Research on the Teaching Quality Evaluation System of Computer Specialty Courses for Engineering Education Certification

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Abstract. Taishan University insists on taking engineering education certification as the standard of teaching quality, establishes an engineering certification team, optimizes and innovates the teaching quality evaluation system of computer professional courses, and implements and continuously improves it among students in grades 19 and 20. Compared with the results of Grade 18 students, the results show that the excellent rate of performance increases year by year, and the failure rate decreases significantly.

Keywords: Teaching quality · computer · Engineering education certification · Evaluation system

1 Introduction

At present, more and more universities have joined the 'professional certification' system to further improve the teaching quality [1, 2]. As the first batch of application-oriented undergraduate universities in Shandong Province, Taishan University has a slight lack of competitiveness in engineering. In order to improve the industry competitiveness of students majoring in computer science, it is an effective and feasible reform plan to join the 'engineering education professional certification'.

This paper makes a forward-looking and comprehensive research on the evaluation strategy and implementation of undergraduate teaching quality. From the perspective of professional certification of engineering education, it is committed to cultivating engineers who are in line with the international standards and have the 'spirit of craftsman in a big country', so that students can become engineers who can solve complex engineering problems and have the spirit of innovation.

2 Reform the Teaching Quality Evaluation System

2.1 Reform Points of Teaching Quality Evaluation System

The evaluation of teaching quality of university teachers under the background of project certification should follow the educational concept of 'student-centered'. The core is to improve students' learning quality [3, 4]. The ultimate goal is to train students to become

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high-quality talents who meet the teaching objectives of universities and can adapt to and serve the society. At the same time, we should pay attention to pro-moting the promotion and development of teachers' professional ability and give full play to teachers' leading role in teaching.

The evaluation methods mainly include teaching supervision and evaluation, teaching peer evaluation, teaching leadership evaluation and student evaluation [5]. Changing the traditional evaluation method requires changing the evaluation concept of teacher or student responsibility.

2.2 Implementation of the Program

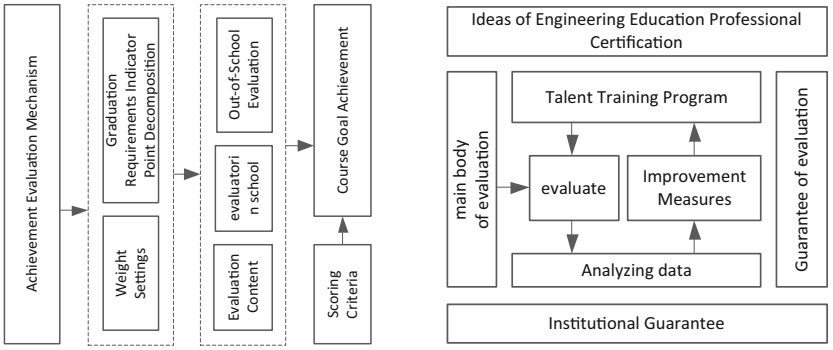
(1) Establish the main body of evaluation responsibility for the professional certification of Engineering Education

At the academic level, a working group for professional certification of engineering education has been added. Its main work includes:

Be responsible for formulating and implementing the work plan for each stage of professional certification; Responsible for organizing and implementing professional investigation and evaluation; Be responsible for the construction of evaluation mechanism and the evaluation of graduation requirements of this major; Write the self-assessment report of this major.

(2) Establish evaluation mechanism of course and graduation requirements

The evaluation mechanism should conform to the characteristics and positioning of the school and reflect the professional certification standards. We should also consider the development of disciplines and specialties and design evaluation standards scientifically and rationally. The design process should follow the principles of combining qualitative with quantitative and complementary results with process. Different types of courses need to design corresponding evaluation indexes and scoring standards.



(a) (b)

Fig. 1. Illustrates the degree evaluation process and Continuously improved construction process [owner-draw]

Course quality evaluation can be carried out by using the course assessment, scoring table, etc. At the same time, it is necessary to design out-of-school evaluation of alumni and employing units to verify and improve the evaluation of graduation requirements. The evaluation process of course goal achievement and graduation requirement achievement is shown in Fig. 1(a).

(3) Establish continuous improvement mechanism

Its general idea is teaching design - teaching implementation - Evaluation - feedback - improvement. The continuous improvement process is shown in Fig. 1(b).

3 Specific Cases

The computer specialty of Taishan University takes the specialized basic course Digital Logic and Digital Circuit as an example. Evaluate the quality of the course. It evaluates the ability of students to integrate theoretical learning with practical application, and evaluates the degree to which students achieve knowledge, ability and quality goals, and makes continuous improvement thereon.

The specific process is divided into the following stages: preparation, implementation, evaluation, feedback.

