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Teaching Practice of "Engineering Project Management Theory and Application" Based on OBE Concept

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Abstract: Strengthen graduate education is a key measure to realize the high-quality development. High-level graduate education should reflect the characteristics of theory, practice and research, so in the teaching process, we should combine the characteristics of graduate students, actively explore suitable for graduate education, and take the student as the center, exert the leading position of students, and guide students to learn independently. Taking "Theory and Application of Engineering Project Management" as an example, based on OBE education concept, this paper analyzes the teaching practice of postgraduate core courses from four aspects: teaching objectives, teaching content, teaching methods and evaluation system.

1. OBE educational idea

OBE education concept, also known as achievement-oriented education or demand-oriented education, is a curriculum system construction concept that takes achievement as the goal orientation and adopts reverse thinking mode. This idea was proposed by Willaim Spady et al. in 1981 and quickly recognized in the United States, the United Kingdom, Canada and other countries. Its basic principle is that all learners succeed[1]. It emphasizes the students' learning results as the core, and the learning results are the end and the starting point. The OBE concept emphasizes students' learning experience, which not only enables students to master knowledge and improve their ability to apply theory to practice, but also has initiative in the learning process. Therefore, the research on the curriculum teaching system based on the OBE concept is to analyze the needs of the curriculum results, then determine the teaching objectives, and reverse construct the curriculum system. The application idea of the OBE concept is shown in Figure 1:

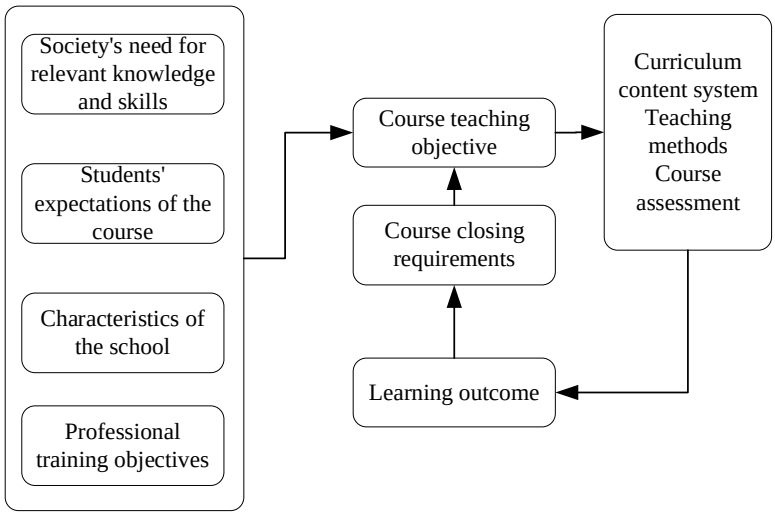

Figure 1: OBE education concept

"Engineering Project Management Theory and Application" is a core course of technical economy and management, engineering management and other graduate majors. It has formed a relatively systematic knowledge system with strong theoretical nature. Because this course involves the knowledge of management, economics, engineering and other disciplines, it is characterized by a wide range of knowledge, many related contents, and large differences in chapters. In the actual learning process, students are prone to problems such as incoherent knowledge system, inadequate theoretical understanding, and inflexible connection with practice.

At the same time, this course is highly applicable. In the construction engineer, consulting engineer, supervision engineer, information system project management division and other professional qualification examinations, will involve the relevant knowledge of project management. In view of the problems reflected in the current postgraduate teaching of this course, combined with the needs of students for the course, this paper studies the theory and application teaching of engineering project management based on the concept of OBE education.

2. Achievement requirements and teaching goal

Engineering project is the most common, the most typical and the most important type of project, which aims at the formation of fixed assets. The object of an engineering project is an engineering technology system with specific requirements. The task of engineering project management is to ensure the completion of the project under the constraints of the established objectives such as duration, cost and quality[2]. Although in practical work, students may only engage in a certain part of project management, there is a close connection between the various fields of project management, so students need to have a systematic understanding of the project management knowledge system. To acquire professional knowledge corresponding to the position is the key requirement for students to learn the course "Theory and Application of Engineering Project Management". As an application-oriented course, whether students have a solid theoretical foundation and the ability to comprehensively analyze and solve problems need to be tested through practice. Therefore, realizing the comprehensive practical application of theory and ability is the ultimate demand of students' learning. In addition, postgraduate teaching is different from undergraduate teaching. In the postgraduate stage, academic ability should also be reflected in addition to the mastery of knowledge system and the cultivation of practical ability. Students hope to broaden their horizons, develop innovative awareness and scientific research ability through learning.

