

# Application and Reform of Modeling in Teaching of Architectural Recognition Graph

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**Keywords:** Architectural design, three-dimension, modelling, reform, teaching.

**Abstract:** In traditional courses of architectural recognition graph, two-dimensional design is the main method for teaching and evaluation. It has formed a certain obstacle to three-dimensional thinking development of students. With the method of modeling, teaching reform of architectural recognition graph can benefit the three-dimensional thinking of students in the functionality and artistry of architecture. Meanwhile, it helps students master basic architectural design knowledge. This work analyzed the application and reform of modeling in teaching of architectural recognition graph for the improvement of teaching level.

## 1 INTRODUCTION

As one important course in architectural majors of colleges, architectural recognition graph is to lay the foundation for architectural drawing. With strong practicability, the teaching of architectural recognition graph includes descriptive geometry and engineering drawing. It aims to develop students' ability of spatial analysis and imagination. Students with related basic graph ability are more qualified for the reading and drawing work of engineering drawings which is also one required skill for students of architecture engineering major. Compared with other courses, architectural recognition graph requires students to have more thinking ability of spatial imagination due to its relatively difficult basic theory (Chen Qiuguang, 2009). Therefore, it is significant for the exploration and thinking of students' comprehensive skill-knowledge improvement in architectural recognition graph.

## 2 OUTLINE OF ARCHITECTURAL RECOGNITION GRAPH TEACHING AND MODELING

With recent frequent international communication, architecture universities in China have gradually introduced several foreign architectural teaching

ideas which have positive effects on domestic teaching of architectural recognition graph. Foreign architecture universities mainly use computer modeling for architectural design teaching and assignment presentation. Compared with two-dimensional drawings, modeling is more preferred by these universities as an assistant teaching method. In China, more attention has been paid to the application of modeling in the teaching of architectural recognition graph (Liu Xiangdong, 2010). Students are encouraged to present their architectural design schemes with modeling in daily courses. However, due to short application time of modeling technology in China, there are certain limitations in teaching methods and curriculums. Most domestic architecture universities still use teaching methods of the early nineties for design thinking cultivation and presentation. Much time of students is wasted in two-dimensional architectural drawings. Therefore, for architectural design, modeling technology is a reform direction of education and learning. In recent years, architecture universities in China have increased the proportion of modeling technology in courses (Gong Kai, Zhang Tong, Wu Jinxiu, 2005). Besides, universities without mature condition also have made corresponding reform schemes for teaching in order to meet the application demand of modeling technology in courses.

### **3 REFORM PRACTICE WITH MODELING IN TEACHING OF ARCHITECTURAL RECOGNITION GRAPH**

#### **3.1 Basic ideas of teaching reform with modeling in architectural recognition graph**

As the core course of architectural design major, architectural recognition graph is the introduction of skills in further architectural design. The purpose of architectural recognition graph teaching is to develop the application ability of architectural design theory in spatial architecture. The recognition of architectural drawings essentially lays the foundation for student design of architectural environment and space. Corresponding course teaching is the training of thinking ability that enables students to have better basic skills and methodologies of architectural design. With modeling technology, architectural recognition graph combines interior space design with exterior space design in order to promote the environment interaction. Based on the transference from simple to complex space design, students can gradually perfect their architectural design elements. This teaching model is mainly affected by model techniques. Through computer technology, modeling benefits students with their presentation of space design as well as the selection of materials and scales. Meanwhile, students are valued by their comprehensive ability and creative ability of three-dimensional space. Modeling presentation of students has become part of evaluation in foreign teaching of architectural recognition graph. Therefore, in this work, we analyzed three modeling subjects for modeling teaching.

#### **3.2 Graph teaching subject for modeling teaching**

##### **3.2.1 Modeling analysis of famous architecture**

With abundant architectural aesthetics, most remarkable architecture works are the beginnings of various artistic styles. Therefore, modeling teaching reform can start from modeling analysis of famous architecture such as 1/50-size architectural models of exhibition centers and art museums. These models are required to present architectural exterior styling, interior space and structure construction. In

teaching practice, students have to analyze multiple design elements of architecture, including cultural and historical background, surroundings, interior structures and space, and its materials and colors.

##### **3.2.2 Modeling graph of small-scale architecture**

Without excessive limitations of surroundings, the functional structure of small-scale architecture can be more easily observed after modeling. For example, small-scale cultural centers or exhibition halls have so simple streamline organization that students can have free design in the process of space design. This subject is closely connected to the design thinking ability of students. Through modeling recognition and small-scale architecture design, students can further understand the general design principle of architecture, and explore the connection of related materials and space structure. Finally, preliminary design idea will be formed with the treatment of detailed characteristics of architecture.

