

Exploration of Graduation Design Model for Civil Engineering Majors in Applied Technology Vocational Undergraduate Education

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Abstract: This article aims to explore the graduation design mode of civil engineering major in applied technology vocational undergraduate universities and propose improvement methods. Firstly, the characteristics of applied technology vocational undergraduate universities are analyzed, and it is believed that their educational goal is to cultivate applied talents with a certain theoretical foundation and practical abilities. Secondly, an analysis is conducted on the existing graduation design models for civil engineering majors, pointing out that the existing problem is the lack of close integration with actual engineering projects, which cannot meet the educational goals of applied technology vocational undergraduate universities. Finally, an improvement method is proposed, which is to establish a graduation design model closely integrated with actual engineering projects, strengthen cooperation with enterprises, and improve students' practical abilities.

1. Introduction

With the rapid development of China's economy and the acceleration of urbanization, the civil engineering major still plays an indispensable role. The graduation project is a summary and application of the professional courses learned by civil engineering students in universities, and its importance is self-evident. As a new type of higher education model, applied technology vocational undergraduate universities aim to cultivate applied talents with certain theoretical foundations and practical abilities. Therefore, how to establish a graduation design model for civil engineering majors that meets the educational goals of applied technology vocational undergraduate universities is an urgent problem to be solved. This article will conduct in-depth research on this issue and propose improvement methods, in order to provide useful references for educational and teaching practices.

2. Characteristics of civil engineering major in applied technology vocational undergraduate universities

Applied technology oriented vocational undergraduate universities are a higher education model that emphasizes the cultivation of practical abilities. The Civil Engineering major is a type of applied technology vocational undergraduate university, with the goal of cultivating civil engineering applied talents with a certain theoretical foundation and practical abilities. The following are the

characteristics of civil engineering majors in applied technology vocational undergraduate universities:

Strong practical ability: The educational goal of civil engineering majors in applied technology vocational undergraduate universities is to cultivate talents with practical abilities. For this reason, the curriculum of civil engineering majors focuses on theoretical and practical teaching, and arranges a certain number of practical training and graduation design stages, so that students can gain practical experience and improve practical operation skills in actual engineering projects.[1] This practical teaching mode can help students better master the knowledge and skills they have learned, and adapt to the requirements of design and construction abilities in future work.

Strong applicability: The teaching content of civil engineering major is mainly application-oriented, closely combined with the actual needs of the industry, with a focus on cultivating students' engineering practical abilities. The curriculum not only involves theoretical knowledge, but also the explanation and mastery of engineering case analysis and practical application skills. Through the practical teaching mode of applied technology vocational undergraduate universities, students can better grasp and apply the knowledge and skills they have learned, laying a solid foundation for future work.

Strong professionalism: Civil Engineering is one of the key engineering majors in applied technology vocational undergraduate universities, with strong professionalism in teaching content. Cultivate students' professional abilities, gain a deep understanding of practical applications in various fields of civil engineering, and have the ability to independently carry out civil engineering related design and construction work.[2] In addition, the civil engineering major also involves numerous professional fields, including structural design, road and bridge engineering, foundation engineering, etc. Students need to conduct in-depth research and learning in relevant fields, and master relevant practical skills.

Strong cooperation: Applied technology vocational undergraduate universities in civil engineering focus on cooperation with enterprises and closely connect with the actual needs of the industry. Students often need to enter enterprises in the practical process, collaborate with enterprise employees to complete relevant work, communicate and exchange with enterprises through practice, and improve their own abilities. In addition, the curriculum of civil engineering also emphasizes the cultivation of teamwork ability. Students need to complete relevant design and practical tasks in a team to adapt to the requirements of teamwork in future work.

Wide employment prospects: Graduates of civil engineering majors from applied technology vocational undergraduate universities have high practical and application abilities, and are widely used in engineering design, construction, and management positions in civil engineering related fields. With the continuous acceleration of urbanization construction in China, the employment prospects of civil engineering graduates are becoming increasingly broad, and their salary and benefits are relatively favorable. Many well-known enterprises and institutions require a large number of civil engineering talents, so the employment market prospects for civil engineering graduates are very promising.

