

Research on the Teaching Reform of Computer-aided Design Course for Urban and Rural Planning Majors Based on OBE Concepts

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Abstract: In response to the school's local applied-type university orientation, this paper explores a teaching model and method integrating the three parties of school, enterprise, and students from the perspective of the OBE concept of engineering education professional certification. This study summarizes relevant concepts, analyzes the problems in talent cultivation objectives, course construction, teaching methods, enterprise-school collaborative education, and course evaluation in the urban and rural planning major's computer-aided design course at Suqian College, and conducts course teaching reform research, proposing corresponding countermeasures. The teaching practice shows that this teaching model and method can better solve the problem of previous teaching and improve the efficiency and effectiveness of course teaching, and can better cultivate students' knowledge, skills, application ability, and comprehensive quality.

Keywords: OBE Concept; Computer-aided Design; Course Reform

1. Introduction

Since its inception, the concept of Outcome based education (OBE) has gradually had a significant impact on teaching and assessment in countries and regions including the United Kingdom, Canada, Japan, China and Africa, and to date the vast majority of studies have been able to demonstrate the effectiveness of the OBE theory for the enhancement of teaching methods and processes. Among the representative studies are Lamit, L.G. and Kitto K. L. (1997), Dix M. And Riley P (2005), Suskie LA (2009), Ikenberry S (2010), Azrula. M and Roszilah H. (2012), Gu Peihua (2014). Yang Yigang (2015), Chen Xiaoqian (2015),

Cheng Sweet (2016), Liu Rong (2016), Zhou Chunyue (2016), Jin Gaadi (2017), Zhang Linlu (2020), etc [1]. At present, this educational model has been recognized and promoted by the international professional accreditation of engineering education, which has become the key issue of research in the field of teaching at home and abroad, and also represents the mainstream direction of the current educational reform. In 2018, the Ministry of Education of China issued the "National Standard for the Quality of Undergraduate Professional Teaching in Ordinary Higher Education Institutions," which pointed out the teaching philosophy of "student-centered, output oriented, and continuous improvement"[2]. In the 2019 consultation meeting on the work of universities directly under the Ministry of Education held by the General Office of the Ministry of Education, the importance of curriculum content organization and teaching mode design based on the OBE concept was also emphasized[3]. At present, in the context of major universities in China actively carrying out professional certification of engineering education, teaching reform and practice based on the OBE concept has also become a hotspot of current education and teaching research [4].

2. Curriculum Teaching Reform Ideas

The urban and rural planning specialty of Suqian College was founded in 2019, and after several years of development, it has achieved some results in school-enterprise collaborative education, teaching mode and practice teaching, but there is still a certain disparity with the school's training objectives of cultivating high-quality applied talents. Therefore, it is imperative to re-examine the talent training program of urban and rural planning, focus on professional curriculum construction, highlight the characteristics, and reconstruct the

output-oriented curriculum-based teaching system. As a basic course of this specialty, computer-aided design focuses on cultivating and strengthening students' operational skills and practical usage ability in the later stage, so the teaching reform and practice of this course has become an important way to enhance the breadth and depth of professional application and promote the cultivation of professional application-oriented talents.

Outcome-oriented education, also known as ability-oriented education, goal-oriented education or demand-oriented education, whose basic idea is student-centered, outcome-oriented reverse design teaching and continuous improvement, has become the main representative idea of the current education reform [5]. This study intends to apply the outcome-oriented education model under the OBE concept to the teaching reform research and exploratory teaching of the computer-aided design course for urban and rural planning majors in our university from the perspective of cultivating high-level applied talents needed by the industry and localities. In order to reflect the teaching idea of reverse design and forward construction, when carrying out the teaching reform of the course, the basic point lies in how to design and build the educational objectives and teaching contents of the curriculum, and the prerequisite for doing these is to make clear the development of the industry and the needs of the society, which needs to break the traditional binary teaching system of teachers and students, and to bring in the third party of the enterprises and institutions so as to form the trinity teaching system of the school, the students and the enterprises. Trinity teaching is a new teaching mode, the intention is to let enterprises into the school, let teachers and students out of school, advocating multi-faceted, multi-form teaching methods, integration of a variety of educational teaching channels, educational teaching resources to design an integrated teaching mode and teaching platform.

