

Original Paper

Exploration and Practice of the Course Construction and
Ideological, Political Reform of Architectural Construction in
the Context of “‘Sanquan Education’ strategy” in subject of
Architecture

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Abstract

In the context of “‘Sanquan Education’ strategy”, Carrying out curriculum construction and ideological and political reform is an important way to realize the cultivation of talents in applied colleges. It is conducive to strengthening the ideals and beliefs of college students in Civics and realizing the innovation of teaching contents and methods. Through the construction and reform of the course “Building Construction”, students’ professional practice ability has been improved and their learning motivation has been increased.

Keywords

Architecture Major; Course Construction, Ideological and Political Reform

1. Introduction

The course “Building Construction” is one of the compulsory courses for sophomore architecture students, which is the basic course of professional technology and an important part of the basic knowledge framework for students. In the past, the course of “Building Construction” Not valuing importance to professional education and was highly theoretical. Students were unable to link the theoretical knowledge with the series of architectural design classes after learning, unable to combine theoretical knowledge with practical experiments, unable to correctly analyze the construction and form of their own design buildings, lacking more in-depth analysis and application, which hindered the cultivation of students’ design ability. Therefore, the curriculum construction and Ideological and

political reform was carried out. After the reform, the curriculum adopts the teaching mode of integration of science and practice, modularization, task-oriented and open-ended, which closely integrates ideological and political education, professional education and social service, and cultivates students' awareness and ability to understand society, study society, comprehend society and serve society.

2. Curriculum Design and Reform

“Building Construction” course content for the role of building components construction, practice and design requirements, training students can use the basic principles and basic theory of building construction, the choice of construction plans, size and material practices, know the civil and industrial buildings in the layout of building components requirements. At the early stage of reform, the course construction team conceived the course as a whole, conducted research on the direction of Ideological and political Education for each chapter, formulated the construction objectives of the course “Building Construction” for architecture majors, established the teaching mode of integration of combining theory and practice as well as modularity, broke the inherent teaching method, changed the previous theoretical teaching, and established an open teaching mode with students as the main body.

The curriculum reform needs to address three aspects: first, to enhance students' spatial thinking ability through virtual digital design; second, to enhance students' comprehensive quality and hands-on ability through field observation and measurement; third, to integrate Chinese culture and ideological and political connotation, and finally to accomplish the construction goal, education goal, ideological and political goal, and service to society of the curriculum.

The reform integrates professional courses with ideological and political education, and integrates measurement practice with social services, so that students can master the basic knowledge of building construction and at the same time enhance teamwork ability, social practice ability, innovation ability and core competitiveness of employment, and cultivate students' consciousness of understanding society, studying society, understanding society and serving society. The course takes “practical work task and vocational ability analysis” as the starting point, and divides the course design and reform into three, as follows:

2.1 Task-based Organization of Course Content

2.1.1 Constructing Cognitive Modules

Building construction fully consider the physical environment, such as light environment, thermal environment, sound environment, water environment, etc. on the construction setting, to waterproof and thermal insulation construction layer cognition as an example.

Waterproof construction layer cognitive: role to reduce the later building use process of water seepage or leakage, construction need to consider the local building soil condition, room function and local rainwater situation comprehensive selected structure design, selected size and material, in order to achieve the purpose of enhancing the use of the building life and durability; Heat insulation

construction cognitive: Insulation and heat insulation layer are made of group resistant materials, building construction in the heat insulation performance is not good easily lead to energy waste, need to cognitive different building components of the heat insulation material layer set position.

The course sets the task of mapping structural drawings, with thinking, understanding structural practices, structural design purposes, structural layering, materials used and the role of each structural layer. The course also sets the task of structural design, which focuses on the rationality, economy and practicality of the structure. There are two specific design methods, one is to use the existing standard construction; the other is to design an economic, beautiful, applicable and safe construction plan according to the environment and construction design principle of the building. Such as in the ground structure design, need to meet the surface use durability, contact with the soil leading to capillary action of waterproof performance, to meet the overall shape of the aesthetic and other aspects of functional design; another example is the roof structure design, need to consider the roof form, roof drainage, to meet the “roofing engineering technical specifications”, thermal insulation, structure, architectural art and other requirements. Through the above comprehensive analysis and consideration, we analyze the feasibility of structure, material and construction, so as to form a safe and reliable building construction plan.

2.1.2 Observation of Mapping Modules

The study of architecture courses focuses on observation, mapping and research, observation needs to be multi-angle and all-round, mapping needs mapping records, which includes hand-drawn records and photographic records, which is an important means to consolidate theoretical knowledge. The “Building Construction” observation and mapping module requires students to express the complete construction drawings and 3D models of actual projects, and the completion of the task needs to be based on accurate and scientific observation records, with every detail being meticulous.

