Teaching Reform and Practice of Electronic Information Majors Based on Engineering Professional Certification

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Abstract: By analyzing background of engineering education certification and the current situation of electronic information majors, the paper explores the teaching reform and construction of electronic information. The evaluation system and evaluation method of achievement degree of graduation requirements and the training objectives were studied. And the achievement degree of graduation requirements and the training objectives of electronic information majors in our school were also analyzed. Practice has proved that the teaching reform is effective. Through the construction of a new teaching model, students can learn independently, and students' ability to solve complex engineering problems and the quality of education were improved. By that means the training objectives under the background of engineering education professional was achieved.

1. Introduction

The core of engineering education certification is to confirm that engineering graduates meet the established quality standard requirements recognized by the industry[1]. Engineering education professional certification is an important basis for international recognition of engineer qualification.

At present, electronic information courses are mainly carried out in the form of theory and curriculum desig. Because of the integrity of the various disciplines knowledge system, the teaching process only pay attention to students study in one module, with the lack of various curriculum connection, which lead to it is not easy for students to combine the knowledge of the multiple modules and comprehensive knowledge. Students are lack of self learning for solving complex engineering problems[2]. Therefore, it is necessary to carry out teaching reform of electronic information majors, strengthen students' ability to solve complex engineering problems and independent learning ability, and achieve the goal of cultivating international common talents.

According to the professional certification standards and the professional standards formulated by the teaching committee of the ministry of education, the curriculum structure is optimized, the goal of talent training is adjusted, the mode of talent training is changed, and the quality of talent training is improved. It is planned to optimize the course system, structure and content of electronic information specialty, and build a new course system meeting the requirements. It is planned to optimize and reform the teaching content, teaching practice, teaching means and teaching methods, and integrate and coordinate the related content of relevant courses, so as to help students to deeply understand and master the relevant principles and analysis methods in the course, and improve students' ability to solve complex engineering problems with comprehensive knowledge.

Through the reform of electronic information majors practice course, optimizing the teaching content, strengthening the practice link, improving the teaching means, improving the students' scientific research ability, helping students to deeply understand and master the principles and analytical methods of the course with students' initiative in learning, improving their interest in learning, and improving their innovation ability and application ability, and by the establishment of

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comprehensive curriculum design, the needs of student future development were achieved.

The new curriculum system attaches great importance to the unique value of different curriculum modules to the development of students, diluting the boundaries of disciplines, and emphasizing the links and integration between disciplines. This change of curriculum structure echoes with the change of curriculum function and reflects the training objectives of the new period, so as to ensure the comprehensive, balanced and individual development of students. Through the reform of electronic information majors curriculum, optimizing the curriculum system, in line with the new training concept. At the same time, comprehensive practical courses are convenient to improve students' application ability and innovation ability, which is in line with the concept of engineering education certification.

2. The Reform of Curriculum System for Electronic Information Majors

2.1 Characteristics of Electronic Information Major Curriculum System.

The university curriculum system is designed and constructed according to the talent training objectives set by the university. Hierarchical curriculum system and modular curriculum system are two representative curriculum systems. The hierarchical course system has the advantages of strong logic and gradual progress, but it also has the disadvantages of narrow caliber. Modular course system usually consists of three course modules, which are professional course module, elective course module and core course module [3]. The modular course system is wide in scope and interdisciplinary, which can realize the comprehensive and individual development of students, but the integrity of the course system is not ideal.

At present, the curriculum system of electronic information major in our school is an organic combination of the above two curriculum systems, which is not only logical and progressive in hierarchy, but also runs through the thought of curriculum module.

According to the new requirements of the new engineering background for personnel training, it is urgent to further optimize and improve the course system of electronic information engineering for the purpose of training engineering talents to solve complex engineering problems. In the curriculum system construction of the past, there are two problems. The first one is a complex engineering problem achieved only by improving their professional basic course and specialized course difficulties. The second one is to improve the ability to solve complex engineering problems by increasing the difficulty of the course such as experiment and curriculum design, by increasing the difficulty of each teaching process to solve complex engineering problems. According to the training objectives of engineering talents and the professional characteristics of electronic information engineering, the curriculum setting must meet the graduation requirements, and the construction and design of the curriculum system should be guided by enterprise or industry experts.

