

The Teaching Monitoring Mechanism Based on The Idea of “OBE”

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Abstract—In order to improve the level of engineering education in Liaoning province, establish a talent training system that connects enterprises and universities in the province, and improve students’ international competitiveness, it is of great significance to establish a teaching monitoring mechanism based on the idea of “OBE”. Taking the surveying and mapping engineering of Shenyang Jianzhu University as an example, the paper establishes a teaching monitoring mechanism based on the idea of “OBE”. The model of the teaching monitoring system covers the rationality evaluation and revision of training targets, the evaluation of graduation requirements, the setting and revision of the curriculum system, the evaluation and improvement of curriculums, and the cognizance of teachers’ engineering background, etc. This paper is of great significance for improving the quality of Engineering Education in Liaoning province. By establishing a teaching monitoring mechanism based on the idea of “OBE”, the educational level of Surveying and Mapping Engineering in our university has greatly improved.

Keywords—The idea of “OBE”; The Teaching Monitoring Mechanism; Engineering Education Accreditation; Surveying and Mapping Engineering

I. INTRODUCTION

In June 2, 2016, China’s engineering education has become a full member of the Washington Accord. China’s accredited undergraduate degree in engineering education is substantially equivalent to the degree awarded by other members of the Washington Accord. Since 2005, China has begun to establish a professional accreditation system for engineering education. The idea of “OBE” has effectively promoted the teaching reform of Engineering Education in China[1].

OBE(Outcome Based Education) education idea, also known as result oriented education, is an advanced education concept based on learning results or result oriented. It represents the mainstream direction of the reform of professional engineering education. It clearly focuses and organizes every link in education so that students can realize the expected results in the process of learning. OBE emphasizes the four questions: What study results should be obtained by students; The meaning of the achievement of this kind of study; Effective ways to help students achieve these learning outcomes; Understand the results that students have

achieved. In a sense, the implementation of the OBE education concept can effectively change the learning goal oriented transformation, and the teacher-centered will change to the student-centered, and the quality control is continuous Improvement. Our school will follow the three principles of Engineering Education: outcome-oriented, student-centered and continuous improvement, improving the traditional knowledge imparting education system, insisting on the main line of teaching quality and highlighting practical teaching. At the same time, we should cultivate students’ ability of innovation and entrepreneurship, and establish a teaching monitoring mechanism based on the idea of “OBE”.

II. PRESENT SITUATION AT HOME AND ABROAD

The major of engineering education certification in domestic universities began in 2007. 7 universities, such as “chemical engineering and technology” of Tsinghua University, have applied for engineering education certification in 8 majors. The engineering education certification of universities in our province began in 2007, respectively, the “chemical engineering and technology” major of Dalian University of Technology and the “major of mining engineering” of Northeastern University. At present, the engineering education website published the most accreditation of Engineering Education in our province is the Dalian University of Technology, which has 18 majors. China’s engineering education has become the official member of the Washington Accord, and the professional accreditation of various universities in China has increased rapidly. The certification application for Engineering Education Certification Association of China has accepted 200 specialties in 2016, and the application for certification in 2017 has been accepted in 375 majors. In 2018, the application for accreditation has been accepted in 547 specialties.

In recent years, domestic scholars have carried out a lot of research works on Engineering Education in China. In 2004, Guo Xin and others put forward the establishment of China’s engineering education accreditation system, and put forward the idea of establishing an engineering education accreditation system as soon as possible. In 2005, on the basis of the analysis of the characteristics of the accreditation system of engineering education at home and abroad, Han Xiaoyan

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pointed out the problems to be paid attention to in constructing the higher engineering education professional certification system adapting to the national conditions of our country[2]. In 2011, Liu Jing and others put forward a training program for computer professionals based on the accreditation system of engineering education[3]. In 2013, Zhang Guoguang proposed the construction of circuit analysis basic course system for engineering education accreditation. In 2014, Chen Zhong put forward the MATLAB micro teaching method under the standard of engineering education accreditation[4]. In 2015, Chen Lihua proposed to reconstruct the first class practice teaching system from the perspective of engineering education accreditation[5]. In 2017, Cheng Xiang put forward the construction of teaching system of environmental engineering courses based on the accreditation standard of engineering education[6]. Since 2015, there has been a large growth trend in engineering education accreditation papers. The main contents of the study are training plan making, curriculum system construction and curriculum teaching methods. From the above published papers, we can see that the research content is more and more specific, and has gradually begun to focus on the main teaching links of engineering education accreditation.

