

# Study on “Student-centered”, Output-based Professional Evaluation and Quality Assurance System

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**Abstract:** The core concept of engineering education certification is to build a talent training system with “student center”, “output oriented” and “continuous improvement”. Output-oriented course teaching and quality evaluation are the bottom line requirements of implementing “OBE” concept. The output of the major is evaluated by carrying out the evaluation of the rationality of the training objectives and the achievement of graduation requirements; the rationality of the teaching links is evaluated by the evaluation of the rationality of the curriculum system and the achievement of the curriculum objectives, so as to ensure that the data of each teaching link can effectively evaluate the achievement of the curriculum objectives and support the graduation requirements, and finally the evaluation results are fed back to the next round of curriculum implementation. Make continuous improvement. Based on the concept of “OBE”, this paper takes the software engineering major of Dalian Jiaotong University as an example.

**Keywords:** Student-centered; Output-oriented; Professional evaluation; Quality assurance

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## 1. Introduction

Engineering education professional certification is an internationally accepted engineering education quality assurance system. The core of engineering education professional certification is to confirm that engineering graduates meet the training quality standards recognized by the industry, and it is a qualification evaluation oriented by the achievement of training objectives and graduation requirements<sup>[1]</sup>. The Ministry of Education has incorporated the three core concepts of engineering education certification -- “student centered”, “output oriented” and “continuous improvement” -- into the national teaching quality standards for undergraduate majors, the construction of national first-class majors, and a new round of undergraduate education and teaching audit and evaluation. It also requires universities to build a quality culture of introspection, self-discipline, self-examination and self-correction based on the three concepts<sup>[2]</sup>.

The core of outcome-oriented professional teaching and quality assurance and evaluation is to ensure that courses can effectively support students’ graduation requirements and that the learning content and evaluation results of courses can accurately reflect the achievement of students’ graduation requirements. The first is to carry out the rationality evaluation of the curriculum system to ensure that the curriculum is determined by the students’ graduation requirements and can support the realization of graduation requirements; The second is to carry out the specific implementation process, including the curriculum content, teaching methods, teaching content, assessment methods, assessment results, etc., which need to be designed around the realization of the curriculum objectives; The third is the evaluation of the achievement of curriculum objectives to ensure that all the teaching process can support the achievement of curriculum objectives; Fourth, carry out continuous improvement of curriculum quality according to the achievement of curriculum objectives<sup>[2][3]</sup>.

## 2. Establish an output-oriented professional evaluation system

### 2.1 The supporting relationship between graduation requirements and training objectives

The supporting relationship between graduation requirements and training objectives is shown in Table 1.

Table 1 The supporting relationship between graduation requirements and training objectives

Major graduation requirements	Training objectives of software engineering major			
	① Be able to consider and evaluate the influence of social factors, integrate engineering knowledge, design and develop software systems, and put forward the application scheme of software engineering technology in specific software projects	② With humanities and social science literacy, innovative thinking and team spirit, able to communicate effectively with domestic and foreign counterparts in the field of software engineering and the public, adapt to the team environment	③ Have a sense of social responsibility and engineering professional ethics, comply with software engineering and other industry standards and norms	④ Can pay attention to international trends, constantly learn and adapt to the development of engineering technology, become the technical or management backbone of the department or project
1. Engineering knowledge	√			
2. Problem analysis	√			
3. Design/develop solutions	√			
4. Research	√			√
5. Use modern tools	√			
6. Engineering and society	√	√	√	
7. Environment and sustainable development	√		√	
8. Professional norm		√	√	
9. Individual and team		√		√
10. communication		√		√
11. Project management		√	√	√
12. Lifelong learning			√	√

## 2.2 Output-oriented curriculum system rationality evaluation

### 2.2.1 Responsible organization for evaluation

The rationality evaluation of the curriculum system takes the college as the main unit and is guided and approved by the teaching Steering committee of the college. The School has set up a working group for the reasonableness evaluation of the curriculum system.