(1) Preparation: the subject is Class 1 and Class 2, Grade 2020, Software Engineering Major, Taishan University. Teachers Team is Computer Teaching and Research Department of Computer of Taishan University and enterprise industry tutor of this topic. Course outline is taken some content for example which is shown in Table 1.

Table 1. Setting of graduation requirements, curriculum objectives and weights [owner-draw]

Graduation Requirements	Indicator Points	Course objectives	Weig-ht
1. Engineering knowledge	1.3 Master the professional knowledge of software engineering and apply…software engineering problems.	Course objectives 1	0.4
2. Problem Analysis	2.3 The basic principles can be used to carry out literature… engineering problems,…and draw effective conclusions.	Course objectives 2	0.4
5.Use modern tools	5.2 Use common resources and tools to support the analysis, design and development, testing, …and understand their limitations.	Course objectives 3	0.2

(2) Implementation: During the first year of undergraduate education, the subjects of the experiment took the operation of experimental skills as an example is shown in Table 2.

(3) Evaluation: the individual achievement of course objective 1 is shown as Fig. 2.

(4) Feedback: instructors and evaluation teachers give timely feedback and experience summary on the information of the whole experiment process. Compare the standards of international engineering certification, so that they summarize the aspects that can meet the standards and need to be improved in engineering education certification for computer specialty which is shown in Table 3.

(5) Compared with the results since the use of the quality evaluation system, taking Grade 20, Grade 19, Grade 18 as an example, the percentage and average score of the students in the grades of the digital electronic technology course in the three grades are shown in Fig. 3. The percentage average score of the excellent segment is increasing year by year.

Table 2. Scoring criteria and weight setting of experimental skills [owner-draw]

Assessment Item	Weight	Scoring Criteria
Experiment	20%	1. There are 16 h of experiments in this course, totaling 6 experiments, which …graded on a percentage basis according to the completion of the experiment. 3. Scoring Rules 100–90: In the course of the experiment, the requirements of the experiment are completed carefully,…optimizing the solution from the technical point of view. 90–80: …… 80–70: …… 70–60: …… 60–0: The experimental requirements can not be completed, the correct experimental results can not… can not be obtained by optimizing the solution from the technical point of view.

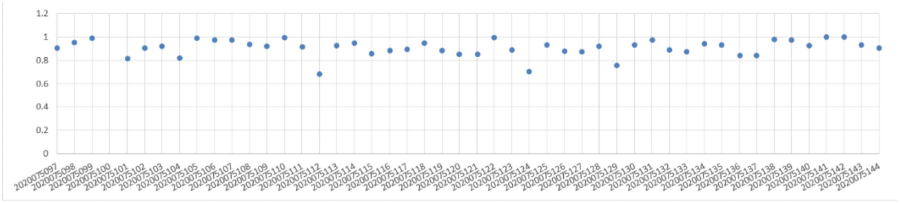


Fig. 2. Individual achievement of course objective 1 [owner-draw]

Table 3. Continuous improvement table[owner-draw]

Continuous Improvement Table for Digital Logic and Digital Circuits Course in the Second Semester of the 2020–2021 School Year	
Improvements to the previous round	The problem reflected in the last round is that some students have poor learning ability. This round of experiments to increase extra-curricular hours, to make up for this part of the students' practice exercise time.
Improvement Measures	Individual students, including those with outstanding abilities and weak foundations, are given targeted guidance and promotion.

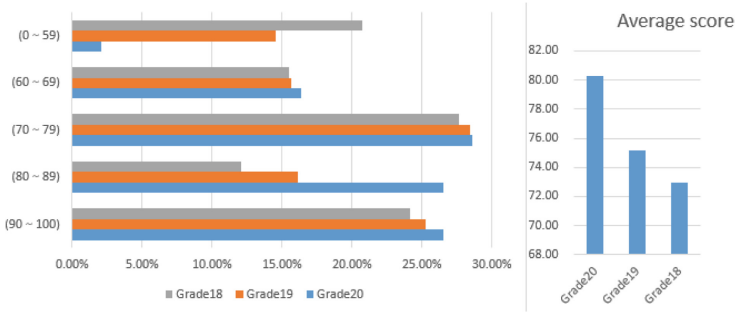


Fig. 3. The percentage and average score

4 Conclusion

The professional certification of engineering education represents the teaching quality and standard within the specialty. Therefore, on the basis of the current situation and summary of Engineering Education in our country, and drawing on the previous research results, this paper puts forward a teaching quality evaluation system for computer specialty in universities under the background of project education certification. For the purpose of professional certification of Engineering education, this system has a prospective and composite impact on the undergraduate computer education training mode, training program and other personnel training strategies and applications of Taishan University.

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