

Research on First-class Curriculum Construction Based on OBE Concept—Taking Electrical Engineering Course as an Example

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ABSTRACT

First-class undergraduate courses are launched for the construction of innovative and challenging courses with high-quality and high-level, and for the adoption of the OBE education philosophy. Taking electrical engineering courses as an example, this article aims to explore the construction of high-quality first-class courses, and truly student-centered curriculums. Furthermore, by revolving around the teaching concept, teaching content, classroom teaching methods, and quality evaluation, this article proposes specific construction measures to form a closed-loop mechanism for sustainable improvement. These measures have made it true for the sound development of the curriculum, and also have guaranteed the student-centered mode as well as the achievement output.

Keywords: *OBE concept, first-class curriculum, students-centred, quality guarantee*

1. INTRODUCTION

China became the 18th full member of the Washington Agreement in 2016, which means its participation in the ranks of substantial equivalence and mutual recognition of international engineering talents. Also, it started a new stage of national higher education development. Therefore, engineering majors have gotten increasing construction in accordance with standards and begun to participate in certification [1][2]. with the aim to ensure that engineering graduates meet the established quality standards recognized by the industry, professional programmatic accreditation in Engineering puts its core connotation this way: The student-centred and output-oriented education, the construction of a talent training system, and continuous improvement [3].

In 2019, the Ministry of Education issued the "Implementation Opinions on the Construction of First-Class Undergraduate Curriculum" [4]. The opinions indicate that the curriculum serves as the core element for talent training, the quality of which is directly determined by the course quality. Therefore, undergraduate universities should carry out first-class curriculum construction in every aspect, i.e, to establish a new concept of curriculum construction, remove the "course without actual content", enhance the grassroots teaching organizations, improve teachers' teaching ability and quality-oriented incentive mechanism for curriculum construction, and to formulate a multi-typed as well as a diversified teaching content and curriculum system[5] [6]. Among the seven general standards for the quality of

engineering education certification, the construction of the curriculum system is especially emphasized[7]. Specifically, the curriculum system serves as the foundation for the cultivation of talents, which is the ultimate goal of certification[8]. In other words, the construction of first-class courses and the OBE educational philosophy are two things integrated with each other, and they share common goals. The integration of them is inevitable for pushing higher education into the new era toward connotative development.

2. THE BACKGROUND AND SIGNIFICANCE OF THE FIRST-CLASS UNDERGRADUATE CURRICULUM CONSTRUCTION UNDER THE OBE CONCEPT

2.1. The construction of first-class curriculum is a new requirement for university courses in the new era.

Classroom teaching plays a primary role in higher education teaching, and "Who to train, how to train and for whom to train" is a fundamentally asked question for education. Hence, classroom teaching should be fully utilized as a major instrument to achieve full-process and all-round education. Colleges and universities should intensify their effort to update the course content, promptly increase the course difficulty, expand the depth of the course, as well as to provide more course choices for

students, and to promote the classroom revolution, and finally to build a quality culture[9]. Only by laying a solid foundation for curriculum system construction can we cultivate talents so as to satisfy the demand of social development[10].

2.2. Curriculum construction is a basic unit of engineering education certification and a main criterion for measuring graduation requirements.

The 12 graduation requirements for engineering education certification entails the specific knowledge, ability, personality and value that students should be equipped with after obtaining their undergraduate degree, and the construction of the curriculum system really matters for fulfilling such graduation requirements. The standards of engineering education certification require that the curriculum construction should be achievement and ability-oriented. It is also required that the courses should be designed with characteristics to conform with the target of the school, to satisfy the development of region economy, and to be professionally competent.

2.3. The course “Electrical Engineering Technology” has been authorized as a first-class undergraduate course in Shandong Province.

“Electrical Engineering Technology”, a course applied in 2019 and undertaken by the author in person, is a first-ranking course for undergraduate in Shandong Province. All these first-class courses have been reviewed by experts organized by the provincial Education Department. Professionals comprehensively evaluated these courses, ranging from the academic level, content quality to the teaching effects. Finally, through evaluation, the course, Electrical Engineering Technology, was approved to be a first-class course for undergraduate in Shandong Province in 2019, which laid a solid foundation for its continuous construction and improvement.