3. Analysis of existing graduation design models for civil engineering majors

The existing graduation design model for civil engineering majors is usually based on course theory and practical teaching, including independent topic selection, literature review, design content, calculation and drawing, and other links. However, in practical teaching, students' practical and applied abilities are often not fully cultivated, which are the core competencies that graduates must possess in their work. Therefore, the existing graduation design model has certain shortcomings. Its shortcomings are mainly manifested in the following aspects:

(1) Insufficient practical experience: The existing graduation design model usually only involves a certain number of internships and training sessions, and students lack real engineering project practical experience in the practical process, resulting in a lack of experience and coping ability when facing practical problems in actual work.

(2) Disconnection with actual engineering projects: Existing graduation projects often only involve students' independent topic selection and are not closely integrated with actual engineering projects, resulting in the inability of graduation project results to be truly applied.

(3) Insufficient guidance: Existing graduation projects often lack guidance, and students may encounter problems in their design and practice. However, due to insufficient guidance, it is often difficult to solve problems, resulting in the graduation project not being successfully completed.

(4) Lack of close integration with actual engineering projects: The existing graduation design model is relatively theoretical and detached from the needs of actual engineering projects, and students lack practical operational experience when completing their graduation design. This situation may lead to students not being able to truly master practical engineering operation skills when completing their graduation project, unable to meet the needs of enterprises for applied talents, and having a negative impact on the employment of graduates.

(5) Insufficient cooperation with enterprises: The existing graduation design model has limited cooperation with enterprises, and students are unable to collaborate with enterprise employees to complete related work, lacking opportunities for communication and exchange with enterprises. This situation may lead to students lacking opportunities to interact with enterprises, unable to truly understand their operations and needs, and thus unable to better adapt to the work of enterprises.

4. Improvement methods for graduation design of civil engineering majors in applied technology vocational undergraduate education

4.1. Establish a graduation design model that closely integrates with actual engineering projects

Establishing a graduation design model that is closely integrated with actual engineering projects is an important means to improve students' practical operation and application abilities. In practice, it can be achieved through the following measures:

Integrating graduation design closely with actual engineering projects: You can collaborate with local construction enterprises or design institutes to select an actual engineering project, and use a subsystem or a key node of the project as the graduation design topic to ensure close integration between graduation design and actual engineering projects. Or choose the current or upcoming project as the object of graduation design, such as the design and construction scheme of a building structural engineering, or the design and construction scheme of a bridge project. This not only closely integrates with actual engineering projects, but also enables students to better understand the requirements and practical operation methods of engineering projects. In the process of completing the graduation project, students can be divided into small groups to jointly complete a complete engineering project plan based on the actual needs of the project. Each team needs to complete certain tasks, such as scheme design, drawing, construction plan development, etc., and collaborate to complete the development of the entire engineering project plan.

Strengthening practical operation: In the graduation project, strengthening practical operation is an important means to improve students' practical operation and application abilities. Practical links can be added to the graduation project, allowing students to participate in actual design and construction, and improving their practical operational skills. Students can conduct structural design, construction organization, etc. based on actual engineering project data, in order to improve their engineering practical abilities. For example, when completing the graduation design of a certain building structure project, students can be organized to measure and shoot on-site to further

understand the actual situation of the engineering project.

Increasing the proportion of practical teaching courses: In the teaching process, increasing the proportion of practical teaching courses can improve students' practical and application abilities, and also have a positive impact on the quality improvement of graduation projects. Students' graduation designs can invite supervisors and designers from actual engineering projects as mentors, ensuring a close integration of graduation designs with actual engineering projects.

Establish a supervision and evaluation mechanism for actual engineering projects: In the process of completing the graduation project, a supervision and evaluation mechanism for actual engineering projects should be established to ensure the quality and practical feasibility of the graduation project. Enterprise experts can be invited for on-site supervision and guidance to evaluate the feasibility and practicality of the graduation design plan. At the same time, experts in relevant fields can be invited for evaluation and review, and improvement suggestions and opinions can be proposed.