3 Analysis of the Current Status of the Course

3.1 Course Overview

At present, the computer-aided design course for urban and rural planning majors in Suqian College is divided into two parts: upper and

lower, and the predecessors of the course are the CAD course for human geography and urban and rural planning majors, as well as the courses of 3D MAX and Photoshop, etc. In 2019, Suqian College's bid for urban and rural planning majors was approved, and after the revision of the professional talent cultivation program, the above course was modified into the computer-aided design (Part I) and the Computer-aided design (Part II) 2 courses, and in computer-aided design (Part II) will be three-dimensional modeling software from 3D MAX to SketcUP software teaching, both courses credit hours for 48 hours. Later, Lumion software teaching was added, CAD and Photoshop teaching was put into the computer-aided design (Part I) course, and SketcUP and Lumion teaching was put into the computer-aided design (Part II) course.

3.2 Problems of the Courses

(1) Unclear positioning of the objectives of the course

As a basic course for urban and rural planning majors, this course has a prominent status and role in the discipline, but because the teaching content and knowledge system of the course have been changing, the target orientation of the course is not clear enough, and there are problems such as the lack of precision in the professional field and the lack of obvious characteristics of vocational skills. Suqian College is a university aiming at applied transformation and development, and in order to meet the needs of society and promote the better development of the university, the university has clearly set the goal of cultivating high-quality application-oriented talents. Therefore, the course needs to fit the overall goal and clearly cultivate students' vocational application ability and comprehensive quality. For example, to cultivate students' professional-oriented spatial analysis and design ability, so that they can analyze and solve the problems related to urban and rural planning based on computer information technology; to cultivate students' innovative ability and team spirit to adapt to diverse working environments and to provide problem-solving methods and ideas.

(2) The knowledge module of the course is messy

The course has gone through many teaching reforms, and the teaching content of the course

has been modified many times, which leads to the knowledge module of the course changing with the change of teaching content, and the knowledge points are complicated and lack of condensation. Therefore, it should be fully combined with the actual needs of urban and rural planning and industry development trend, to carry out targeted curriculum teaching knowledge module reconstruction and teaching content design.

(3) Outdated teaching methods

The course is still teacher-centered in actual teaching, mainly teaching knowledge and skills, emphasizing the teaching content and knowledge modules, ignoring the actual efficiency and effect of learning, and part of the teaching content is not sufficiently in line with the requirements for the cultivation of core competencies. In addition, insufficient attention is paid to students' independent learning, and there is a lack of multi-source and multi-method composite teaching methods with the participation of experts outside the university.

(4) Insufficient classroom effective teaching

Most of the classroom teaching of the course is centered on the functions and functional realization of several major software to carry out teaching, with a wide range of knowledge but insufficient depth of application. From the perspective of students' professional application skills, the target of the course is not enough, which affects the professional effectiveness of classroom teaching, resulting in the course of professional graduation requirements for certain core competencies not to form an effective support.

(5) Insufficient depth of school enterprise cooperation

In recent years, in order to keep up with the pace of the times and adapt to social needs, school enterprise cooperation has been continuously developed, and the number of internship and training bases has been increasing, but most of them are based on the comprehensive practice of the later specialization, and lack of the practice of the special ability for certain courses in the early stage. In addition, the cooperation between schools and enterprises is not deep enough, the enthusiasm of enterprises is not enough, the participation in the school's talent cultivation program and curriculum construction is not enough, the school-enterprise collaborative

cultivation method is single, and the utilization rate of internship training bases is not high, especially in the individual course development and teaching applications. Therefore, it is urgent to strengthen the in-depth cooperation between schools and enterprises, especially for the cultivation of students' special abilities in the early stage, and explore the ways for enterprises to enter into the school classroom, so as to form a trinity teaching mode with both comprehensiveness and pertinence.