##### **3.2.3 Modeling graph of functional architecture**

The design of functional architecture like schools generally is difficult due to the limitation of surroundings and scale. Teachers have to assist students with their mastery of fundamental elements in functional architecture such as function realization and technology application. In the design of functional units, students with the help of modeling can better recognize the spatial mobility and change in functional architecture as well as focus on the treatment of substrate materials. Through these measures, functional architecture with design features will be formed.

### **4 TEACHING REFORM IDEAS OF ARCHITECTURAL RECOGNITION GRAPH BASED ON MODELING**

Architectural recognition graph has an important role in major courses. The method of subject design can help students with their mastery of modeling skills and finally lead them to treat architectural design with correct design thinking. It is also one core objective of teaching reform. The application of modeling technology attracts the attention of

teachers with its unique characteristics formed in practical teaching and teaching reform.

#### **4.1 Influence of modeling throughout teaching reform of architectural recognition graph**

Computer model benefits the realization of the whole teaching of architectural recognition graph. Teaching with modeling technology needs to explore teaching system of architectural recognition graph with the assistance of model design. The analysis of famous architecture essentially helps students further understand elements of architectural design. With the method of modeling, students can have a three-dimensional analysis on exterior and interior design elements of classical architecture. Meanwhile, three-dimensional modeling has a more positive effect on students without excellent three-dimensional thinking. It is conducive to develop comprehensive ability of architectural analysis as well as to improve basic ability of design. In three-dimensional space design, students have to analyze the presentation of design elements such as scale, proportion and materials in order to form a basic architectural model. Then the model can be applied for further design selection of transportation condition, sunlight and surroundings. Based on the three-dimensional modeling throughout the design, students can conveniently present the functionality and artistry of architecture. Besides, more innovative design will be created in teaching process, finally contributing to a teaching improvement in practical courses.

#### **4.2 Ability improvement of design thinking based on modeling**

In traditional teaching system, teachers always ignored the development of three-dimensional design thinking. Students are required to focus on the presentation of two-dimensional architectural design. Despite of simple operation, this two-dimensional method has neglected the three-dimensional essence of architectural design. Therefore, through a series of modeling design training, students can further master the essential presentation method of architectural design. Modeling makes abstract concepts of three-dimensional space in textbooks more comprehensible. Meanwhile, by comparisons of elements such as shape and light, students can comprehensively understand material textures and spatial structures, which is an improvement for

spatial imagination ability of students. These advantages of modeling teaching are a new level beyond traditional teaching in architectural recognition graph. Three-dimensional modeling breaks through the traditional teaching model and brings a comprehensive improvement of three-dimensional thinking ability as well as presentation skills for students.

#### **4.3 Presentation optimization for students**

One important purpose of architectural recognition graph is to teach students presentation methods of architectural design. These methods are determined by different phases and conditions of design. Three-dimensional modeling can effectively integrate related data for analysis and presentation of architectural models. It enriches the kinds of architectural presentation methods. In practice, students' ability to reveal and solve problems is developed with the deconstruction and analysis of architectural models. In initial phase of architectural design, students are required to design basic architectural models by modeling. This design method can perfect their presentation of architectural elements such as space scale and dimension, artistry and functionality of design, connection between architectural shape and surroundings, and even details of architecture. Based on modeling throughout the whole architectural design process, students have more presentation methods for their thoughts and ideas in different forms.

#### **4.4 Reform of evaluation method based on modeling**

In traditional teaching, the evaluation of architectural recognition graph course requires students to complete their two-dimensional sketch design. It focuses on students' presentation skills and final design rather than the development of design thinking. Modeling can have a positive effect on teaching reform and the improvement of evaluation. Students can integrate their thinking process and design schedule into models with assistance of modeling. Taking design drawings and quality as well as design thought into consideration, mature evaluation method is more objective and scientific with the presentation of whole design phase. Therefore, through application of modeling, the course reform of architectural recognition graph will have concrete evaluation methods and guiding directions for students.

## 5 CONCLUSIONS

With the development of current technology, analog simulation is widely applied in construction industry. Traditional mathematical models have failed to meet the complex demand of architectural engineering. Therefore, the introduction of modeling technology in analog simulation has a positive effect on students' comprehensive understanding and mastery of architectural recognition graph. Its application is significant for the development of three-dimensional design ideas and the mastery of architectural artistry and functionality design.

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