III. EXISTING PROBLEMS

At present, there is a common lack of teaching monitoring mechanism based on “OBE” in the major of engineering education accreditation. Even the two accredited majors are involved, the same problem exists. The main teaching supervision mechanism of various universities is mainly responsible for the teaching supervision department, mainly concerned with the standardization of teaching materials. Engineering education certification is mainly concerned with whether the results of the output of teaching can be measured and supported. For example, the examination of the syllabus for the engineering education certification should examine whether the teaching objectives support the graduation requirements, whether the teaching content supports the curriculum objectives, whether the teaching method is conducive to the realization of the curriculum objectives, and whether the content of the assessment will effectively support the graduation requirements and the curriculum objectives. In view of the problems existing in universities, this paper proposes a teaching monitoring mechanism based on the idea of “OBE”.

IV. CONSTRUCTION OF TEACHING MONITORING MECHANISM BASED ON THE IDEA OF “OBE”

Based on the concept of “OBE”, taking the training target as the end, reversing design graduation requirements, with graduation requirements as the core, designing a teaching monitoring mechanism based on the idea of “OBE”. The main teaching links include curriculum setup, syllabus examination, theoretical courses, experiments, curriculum design, internship, graduation project (thesis) and so on.

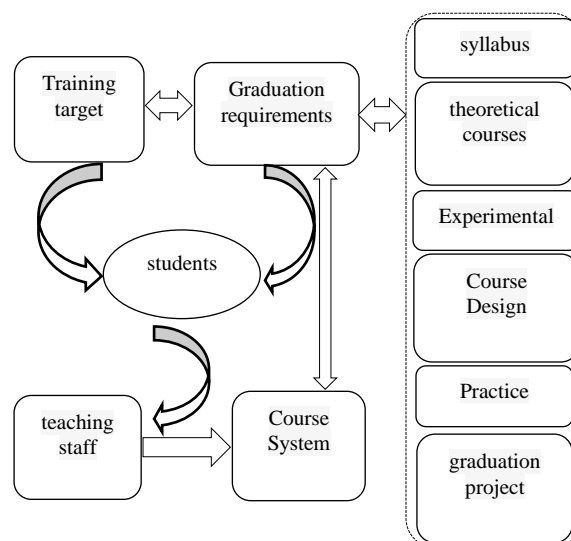


Fig. 1. System structure diagram of teaching monitoring mechanism based on the idea of “OBE”

V. THE ACHIEVEMENTS OF TEACHING MONITORING MECHANISM BASED ON THE IDEA OF “OBE”

A. A summary of the achievements of the teaching monitoring mechanism

The main research results of this paper take the surveying and mapping engineering specialty of Shenyang Jianzhu University as an example, and establish the teaching monitoring mechanism based on the idea of “OBE”. The concrete results are as follows:

- 1) Established the mechanism of the rationality evaluation and revision of training target;
- 2) Established the mechanism of the evaluation of graduation requirements;
- 3) Established the mechanism of the setting and revision of curriculum system;
- 4) Established the mechanism of the evaluation and improvement of curriculum;
- 5) Established the mechanism of the cognizance of teachers’ engineering background.

B. The optimum design of the content of the teaching monitoring mechanism

The results of professional engineering education certification are mainly due to the rationality of the curriculum system setting, the reform of the teaching methods, contents and assessment of professional teachers, and the conditions for supporting the students' experiment and practice. Among them, the research results of the quality control mechanism of the major teaching links are the key contents of this paper. The quality control mechanism of the key teaching links, including the review mechanism of the syllabus, the theory course, the experiment, the practice, the design of the curriculum, the graduation design (Thesis), is the final foothold of this paper.

1) The mechanism of the rationality evaluation and revision of training target

The profession regularly carries out the rationality evaluation of the training target, evaluates the achievement of the professional ability contained in the training target, and investigates and evaluates the improvement opinions of the training objectives, and revises the training objectives of the present application on this basis.

The evaluation mainly focuses on the establishment of a tracking survey system for graduates. Based on the survey, the evaluation is carried out and the training objectives are improved on the basis of evaluation. The mechanism covers evaluation methods, periodicity, evaluation objects, and evaluation of responsible persons etc.

2) The mechanism of the evaluation of graduation requirements

The profession regularly carries out the evaluation of graduation requirements regularly, and the evaluation is carried out through the graduation requirements index points of this professional decomposition.

The evaluation of graduation requirements is mainly based on the evaluation of the curriculum. It is necessary to analyze the requirements of graduation in time, to find out the shortcomings of the teaching methods and contents in the graduation requirements and courses, and to improve the graduation requirements and the teaching methods and contents in time. The mechanism covers evaluation methods, periodicity, evaluation objects, and evaluation of responsible persons etc.

3) The mechanism of the setting and revision of curriculum system

The revision of the syllabus of specialized courses mainly realizes the study effect of focusing on the students, the objectives of the course mainly support the achievement of graduation requirements, the teaching content of the course supports the requirements of the course objectives well, the teaching method of the course is beneficial to the realization of the teaching content and effectively supports the achievement of the course goal, the contents and methods of curriculum assessment can effectively evaluate the course objectives. The teaching monitoring mechanism based on the idea of "OBE" is realized in the professional basic course and professional course syllabus.

