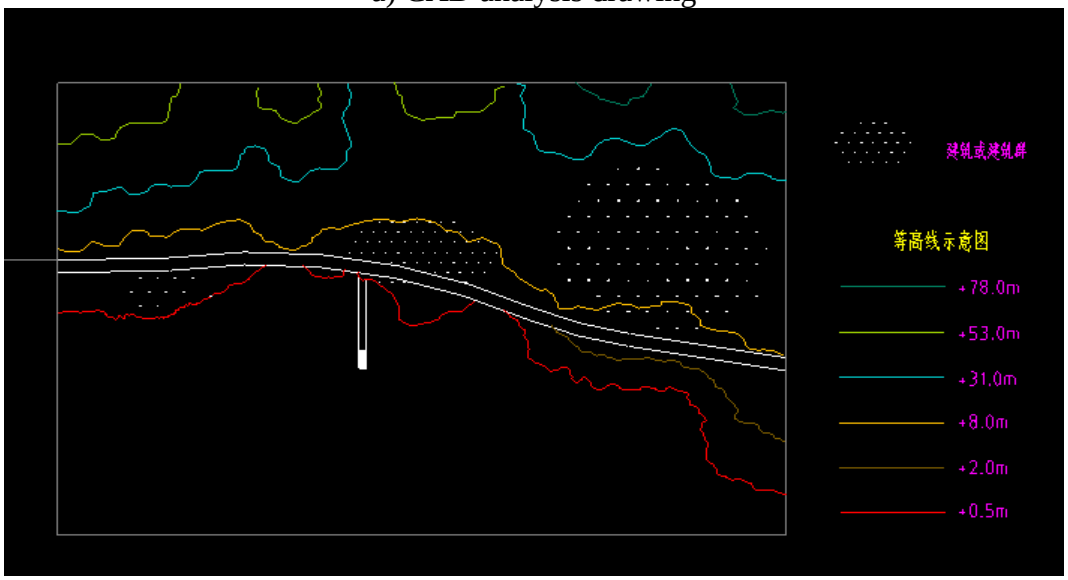
This ecological model is full of creativity. Within a 60mm*60mm space, mountain views, water features, living plants, moss, buildings, bridges, etc. are all integrated into it. At the same time, the change of terrain will also be shown in this model. The creativity, difficulty of making and final performance of the model are good.

Stage 1: CAD analysis, as shown in Figure 12.

The CAD layout provides a certain direction for the following grass model, but this is only one direction of thinking. Later, we will explore various possibilities of form through the model.



a) CAD analysis drawing



b) CAD contour sketch

Fig.12 Cad Analysis

Stage 2: inquiry process, as shown in Figure 13.

Many attempts are reflected in the process, including the innovation of materials and methods. For example, the use of cement, cardboard or KT boards, with different forms and methods, are all preliminary ultimately for design theme and effect.

a) Cement molding

b) Architectural decoration

c) Draft model

d) Waterproof treatment

Fig.13 Process Exploration

Stage 3: ecology model, as shown in Figure 14.

a) Rockery soil cultivation

b) Waterscape unfolds

c) Local living plants in the model d) Overlooking the bridge water plants in the model

e) Final effect after model atomization

Fig.14 Final Effect of the Ecology Model

7. Conclusion

Any kind of design is a process of inquiry, and any kind of teaching is a process of continuous exploration. The innovative teaching exploration of the model by introducing projects into the teaching provides more innovative thinking for the curriculum. This not only makes the curriculum more vital, but also allows students to gain more abilities. Eventually, more suitable and practical environmental art talents demanded by the market will be cultivated.

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