(6) Outdated evaluation methods, teaching does not form a closed loop

The teaching and learning evaluation of the course is mainly relied on the traditional evaluation method of test papers, which assesses the students' mastery of teaching content and theoretical knowledge, and there is less evaluation of the ability to achieve and practical application. At the same time, there is a lack of process evaluation, which makes the teaching fail to form an effective closed-loop mode of teaching - evaluation - feedback - continuous improvement.

4 Reform of Curriculum Teaching

4.1 Curriculum Teaching Content

The teaching content of the course needs to be determined according to the needs and objectives of personnel training, so timely grasp of the current industry development trends and social needs, strengthen and refine the cooperation and exchanges between schools and enterprises, and establish teaching objectives and course knowledge content towards results and applications has become the primary task of the curriculum teaching reform. The teaching team of the course condenses the current social demand for students' knowledge and skills according to the results of the survey of enterprises and institutions, interviews, talks, discussions of the teaching team and extensive consultation with experts, and designs the goals to be achieved in course teaching and the specific content of teaching by the demand for skills and results-oriented requirements, and redesigns and builds the teaching contents and teaching modules from the perspectives of knowledge, technology and ability.

In the specific course content and teaching module design, change the previous basic knowledge and functional realization of the

main teaching ideas, shift to practical application and ability literacy exercise is the main, meanwhile change the previous teaching content organization and design of the teacher's mono-core state, join the social forces to form a dual-core teaching drive, through introducing enterprises and institutions as one of the teaching parties in the course, first-hand materials on the forefront of the profession have been added to the course content, adding an enormous number of real-life projects and practical content to the course. This is conducive to guiding students to think about how to solve practical problems through practical cases, and on this basis, shaping students' practical operation and skill abilities.

4.2 Teaching Methods and Approaches

In the commonly used classroom teaching style in the past, the teacher is usually the center of teaching, the main body of knowledge, and supplemented by the form of after-school homework to carry out the teaching work, most of the students are in a passive learning state, the interest in the course as well as the motivation to learn are difficult to mobilize, these phenomena are contrary to the basic concept of student-centered in the OBE teaching model. Therefore, curriculum teaching reform needs to take the student-centered perspective and introduce diversified and diverse teaching methods.

The course team re-examined the teaching of the course from the perspective and understanding of students and explored the change of teaching methods and approaches around how to make students become teaching center. In the teaching design of the course firstly to ensure that each student can realize the status and role of the course, to solve the problem of why they learn, and stimulate their interest and enthusiasm for learning; secondly to solve the problem of what to learn, against the requirements of knowledge, skills, abilities and literacy, guided to let the students to recognize the knowledge system structure of the course; and lastly to solve the problem of how to learn, the course based on the network platform to increase the pre-study, Exercise and other extracurricular tasks, thus saving the classroom theoretical teaching time, increase the interaction with students to make it easier to grasp the students' learning status and knowledge mastery in a timely manner, in the

classroom teaching integration of inspiration and guidance, questions and answers, discussion, group work, demonstration and practice, case studies, and a variety of teaching methods, ways to carry out teaching work, in addition to reviewing homework after the classroom, but also vigorously develop the second classroom resources, the course team recorded a large number of practical work, the course is not only the first class, but also the second class. The course team has recorded a large number of hands-on video materials for students to learn independently, and more importantly, the course requires that students be led by enterprise mentors to carry out practical work on projects, so as to realize the link between principle understanding and practical application, and to achieve the integration of knowledge and skills.