4.2. Strengthen cooperation with enterprises

Collaboration with enterprises is an effective means to improve students' practical operation and application abilities, and it is also conducive to combining graduation projects with actual engineering projects. The specific measures are as follows:

Inviting enterprise experts to participate in graduation design guidance: Inviting enterprise experts to participate in graduation design guidance can help students understand the talent needs and practical operational skills requirements of the enterprise, and also help enterprises understand the teaching quality of the school and the level of students, improving students' job competitiveness. Enterprise experts can participate in the guidance of graduation design from the following aspects:

(1) Teachers and enterprise experts jointly form a graduation design guidance group to guide students in their graduation design.

(2) Enterprise experts provide guidance and evaluation on students' graduation design plans, providing relevant practical experience and suggestions.

(3) Invite enterprise experts to give lectures or seminars at the school to provide training on practical operational skills and application abilities for students.

Organizing students to practice and intern in enterprises can help them better understand the actual workflow and needs of the enterprise, as well as enable the enterprise to understand students' practical operational and application abilities. Organizing students to practice and intern in enterprises can be carried out from the following aspects:

(1) Collaborate with enterprises and arrange for students to practice and intern in enterprises.

(2) Arrange students to practice and intern in different enterprises, so that they can understand the actual design and construction processes and indicator requirements of different types of enterprises.

(3) Arrange for enterprise employees to attend lectures and practical skills training at schools to improve students' practical and practical skills.

4.3. Increase the proportion of practical links

The graduation project is the final process for students to complete their studies, and the proportion of practical activities should be increased to cultivate students' practical and practical abilities. The specific measures are as follows:

Adding curriculum for practical aspects: It can increase the curriculum for practical aspects and enhance students' practical operation abilities. Incorporate the practical aspect into the course assessment scope, requiring students to participate in the practical aspect and complete practical tasks in order to obtain corresponding credits. Increase the number of practical teaching courses, including experimental courses, design courses, construction practice courses, etc., to improve students'

practical operation and application abilities. Practical teaching courses should have practical operability, and the content of practical teaching courses should be combined with actual engineering projects, allowing students to experience practical operations firsthand and improve their practical and application abilities.

Expanding the scope of internships: Cooperation with enterprises is an effective means to expand the scope of internships. Enterprises can be invited to provide internship opportunities, allowing students to participate in practical engineering projects, and improving their practical and application abilities. Establish an internship base, provide internship opportunities, and allow students to exercise their practical operation and application abilities in practice. Strengthen internship management, improve internship effectiveness, and provide supervision and guidance during the internship process to help students better acquire practical and practical skills.

4.4. Strengthen guidance efforts

(1) Establishing a graduation project guidance group: Establishing a graduation project guidance group is an effective means of guiding students to complete their graduation projects. It can be composed of teachers, enterprise experts, and experts in related fields to guide and supervise students' graduation designs. The graduation design guidance group can formulate detailed guidance plans and guidance plans, provide comprehensive guidance and supervision to students, and ensure the quality and effectiveness of the graduation design. The graduation design guidance group can also timely understand students' practical operation and application abilities through continuous communication and exchange, help students overcome difficulties, and improve their design and practical operation abilities.

(2) Strengthen teacher guidance: Teachers should strengthen their guidance to students, promptly answer their doubts, help them overcome difficulties, and improve their design and practical operation abilities. Teachers can also adjust the direction and methods of guidance based on students' actual operational and application abilities, to help students better complete their graduation projects.

5. Conclusion

This article explores the issue of graduation design models for civil engineering majors in applied technology vocational undergraduate universities, and proposes improvement methods. Establishing a graduation design model that closely integrates with actual engineering projects, strengthening cooperation with enterprises, increasing the proportion of practical links, and strengthening guidance can effectively improve students' practical and application abilities, making the graduation design more in line with the educational goals of applied technology vocational undergraduate universities.

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