Teachers need to be aware of three points that need to be made clear to students during the observational mapping study process:

- (1) All-round, multi-view observation and mapping, one viewpoint can not fully express the information of building structure, need all-round, multi-view observation and mapping, and analysis of building structure, consult the case of sectional drawings, judgment and analysis of building structure, structure and materials.
- (2) The ratio changes, generally the ratio of the plan elevation section in the design program of architecture is between 1:100-1:300, and the total plan is between 1:500-1:1000, but the ratio of the building construction drawing is larger than the ratio of the plan elevation section and the total plan, and the content should be reflected in more detail, and the section cut reflects the content of materials and structure.
- (3) The “Building Construction” course uses classroom observation and mapping, as well as with the junior summer ancient building mapping course, allowing students to integrate the ancient and modern, to build a professional bridge, the mapping process to understand the differences between ancient and

modern structures.

2.1.3 Cultural Inheritance Module

Learning the composition of ancient Chinese architectural structures, comparing and analyzing them with present-day architectural structures, cultivating students' knowledge of ancient Chinese architectural structures, realizing the inheritance of traditional Chinese culture, enhancing cultural self-confidence, and triggering connotations of thought politics. The ancient building structure is divided into three, in the "wood scripture" is called "three points", said: "where the house has three: it's 'upper part' that above the beam; it's 'middle part' that above the ground; and 'lower part' that the steps." The "Wood Sutra" is a work on house construction methods and the first manual of wood construction in China's history. It was later lost and briefly recorded by Shen Kuo in the Northern Song Dynasty in "Mengxi Pen-talk".

The course takes ancient Chinese building construction as an entry point to study construction materials, scale and shape, and looks at the evolution of Chinese building construction, which can be reflected in the form of images or drawings. The course includes a comparative analysis of ancient and modern Chinese building construction, as shown in the following table:

Table 1. Comparative Analysis of Ancient and Modern Chinese Building Structures

No.	Three parts	Names of ancient building components	Name of modern building components	Comparison study
1	Lower Part	Foundation and table base	Foundation and Base	Ancient Chinese wooden buildings use the foundation to prevent moisture and avoid water, building hierarchy, the role of stable foundation. Modern architecture with indoor and outdoor height difference, and the ancient foundation has a similar role, pay attention to the foundation and base.
3		Ground	floor and Ground	The ground is the part of the ancient building under the substructure, and the modern building contains the floor and ground.
4	Middle Part	Wooden frame	Walls, Columns	The ancient wooden frame was the main load-bearing element, equivalent to the columns and beams in modern architecture.

5	Bucket arch		<p>Bucket arch is an important architectural element of ancient buildings that is not found in modern architecture.</p> <p>In ancient times, walls were only used for maintenance and space separation, but modern buildings have different structural forms of walls that can also carry loads.</p>
6	Wall		<p>In ancient times, wooden stairs were mostly used, and modern building stairs, elevators and escalators are used as vertical transportation.</p>
7	Individually Stairs	Stairs, Elevators, Escalators	<p>The roofs of ancient buildings were of various forms, different from those of modern buildings.</p>
8	Upper Part Roof	Roof	

2.1.4 Knowledge Assessment Module

The course “Building Construction” is aimed at training applied talents, which plays a fundamental role in the great process of building a strong country of higher education. Therefore, the basic knowledge needs to be assessed in several aspects, such as basic knowledge, practical ability, etc., focusing on process assessment and attention to the assessment of ability.

The course assessment integrates theoretical knowledge, practical knowledge, ideological and political connotations, and culture to realize the integration of theoretical learning process and practical work tasks. After the course reform, the modular and process-oriented assessment is realized, and students can not only learn the construction expertise in the process, but also improve the comprehensive quality and ability.

2.2 Virtual Design as a Leader to Optimize the Teaching Process

In order to allow architecture students to establish good information communication with teachers in the learning process, virtual building construction models are built to teach in the classroom. Teachers rely on two-dimensional drawings to tell relatively difficult, in the process of teachers teaching to read the drawings, students also have the inability to read the drawings, in order to more efficient and professional learning, the subject teachers use three-dimensional virtual models to help students understand the two-dimensional drawings and establish the connection between three-dimensional graphics and drawings. The teaching tasks are required to be directly or indirectly derived from real projects and completed in an atmosphere of realistic laboratory simulation.

Students in the learning process that is the real work process, observation and measurement after the two-dimensional drawings into three-dimensional virtual model, deepen the understanding of the boring construction knowledge. In the classroom teaching, give full play to the students' initiative.

2.3 Building a Dream as a Starting Point to Inherit and Preserve Historical Buildings

Through the linkage of the two courses of architectural construction and ancient building mapping, the structure and form of modern and ancient building structures are expressed in detail based on the knowledge of drawings and the construction of 3D models, and the differences between ancient and modern buildings are analyzed through refined measurement results. For ancient buildings, the study of inheritance and conservation strategies, to achieve a detailed understanding of the structure of the building to achieve the purpose of historical building maintenance, which also reflects the Southwest Jiaotong University Hope College of architecture professional construction "integration" connotation.

