

Applied Research on the Teaching of Architectural Structure Course in Modern Universities

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Abstract: In recent years, China's architectural structure design has been highly valued and the construction industry has developed rapidly. Chinese universities have also increased their research in the field of building structures and strengthened the reform of the building structure curriculum. The architectural structure curriculum is relatively professional, with a wide range of basic knowledge points and practical skills required. Based on the current situation of building structure courses, this paper puts forward many problems in the teaching process, such as the deviation of teaching objectives in the process of implementation, the low quality of practical teaching, the lack of planning of teaching content, the lack of close integration of knowledge and engineering background, and The problem is put forward corresponding strategies to rationally plan teaching programs, improve students' knowledge application ability, and solve practical engineering problems.

1. Research Background

1.1 Literature review

Based on the “High-rise Building Structure Design” course, Zhan and Zhao et al. used the PDCA cycle method to adjust and improve the case teaching, and proposed countermeasures such as the teaching effect evaluation mechanism and the design case teaching plan (Zhan and Zhao, 2018). Cheng and Ning et al. combined the building structure curriculum talent training program to propose curriculum standard design, curriculum teaching content reform, teaching method reform, and assessment method reform for higher vocational building structure courses (Cheng et al, 2014). Li and Wen analyzed the traditional building structure teaching mode, expounded the problems and causes of this model, and combined with the German education system and concept, proposed reform measures for teaching content, teaching methods and assessment methods. (Li et al, 2018). Chen and Long et al. reconstructed the architectural structure curriculum system for undergraduate teaching from three levels of courses: structural selection, architectural mechanics, and architectural structure, in view of the isolation and obsolescence of the structural and architectural mechanics curriculum. Chen et al, 2015). Zhang and Gao found that the teaching materials in the course of building structure in higher vocational colleges are obsolete, the teaching form is single, the teaching effect is poor, the teaching mode is rigid, the teaching quality is degraded, and the corresponding solutions are proposed. Zhang and Gao, 2015). Huang and Yuan et al. analyzed the current situation of the architectural structure curriculum, and proposed that the architectural structure curriculum is too theoretical, the teaching content can not meet the post ability requirements, the students have poor ability to map, and the teaching content reform and teaching Countermeasures such as mode reform and reform of assessment methods (Huang et al, 2017).

1.2 Purposes of research

The Architecture Course is a professional course in the architectural engineering profession. In the field of architectural engineering, this course is relatively professional, with a wide range of basic knowledge points and practical skills. With the development of urban construction, the theory

of building structure has also developed rapidly. But at this stage, there are many problems in the combination of teaching objectives, teaching quality, teaching content, knowledge points and engineering examples. In order to solve the problems existing in the teaching of modern university building structure courses in recent years, based on the teaching objectives of applied undergraduate colleges, this paper proposes countermeasures for the application of modern university building structure course teaching.

2. Teaching Status of Modern College Building Structure Course

2.1 Clear teaching objectives

In China's education system, college talent training programs that emphasize application skills have unique target advantages in the application of teaching content. On this basis, the teachers carry out teaching according to the application-oriented college talent training plan, and at the same time focus on the transfer of professional knowledge, cultivate students' practical ability and professional problem handling ability. Teachers generally teach through specific engineering examples to develop students' ability to apply their expertise flexibly (Hu et al, 2013). In the course of the actual building structure course, the teacher enhances the cognitive structure of the students through the structural model building, structural design and other curriculum content, and cultivates the students' ability of drawing.

2.2 The number of experimental teaching classes is gradually increasing, and students' practical ability is enhanced

At present, the architectural structure courses of major universities are mainly based on theoretical teaching, supplemented by practical teaching. In order to achieve the purpose of enhancing students' practical ability, colleges and universities have reduced the content of theoretical courses, and will reduce the available course hours after the course content is arranged as a practical course. At the same time, the assessment requirements for professional knowledge are reduced, and the requirement for reviewing professional knowledge is changed to require only cognition (Kang et al, 2015). Taking a university in a certain region as an example, the current architectural structure course of the university's architectural engineering major has 40 course hours, all of which are taught in a theoretical form. In order to increase the number of practical courses, the college has cut down some of the teaching content that can be deleted, and at the same time increased the practical class of the same class. In the practical course, the teacher arranges students to conduct actual combat on the content of the building structure course, and conducts class discussion on specific building examples. Teachers pay close attention to students in the classroom, solve problems faced by students in practice, and improve classroom interaction between students and teachers.

2.3 Teaching content has been optimized

The architectural structure course has a wealth of theoretical knowledge and a systematic and scientific professional teaching system. With the rapid development of the construction industry, the teaching of architectural structure courses in colleges and universities is continuously optimized. At present, the formulation of the teaching plan of the university building structure course is generally adjusted according to the development of the construction industry and the students' own training needs. In order to meet the needs of talent cultivation in the national construction industry, colleges and universities tend to choose textbooks that combine practical content with theoretical content and rich examples. On this basis, colleges and universities follow the footsteps of the development of advanced professional knowledge of the world's building structure, and constantly optimize and adjust the content, teaching mode and teaching form of the architectural structure to ensure the effectiveness of the teaching content and improve the classroom teaching effect.