### 2.2.2 Evaluation cycle and evaluation basis

Evaluation cycle: The rationality of the curriculum system is systematically evaluated every two years.

Evaluation basis: professional orientation, training objectives, graduation requirements and the achievement of the evaluation results in the past 3 years.

### 2.2.3 Evaluation content

The evaluation mainly focuses on the curriculum setting in the training program and the curriculum syllabus, including the evaluation of the rationality of the curriculum system to support the graduation requirements, the evaluation of the rationality of the curriculum teaching objectives to support the achievement of the graduation requirements, and the evaluation of the curriculum assessment to support the achievement of the curriculum teaching objectives.

### 2.2.4 Evaluation method

There are two ways to evaluate the rationality of curriculum system: one is audit evaluation and the other is diagnostic evaluation.

## 2.3 Evaluation of output-oriented curriculum objectives

### 2.3.1 Responsible institutions and responsibilities of the evaluation

Responsible Agency: Working Group on Evaluation of achievement of Curriculum Objectives.

Responsible person: The department head shall be the group leader, the major leader, the course leader, the course teacher and the student.

Main responsibilities: Comprehensively analyze the achievement of curriculum objectives by combining quantitative and qualitative evaluation methods, feed back the results to teachers, and continuously improve the specific implementation process of teaching links.

### **2.3.2 Evaluation object and evaluation period**

Evaluation objects: theoretical courses and practical courses listed in the software engineering major training program.

Evaluation cycle: once every semester.

### **2.3.3 Evaluation basis**

Software engineering course outline and course teaching data (including test paper scores and analysis reports, daily performance, homework, experiment report, practice report, design report, defense record, graduation thesis, etc.) or questionnaire.

### **2.3.4 Evaluation method**

The evaluation of curriculum goal achievement can be divided into quantitative evaluation and qualitative evaluation.

### **2.3.5 Evaluation process**

The evaluation methods of achieving curriculum goals include quantitative evaluation and qualitative evaluation. Direct evaluation refers to that teachers conduct quantitative evaluation of students' learning results against curriculum goals and form an analysis report of achieving curriculum goals. Indirect evaluation includes supervision evaluation and students' self-evaluation. Through the course questionnaire, evaluation analysis report is formed.

### **2.3.6 Result Usage Requirements**

Teachers achieve the evaluation results based on the curriculum objectives, analyze the evaluation samples, find out the relatively weak achievement of the curriculum objectives, and then analyze the shortcomings of students' curriculum learning, make targeted teaching improvement, and promote the achievement of the curriculum objectives; Teachers fill in the analysis of the achievement of curriculum objectives and improvement measures, as the basis for continuous improvement of teaching quality. According to the evaluation results, teaching supervisors supervise and inspect teaching links, so as to help teachers find out problems and promote the achievement of curriculum objectives by improving teaching links.

## **3. Establish professional teaching quality monitoring and guarantee system**

The software engineering major follows the quality assurance principle of "target-leading, clear standards, process monitoring and continuous improvement", and establishes a whole-process teaching quality monitoring mechanism. Through strengthening organizational construction and system guarantee, the closed-loop control and continuous improvement process of full participation, whole process management, all-round implementation and effective monitoring are implemented.

## **4. Summarize**

The implementation of output-oriented teaching and quality evaluation is the basis and guarantee of the whole cycle of "student-centered" and output-based talent training system. Through the rationality evaluation of training objectives and graduation requirements, as well as the achievement evaluation of curriculum system and curriculum objectives, the data of each link can effectively reflect the quality of the full closed-loop process of professional teaching, and the results will be fed back to the next round of implementation process, so as to form the continuous improvement of professional teaching quality, ensure the achievement of students' ability, and comprehensively guarantee the quality of "output-oriented" talent training.

## **5. Acknowledgment**

Supported by Research Project on Undergraduate Teaching Reform of Liaoning General Higher Education in 2021 (General Project 357).

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