In the teaching process of professional basic course and professional course theory course, the course goal and the supporting graduation requirement of the course are achieved. On the basis of this, the monitoring mechanism of the teaching process of the professional basic course and the professional course theory course is established, it covers teaching contents, teaching methods, examination methods and so on.

In the teaching process of professional basic courses and specialized courses, the experimental teaching organization and operation management mechanism, the standardization of teaching experimental materials and the contents of experimental teaching effectively support the course objectives and graduation requirements. The content of experimental teaching is integrated with the development of professional field etc.

In the teaching process of professional practice, the content of the practice can meet the requirements of the practice outline, and effectively support the ability to cultivate the students' ability required by graduation. Before the practice, the instructor should carry out the education of safety, environment, engineering ethics, work discipline and so on, the standardization of the practice materials, the summary of the practice, which reflects the experience and deficiency of the practice. And to reflect practical suggestions and measures for rectification.

In the course of professional course design teaching, the content of course design should be realized, the form should reflect the requirement of graduation, the quality of independent thinking and the ability of innovation should be strengthened, and the task of course design should be completed independently. When students write the course design report, the instructor assesses the results according to the students' performance and the accuracy, scientificity, detail, depth, writing style and innovation of the report.

In the process of professional graduation design (thesis) teaching, the content of graduation design (thesis) meets the requirements of graduation completely, and the topic of graduation design (thesis) is fully demonstrated. The process management and quality supervision of graduation design (thesis) have clear requirements, and students' graduation design (thesis) achievement writing is normative. Graduation design (thesis) guidance teacher review, mutual review process has a normative, evaluation conclusions with objectivity and impartiality.

4) The mechanism of the evaluation and improvement of curriculum

The curriculum system is based on the requirement of graduation, which determines the structure of the curriculum system, designs the course contents, teaching methods and assessment methods. The course system is designed with the participation of industry experts, and the curriculum content is updated in time to adapt to the actual development of the industry.

The evaluation of curriculum system includes the rationality of mathematics and natural science, engineering foundation and specialty, general education of humanities and social sciences, engineering practice and the setting proportion of graduation Design (thesis), and the rationality of the timing between courses. The ability of the curriculum to meet the needs of economic and social development and the curriculum has effectively supported the 12 graduation requirements in the training program. The evaluation of curriculum system is carried out regularly, and the evaluation results are applied to the revision of curriculum system.

5) *The mechanism of the cognizance of teachers' engineering background*

Professional teachers have a certain proportion of full-time teachers with engineering background, professional teachers engineering background identification has a clear identification standards. The standard can consider the working experience of teachers in enterprises and institutions, the amount of funds for lateral projects or the amount of funds for participating in horizontal projects.

V. THE DIRECTION OF REFORM AND DEVELOPMENT OF TEACHING MONITORING MECHANISM BASED ON THE IDEA OF "OBE"

A. *Establish the Integrated Teaching ability training Mechanism of Multiple courses Theory, experiment and practice*

The curriculum system based on the idea of "OBE" makes it more scientific to cultivate the core competence of the students, but there is still a repetition of the teaching content between the courses, the lack of unified design for the experimental links and practice links between each other, and the relative isolation of many teaching links and the existence of systematic defects. Therefore, we can establish a Multiple courses theory, experiment and practice integration of the overall link of teaching ability training mechanism.

B. *Teaching links of solving complex Engineering problems with Multiple courses overall Design*

A number of graduation requirements in the General Standards for Engineering Education Certification emphasize the solution of complex surveying and Mapping Engineering problems. In view of training students' ability to solve problems in complex engineering, this paper studies the teaching contents, teaching methods and examination methods of solving complex engineering problems by using the core curriculum of surveying and mapping engineering specialty and the corresponding practical links as a whole.

VI. CONCLUDING REMARKS

Through the establishment of teaching monitoring mechanism based on the idea of "OBE", the educational quality of surveying and mapping engineering in our university has been improved, which provides an effective reference for colleges and universities in Liaoning Province to participate in engineering education certification. Specifically, The establishment of the evaluation mechanism for the achievement of professional graduation requirements facilitates the establishment of the supporting relationship between courses and graduation requirements, ensures the effective achievement of graduation requirements, and makes the teaching methods and contents reasonably improved; The establishment of the quality control mechanism in the major teaching links has made the students' learning effect optimized, and the students have achieved good results and absorbed rich experience in their daily study and extracurricular practice; The establishment of curriculum system and evaluation mechanism improves students' ability of combining theory with practice, and effectively strengthens the adaptability of students' practical development with related industries; The establishment of teacher engineering background recognition mechanism has significantly enhanced teachers' sense of responsibility, standard consciousness and comprehensive ability of teaching.

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