3. THE FIRST-CLASS CURRICULUM CONSTRUCTION MEASURES OF “ELECTRICAL ENGINEERING TECHNOLOGY” UNDER OBE CONCEPT

3.1. Changing the traditional curriculum teaching concept and establishing a student-centered teaching model

Instead of observing the traditional rule of knowledge transmission, the curriculum should be reformed by taking

the professional engineering education as a criterion and to integrate the curriculum ideology on the basis of goal-oriented, student-centred and continuous improvement. Then the student-centred philosophy should be penetrated into the entire process of teaching, including teaching objectives, teaching contents, teaching methods and assessment forms. Figure 1 shows the curriculum teaching concept. The curriculum syllabus is formulated to echo the OBE concept. The corresponding relationship between the curriculum teaching objectives and graduation requirements can be clearly presented in this figure, it can be seen that teaching contents indicating the curriculum teaching objectives are designed, and the assessment is provided to test to what extent the teaching goal is achieved. What's more, through the integration of curriculum policies and teaching efficiency improvement, the ideological and political elements of the course are explored and established, and the teaching content is condensed. Consequently, the teaching quality of the course can be effectively improved by the proper increase of assignments for students, reform of the teaching mode, and the cultivation of scientific learning method for students.

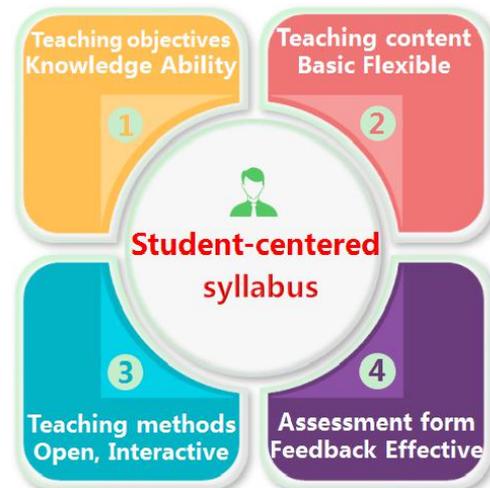


Figure 1. Student-centered teaching philosophy

3.2. Updating teaching content in real time and insist on integrating knowledge transformation with ability cultivation.

For course teaching, a consistent theme of the course is formulated in the introduction part of the course under the guidance of the teaching objectives, and the teaching contents are clearly divided into key parts and difficulty parts on the basis of the student-centred teaching so as to ensure that the students can grasp the essence of the course in their learning. The course emphasizes how are the teaching contents organized and how do they correlate with each other, thereby the curriculum cultivation and students’ interdisciplinary thinking are strengthened in this way, and the whole teaching process becomes transparent. The teaching content will be timely updated based on the

new development and new direction; the curriculum objectives will be formulated in accordance with the course target of the graduation requirements; and with the output being a direction, the curriculum will be taught in the form of the module within a knowledge structure illustrated by the mind mapping. Figure 2 shows the teaching content design concept.

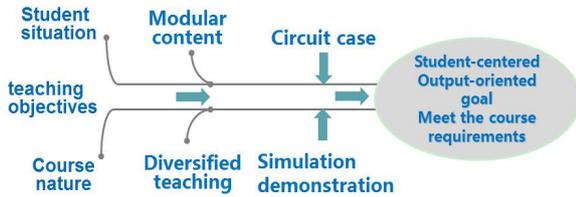


Figure 2. Teaching content design concept

3.3. Comprehensive use of multiple teaching methods, extensive use of new media teaching techniques and methods.

In order to highlight the student-oriented concept, teachers should use new media technologies to better teaching methods on the basis of students' acceptance for new things during the teaching process. Teaching strategies should be designed in light of three stages, namely, before-class, in-class and after-class, and a classroom teaching model should feature interaction, cooperation, autonomy, and openness. Specifically, the teacher is required to have a clear teaching target, the guided teaching method, a progressive teaching, and the combination between the theory and practice. Besides, apart from the imparting of knowledge, teacher should make further efforts to develop the independent learning ability and engineering thinking ability of students, and properly increase their burden. Through these efforts, the reform of teaching can be promoted. Figure 3 shows the teaching method design.