According to the analysis of the course demand, the teaching objectives of the course "Theory and Application of Engineering Project Management" can be set as follows: First, to consolidate the theoretical foundation, which is the primary goal of the course teaching. Through learning, it helps students build knowledge memory structure, enables students to understand and master the core theories and methods of engineering project management, and forms a comprehensive cognition of the project management knowledge system. The second teaching goal of this course is to improve students' practical ability. To train students to consciously take theory as guidance, comprehensively use their own ability to solve practical problems, and realize the comprehensive application of knowledge and ability. The third teaching goal is to guide students to take the initiative to understand the research status at home and abroad, understand the management needs of different project stages, analyze problems in combination with the actual situation, put forward new ideas to solve problems, and cultivate students' innovation ability.

The teaching objectives and realization path of engineering project management course are shown in Figure 2.

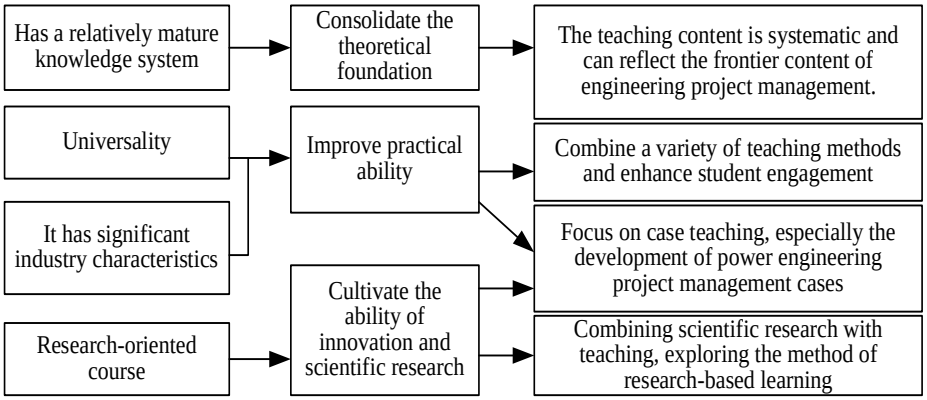

Figure 2: Teaching objectives and realization paths of engineering project management theory and applied courses

3. Optimization of teaching content

Based on outcome-oriented, the primary goal of "Engineering project management theory and application" course teaching is to consolidate the theoretical foundation. Engineering project management involves a very wide range of knowledge. According to PMBOK, project management knowledge system includes knowledge modules such as integration management, scope management, schedule management, cost management, quality management, resource management, communication management, risk management, procurement management, stakeholder management, etc. The teaching content of engineering project management in this class is also designed with the project management knowledge system of PMBOK as the framework, and combined with the characteristics of engineering projects. Considering the limitation of teaching time, the teaching content will be combined with social needs, and the teaching emphasis of each knowledge module will be reasonably arranged. Through the investigation of actual work needs, the complex theories in the teaching content are divided, and the knowledge points of management, economics, engineering and other related disciplines are highlighted, so as to cultivate students' solid theoretical foundation and the thought of multi-disciplinary theory integration. The optimization of teaching content also takes into account the perspectives of different project management participants. Due to the differences in project management mode and business scope of management units, the participants in engineering project management have different emphases. For example, consulting engineers focus on the pre-planning of engineering project management,

while project management companies cover planning, design and even operation. Therefore, it is necessary to add the interpretation of the management work content from the perspectives of different participants in project management, simulate different working environments, strengthen students' sense of inclusion and responsibility in the whole process of project management, form a clear and accurate positioning and scope definition of the needs of project management under different circumstances, realize the integration of theory and practice, and enhance personal practical ability.