2.4 Gradually add engineering examples during the course teaching process

In the course of college building structure, engineering examples generally only appear in the

introduction part, and tend to introduce concepts. A very small number of courses involve the explanation of specific engineering examples. Therefore, in the classroom teaching of college building structure lacking engineering examples, it is difficult to avoid the problem that students cannot understand professional knowledge and it is difficult to apply in practical operation. A small number of teachers will cite certain engineering examples in the course of teaching, and assist in the teaching of theoretical knowledge, which is conducive to students' understanding of building structure expertise. Major universities have gradually developed a combination of classroom theory knowledge and engineering examples. Specifically, each university combines professional knowledge such as wall spacing, wall section aspect ratio, width, etc. with engineering examples to allow students to conduct data analysis to improve students' data processing capabilities and engineering project experience. Furthermore, teachers can select typical accident cases, such as engineering accidents caused by improper design in the infrastructure, and conduct accident case analysis to highlight the importance of the building structure curriculum.

3. Problems in the teaching of modern university building structure course

3.1 Teaching objectives are deviated during execution

The application of undergraduate colleges and universities is based on “application”, which aims to cultivate applied talents. The Building Structure Course is a basic course for the architectural profession and places special emphasis on the application of students' professional knowledge. However, since applied teaching is still in a new teaching mode, the majority of educational practitioners lack a deep understanding of this concept, so most of the existing teaching targets deviate. The syllabus of the building structure curriculum still follows the early materials, and many new teaching models lack application.

3.2 The quality of practical teaching is low, and students' ability to practice is weak

In the discipline, the quality of teaching directly affects students' ability to master professional knowledge and practice. All colleges and universities in China generally attach importance to theoretical teaching, neglecting the practice of knowledge transfer, and it is difficult to implement the national requirements for the cultivation of college construction professionals. In the existing building structure courses, the practical teaching content is weak, the teaching quality is low, and the students' general practical ability is weak. At this stage, the teaching content of architectural structure courses in most colleges and universities is biased towards the theory. In the process of classroom teaching, more attention is paid to the detailed explanation of the professional knowledge of building structure, so that most students only have certain mastery of professional knowledge, but in specific practice.

3.3 lack of planning content

The lack of planning for the teaching content of college building structure courses, such as the lack of clear plans for the proportion of practical teaching content and theoretical teaching content. The teaching content of college building structure courses mainly includes conceptual design and seismic design, component design, structural foundation design, structural calculation principle, and building structure system. The textbook covers the related data calculation, construction structure, and construction framework involved in the building structure. From the analysis of the overall teaching content, the teaching knowledge of college building structure courses is complicated and difficult for students to master.

3.4 The combination of knowledge points and engineering background is not tight

In the process of teacher teaching, the professional knowledge of building structure is not closely related to the case of textbook engineering. The engineering examples of building structures are becoming more and more common, and the proportion of building structures in new construction projects has increased year by year. But the engineering examples used in teaching are still old examples. When college teachers explain the professional knowledge of building structure, it is

difficult to combine with the engineering examples provided in the teaching materials, which leads to the disconnection between the theoretical knowledge of the architectural structure curriculum and the practical practice teaching curriculum. For example, at present, some urban land documents require a certain number of parking spaces, which results in most real estate's adopting a tower structure with a basement. However, in the teaching content of college building structure courses, there is a lack of explanation for this engineering background.

4. Optimization Strategy of Modern College Building Structure Course Teaching

4.1 Deepening the practical application of teaching objectives

The purpose of the course of building architecture in colleges and universities is to cultivate comprehensive talents with theoretical knowledge of building engineering technology and modern building structure. To lay a solid theoretical foundation for students' future work, assist students to master the construction drawing of building structure, familiar with the characteristics and construction requirements of different building structures. Therefore, a clear curriculum teaching goal plays a crucial role in the teaching work. The ultimate goal of teaching is to ensure that students have the ability to analyze engineering practice and the ability to select and judge engineering models, so that students are familiar with the building structure system.

4.2 Increase the content of practical teaching

The content of the building structure curriculum is comprehensive, involving not only theoretical knowledge, but also calculation and practical operation content. In the course of building structure, students only study the theoretical knowledge of building structure, lack direct contact with the building structure in real life, and lack of construction work experience. Therefore, the optimization of the curriculum teaching content is mainly to increase extracurricular practice activities and increase internship opportunities for direct contact with construction projects. In this way, students are encouraged to use the professional knowledge of classroom teaching to enhance students' knowledge understanding ability.

4.3 enrich teaching methods and practical content

The rich teaching methods are conducive to the development of teaching work, and also have a certain degree of improvement in students' interest in learning. When teachers carry out the teaching of building structure courses, they can flexibly use multimedia resources and network resources, and use modern advanced computer science and technology software to carry out three-dimensional display of buildings in the classroom, so that students can easily master the professional knowledge of building structure courses. In the practical course, the teacher can lead the students to observe the building structure and conduct on-site visits. Compared with the use of three-dimensional graphics, this practical activity can enhance the teaching effect more effectively, and enable students to have knowledge of building structure and architectural design. In addition, the university architecture structure curriculum needs to add a lot of practical operation content, combine the practical content with the theory, and enrich the students' understanding of the content of the architectural structure course through the rich and varied teaching methods, and consolidate the knowledge points. Colleges and universities should strengthen the emphasis on the optimization and reform of architectural structure courses.

4.4 Reference to the new teaching model

Teaching model teaching methods are more common in colleges and universities. This teaching method is to use the teaching model to carry out the teaching of the building structure course, and to improve the mastery of the professional knowledge and the level of knowledge of the building knowledge through systematic teaching. The construction of the teaching model should follow the national university building structure curriculum talent training plan. At the same time, the teaching model should include the explanation of the latest building structure knowledge, engineering case analysis, and the physical model learning of the course-related buildings. Teaching model teaching

plays an important role in helping students understand building structure, strengthen professional knowledge points and exercise hands-on ability in practice.

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