4.3 Course Evaluation and Continuous Improvement

Computer-aided design is a basic curriculum with strong practicality in the field of urban and rural planning, and it is also a technical course directly oriented to the application. The assessment and evaluation of the curriculum should focus on the students' practical operation and engineering application ability, including the students' ability to solve practical problems, re-learning, innovation, engineering awareness, and other aspects of the ability as well as comprehensive literacy. However, in the past, the evaluation of this course focused on the quality monitoring and analysis and evaluation of teaching results and key teaching links, and the traditional examination and evaluation mode lacked objective and fair evaluation of the learning effect of the curriculum, and was insufficient to evaluate and analyze the ability and quality of students, and there was insufficient assessment of the teaching process, and the course lacked an effective feedback mechanism and the function of continuous improvement, which was inconsistent with the teaching concept of OBE and could not satisfy the engineering education concepts. This kind of course evaluation system is inconsistent with the concept of OBE teaching and cannot meet the requirements of engineering education accreditation. Therefore, the course reform needs to shift the original evaluation of course teaching results to a combination of result evaluation and process

evaluation, reduce the proportion of final examination evaluation, strengthen the assessment of students' independent learning and practical application skills, and give specific evaluations by enterprise instructors for the cultivation of practical application capabilities led by enterprises, and give immediate feedback and timely correction of the results of the process evaluation, so as to continuously improve the teaching effectiveness of the curriculum.

In the specific implementation, the course team focuses on building the course process evaluation and feedback link, increasing the proportion of ordinary assessment and dividing it into four parts: independent study, homework, project practice and stage test. The evaluation of students' independent study and homework is mainly based on study notes, task points based on online teaching platform and homework results, which can basically respond to students' learning status objectively and reasonably, while the project practice and stage test can respond to students' learning effect and mastery of knowledge and skills in a timely manner, and these evaluations also allow the course team to conveniently understand the problems of the students in the process, and facilitate and give timely feedback to them. These assessments also allow the course team to easily understand the students' problems where they faced at specific stages of learning and provide timely feedback and guidance to promote the students' personal skills and the continuous improvement of the course. The question type of the final examination paper is changed to all on-line operation questions, which no longer involves too much in the theoretical system, but assesses the practical ability, professional application skills and skill quality, focusing on the evaluation of comprehensive ability and practical application ability. Through the diversified assessment and evaluation from different perspectives and feedback to the teaching of the improvement of a series of content to form a closed-loop teaching chain, to achieve a comprehensive and three-dimensional evaluation of students' mastery of computer-aided design courses, real-time reflection of student learning, while laying the foundation for the course team to adjust and optimize the curriculum and continuous improvement.

5 Conclusion

OBE education concept is an education concept promoted by engineering education certification, which has formed a relatively complete theoretical system after years of education practice at home and abroad, and is gradually recognized by the majority of educators. Suqian College of Urban and Rural Planning computer-aided design teaching team, in accordance with the requirements of the professional certification of engineering education, practice OBE education concept, combined with the application of professional knowledge and skills of the enterprise into the construction and reform of the curriculum, to create a trinity of schools, students and enterprises in the teaching system, to explore the results and output-oriented education and teaching methods to adapt to the current social development and demand, and to adhere to the teaching design to create a student-centered curriculum system and reform the curriculum. In the teaching design, we insist on creating a student-centered curriculum system, reforming the curriculum evaluation method and forming a timely and effective feedback mechanism to realize the continuous improvement of the curriculum. Through the reorganization of knowledge and skills modules, the reform of teaching techniques and methods, the careful design of the teaching process and the shaping of the overall evaluation system for curriculum teaching effectiveness, to provide students with better learning paths and platforms, after many years of practical teaching and learning test, this teaching mode has guaranteed the effectiveness and progressiveness of course teaching, improved the cultivation of students' practical ability and comprehensive quality to meet the needs of society, and laid a solid foundation for the future work and further education of students of this major.

To ensure the effectiveness and progressiveness of the course teaching and advanced to enhance the practical application ability of students and the comprehensive quality of the cultivation of students in order to meet the needs of social development, and to lay a good foundation for the future work and further study of the students of this specialty.

Acknowledge

Funds or Projects: Suqian University Teaching

Reform Project (SQU2021JGYB08);Suqian University's industry-education integration course construction project (2022CJRH4)

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