The teaching content of "Engineering project management theory and application" should combine the advantages of universities and reflect the characteristics of the industry. Our university has a strong energy and electricity characteristics. After graduation, many students will be engaged in the work of power engineering project management. Therefore, the characteristics of energy and power industry are also reflected in the design of teaching content. Case teaching helps students to combine theory with practice and deeply understand the whole life management of engineering projects. Therefore, in the teaching content, the proportion of case teaching has been increased, and more time-sensitive and innovative cases have been added. Considering the characteristics of energy and power industry, the case management of wind power, photovoltaic, smart grid and other projects has been added. In order to expand the project management technology required for integrated and intelligent projects in the context of the industry.

The teaching content should also reflect the development trend of project management and integrate new content, such as green project management. At present, the society pays more and more attention to environmental protection, and environmental protection is also added to the goal of engineering project management, such as the use of green materials and processes, improve the energy efficiency of the whole life cycle of the project and so on.

4. Optimization of teaching methods

The OBE concept emphasizes the principal position of students in learning, and the teaching method should be based on heuristic and case teaching to guide students to think positively, discover and solve problems. Therefore, the course "Theory and Application of Engineering Project Management" has changed the mode of only teaching by teachers, designed special topics, conducted student-led analysis and explanation, and applied case analysis and thematic discussion, so that students can master the theories and methods of engineering project management in the process of actively seeking answers to questions. In the course teaching, homework sharing is also organized to encourage students to exchange ideas on homework design, and through this exchange, students' interest in learning is stimulated.

Make full use of online resources and integrate online and offline teaching. At present, the development of online teaching platform is becoming mature. All kinds of teaching platforms can be used for teachers to publish learning tasks and upload teaching courseware, etc., and platforms such as university MOOC and Xuetang online also share various subject curriculum resources. This course uses the flat of Ketangpai distribution to provide teaching resources, publish homework, and conduct classroom tests, so that students can preview before class, review after class, and consolidate in class. Moreover, by recommending excellent online courses to students, the teaching content is comprehensively extended. The full use of online platforms can better enrich the teaching content, but it may also reduce teachers' control of the course rhythm and students' learning status. Therefore, it is necessary to integrate online and offline. Offline teaching is more conducive to achieving positive interaction with students and stimulating their learning enthusiasm, such as class group discussion, offline can form a better learning atmosphere. In order to ensure the coherence of online and offline teaching, teaching content was adjusted synchronously according to the different

characteristics of online and offline teaching, so as to realize the complementary advantages of online and offline teaching.

5. Optimization of the result-oriented evaluation method

Corresponding to the teaching objectives, the assessment of the course also adopts the whole process multi-dimensional evaluation method. Through the quiz in class, check the students' grasp of the basic knowledge of each module. Considering that the students who choose this course are mostly from the majors of technical economy and management and engineering management, many of these majors will participate in the construction engineer qualification examination or consulting engineer qualification examination after working, so the classroom test also refers to the content and form of these vocational qualification examination, and more multiple-choice questions and judgment questions are used to test students' grasp of the basic knowledge of engineering project management. Through case analysis, project planning and other forms, the students' ability to apply the theory of engineering project management is assessed. The course also uses the form of writing essays to evaluate students' comprehensive analysis ability and innovation ability. In the process of writing the essay, it is necessary to summarize, analyze and refine the viewpoints and research methods in a large number of existing literatures, promote students to actively understand the research status quo of engineering project management at home and abroad, broaden their horizons, divergent thinking, explore the breakthrough point of scientific research innovation, and cultivate students' scientific research ability. This can lay a foundation for further research and study.

To summarize, the core of the OBE concept is results-oriented. The optimization of the teaching system of "Theory and Application of Engineering Project Management" course should be combined with the actual needs of the society and the characteristics of postgraduate courses. Through the optimization of teaching objectives, teaching contents, teaching methods and assessment methods, the effect of postgraduate classroom teaching can be improved and talents in need of the society can be cultivated.

Acknowledgement

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