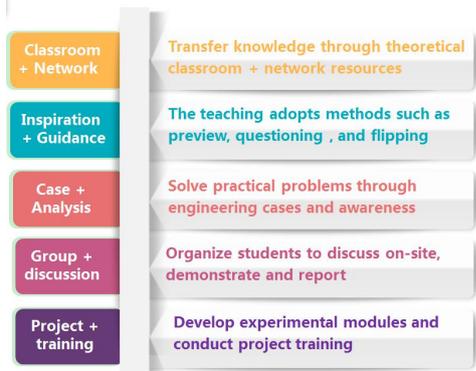


Figure 3. Teaching strategies and methods

4. BASED ON THE OBE CONCEPT, ESTABLISH A TEACHING PROCESS QUALITY MONITORING AND ASSESSMENT MECHANISM

A sophisticated teaching quality monitoring mechanism and assessment mechanism are necessary. With output as an direction, the school should replace the traditional testing with a way that can test students through the whole process of learning in multiple manners. The evaluation guidance and a new evaluation method which can perform quantitative calculation and analysis is recommended. Teachers should abandon the traditional paper test scores, and instead, pay more attention to the students' ability and achievement. Teachers should formulate curriculum quality evaluation standards, form process materials of evaluation, and adopt two evaluation mechanisms,i.e, teaching process evaluation and teaching effect evaluation. In class, theoretical teaching feedback is provided based on the observation of the students' performance, questioning and exercises in class. After class, the in-depth communication with students and question-answering can provide how well students have learned and what their suggestion towards the class are to the teacher. For evaluation, the test result can reflect how much students understand and to what extent they master the contents they are taught in class. These can stimulate teachers to reflect on teaching designs, adjust their teaching strategies and optimize the teaching process. In the meanwhile, curriculum can be improved timely through many aspects, such as student evaluation, supervision evaluation, peer evaluation, leadership evaluation and examination paper analysis in the whole process of teaching organization. Figure 4 shows the monitoring and feedback mechanism of course quality process.

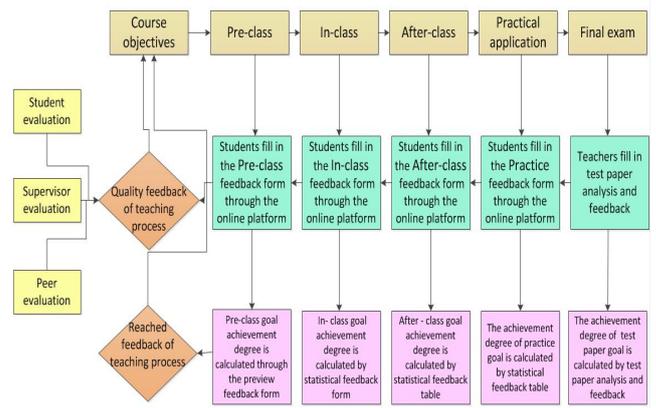


Figure 4. Course quality evaluation feedback mechanism

5. CONCLUSION

Engineering education professional certification means the realization of the actual equivalence and mutual

recognition of international engineering talents, simplifying a new situation both for the development of the country and the higher education. The OBE concept is integrated with the certification standards of engineering education, thus guides the engineering education to reform and develop itself. Course construction is one of the construction standards for engineering education professional certification. The electrical engineering technology, approved as a proposed construction project of the first-class undergraduate course in Shandong Province in 2019, has been continuously perfected since then. Based on the OBE concept, the course objectives, which are set to meet the requirement for graduation, have been improved effectively. Teaching contents are designed in the form of module to show the characteristics of this major. Various teaching methods and means featuring autonomy, interaction and openness are involved to highlight the teaching concept of "students as the major participants and teachers as the guide". Assessment methods that penetrate the entire process of teaching are provided in multiple ways and effectively help to achieve course objectives. The quality control mechanism of teaching process which can conduct the qualitative and quantitative evolution is proposed. A curriculum evaluation mechanism that mainly evaluates the output of students is provided. The curriculum ideological and political teaching system has been established. According to the reverse design principle, teachers can determine the teaching objective, organize the teaching content, and develop the teaching strategy by expecting learning outcomes of students. What's more, they need to focus on the interaction between key factors in the course to carry out evaluation and feedback, and, finally, to evaluate the achievement degree of teaching objectives through learning outcomes. Only by those ways can a course construction and teaching process guided by goals be formed.

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