3. Digging Deeper into the Ideological and Political Elements

According to the professional characteristics of architecture "integration" and the overall goal of Civics, through the study of students' development needs and learning characteristics, the course team based on the advantages of the discipline, discuss together, deeply refine and explore the Civics elements in the curriculum, as follows:

3.1 Strengthen National Pride

By explaining the construction techniques and structural structures of ancient Chinese buildings, students will realize the subtlety of ancient Chinese building techniques, feel the greatness of Chinese architecture, realize the prosperity of architectural history in the long history of China, firm up students' national pride through the course, and let them know that seriously learning the content of the course "Building Construction" becomes their future responsibility in the society.

3.2 Inspire Patriotic Feelings

In the classroom, students are told about Bucket Arch construction in the Tang, Yuan, Ming, and Qing dynasties, and are asked to scientifically evaluate the construction techniques of Bucket Arch art of ancient architecture, to stimulate patriotic feelings and motivate them to actively learn and correctly view the connection between ancient and modern architecture.

3.3 Compliance with Professional Ethics and Norms

Through the study of building construction-related codes, such as the Technical Specification for Roofing Engineering, students can understand which constructions are not in line with the current national codes and which behaviors will violate laws and regulations and professional ethics codes, so that they can comply with professional ethics codes in practice and consciously learn the relevant legal knowledge.

3.4 Awareness of Serving the Country and Society

In today's situation of frequent epidemics and natural disasters, especially the construction of the Square Cabin Hospital during the epidemic, there are countless architects who have given and worked

hard to benefit the Chinese people so that students can have the motivation to study hard and work hard to solve people's problems and serve society.

3.5 Establishing a Human-Centered Concept

Architecture major "Architectural Design" series of courses in the process of learning, all-round integration of the "people-oriented" concept, "building construction" course, as a professional foundation course, also in the classroom to guide students to pay attention to human physiological and psychological characteristics, in respect of human use of the premise of structural design.

4. Teaching Structure Reform

The course serves the architecture major, and at the same time carries out the reform of the teaching structure. The reformed course enhances the frequency of classroom interaction between teachers and students, changes the teaching idea of the traditional classroom in which the teacher lectures and students learn, stimulates the students' hands-on ability and independent exploration ability through the students' research and practice, and the teacher's commentary and guidance, so that college students can not only understand and master the professional knowledge and skills, but also enhance the practical application ability.

4.1 Observation, Measurement and Mapping Import to the Classroom

Students are encouraged to observe more buildings around them and to map school building structures. At the beginning of the class, the teacher does not directly introduce the course knowledge points, but introduces the course content through the observation of the surrounding buildings, which can show the main position of students in the classroom, the number of students participating in the classroom increases, so that students receive knowledge with practice and hands-on skills, and the classroom will not be boring because it is not all theoretical knowledge. The course develops students' adeptness to think more deeply about problems, identify them, and solve them.

4.2 Guiding Students' Independent Learning and Practice

When the teacher is in class, the original theoretical knowledge will be changed to the students' own lecture and report, to provoke students to think and research, so that students become the thinker in the classroom, so that the memory of knowledge will be greatly deepened, unlike the previous repeated memorization way. In the practice of mapping, students use group research and investigation, so that students enhance the collective consciousness and team concept, division of labor and cooperation to complete the task, the teacher at the appropriate time to summarize the course knowledge framework, students independently grasp the important and difficult points of the course, improve learning methods and enhance the quality of ability.

4.3 Conducting Teaching Experiments to Enhance Students' Cognitive

In the course of "Building Construction", some contents are difficult to understand, which requires teachers to use experimental means to give students guidance, such as three-dimensional model guidance, construction model observation experiments, etc. Teachers can do three-dimensional

demonstration in the classroom or use 1:1 model in the laboratory for students to better understand the course content, guide students can use experimental means to independently explore the subsequent knowledge points. Such an experimental process allows students to grasp professional knowledge more deeply, to achieve a combination of theory and experiment, so that knowledge is conveyed more effectively, while enhancing students' interest and enthusiasm in learning.

5. Conclusion

College students complete the knowledge, ability, emotional and ideological and political objectives through the course "Building Construction". Students can draw and read drawings related to building construction, master the knowledge and principles of building construction and carry out construction design. After the reform of course construction and ideology and politics, students' enthusiasm in class is obviously improved, the evaluation results of students and supervisors on teachers are good, and the objectives of the course are consistent with the training objectives of architecture majors. The integration of ideological and political education and professional education has been realized, which provides a referenceable and replicable model for the construction of the course philosophy of other professional courses.

Fund

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