2.2 Ideas and Measures of Curriculum System Reform.

According to the engineering talents training objectives, combined with the characteristic of electronic information major, the course system should be reformed from the following several aspects. General education curriculum in targeted to increase comprehensive general class of basic knowledge training, which will increase the knowledge of engineering ethics, ethical constraints, invention of constraint, intellectual property policy, laws and regulations, environmental protection and other engineering basic knowledge, and improve the students' comprehensive qualities[4]. Increase the cultivation of economic and management knowledge. Cultivate the basic financial knowledge and management accounting knowledge of enterprises, so as to enable students to have the ability of economic decision-making in the development of engineering projects. In the new curriculum system, elective courses of economics and management should be added to improve students' cognition of economics and management, which will train students to think about the development direction of engineering technology from the perspective of macro-management and economic development of enterprises.

Engineering practice, especially in the production practice and cognitive practice, should combine with the engineering practice of design and development solutions. The practice of professional course to introduce real industry advanced equipment to achieve corporate adjustable measuring complex engineering problems of campus environment on the basis of the current trend of professional development. And by simulating the real enterprise environment at school, students can easily come into contact with the latest technology in the area an understand the whole process of product development. And the students' practical ability and professional technology level were improved at same time. In terms of practical teaching, it combines the characteristics of electronic information technology, takes students' interest and quality as the important factor, integrates teaching and practical resources inside and outside the university, and imparts complex subject competition questions in relevant courses of several semesters.

Integrated Product Development or other methodologies should be cultivated before cognitive and production practices in enterprises. IPD design and development mode is no longer used only for technology design and development, but for technology design, development and engineering links, including pilot test, production, sales, engineering, service, comprehensive integration, is oriented to practical application. By increasing the basic knowledge of engineering, economic and management knowledge and methodology to solve complex engineering problems [5]. And by the training of engineering practice, the innovation of curriculum design, graduation design requirements, soving complex engineering problems become a related index decomposition point of graduation requirements.

2.3 The Evaluation Method of Achievement Degree of Graduation Requirements.

The evaluation system and evaluation method of achievement degree of graduation requirements and the training objectives includes evaluation method, data source, evaluation institution, evaluation period, result feedback and so on. The calculation formula of the evaluation result of the degree of achievement of graduation requirements points in the evaluation period is as Eq.1.

$$P_{jk} = \min\left[P_{jky} \right] \tag{1}$$

Based on the evaluation of achievement degree of graduation requirements, the evaluation results of graduation requirements achievement degree were calculated. The formula is as Eq.2.

$$P_{ij} = \sum_{k=1}^{n} P_{jk} \tag{2}$$

The evaluation data come from students' examination papers, reports, scores of large assignments, and scores of professional experiments, course designs, graduation designs, etc, which were collected and sorted out regularly by evaluators every year. The evaluators include teachers and teaching administrators.

The evaluation committee evaluates the achievement degree of graduation requirements. The graduation requirements achievement evaluation report includes graduation requirements achievement evaluation form and course achievement evaluation form. The report should specify whether each graduation requirement is achieved. Among them, the qualification value of graduation requirement is set as 0.66. Through the evaluation report, the graduation requirements of graduates can be tracked and evaluated. All relevant teaching departments and teachers use the evaluation results to guide the continuous improvement of relevant teaching activities.

According to the graduation requirements of electronic information majors, the graduation requirements are decomposed into specific index points, and corresponding teaching activities are set according to the index points. Then, according to the credits of each teaching activity and the correlation strength between teaching activities and index points, the weight value is set. The number of courses supporting the same index point is no less than 3, and the sum of the weight value of all courses is 1.

2.4 The Relationship Matrix between Graduation Requirements and Training Objectives.

According to the 12 graduation requirements listed in the general standards of engineering education certification in China and combined with the characteristics of electronic information majors in our university, 12 graduation requirements covering all the general standards and formulates the training program of this major were put forward. The matrix of graduation requirements and training objectives formulated by this major is shown in table 1.

Table 1 The relationship matrix between graduation requirements and training objectives

Graduation requirements	objective1	objective2	objective 3	objective4
1	support	support		
2	support	support		
3	support	support	support	
4	support	support		
5	support	support		
6			support	support
7			support	
8			support	
9		support	support	
10		support		
11				
12		support		support

3. Summary

The paper explores the teaching reform and construction of electronic information based on analyzing engineering education certification and the current situation of electronic information majors. Through the reform of electronic information majors practice course, optimizing the teaching content, strengthening the practice link, improving the teaching means, improving the students' scientific research ability, helping students to deeply understand and master the principles and analytical methods of the course with students' initiative in learning, improving their interest in learning, and improving their innovation ability and application ability. The evaluation system and evaluation method of achievement degree of graduation requirements and the training objectives were studied. The evaluation system and evaluation method of achievement degree of graduation requirements and the training objectives includes evaluation method, data source, evaluation institution, evaluation period, result feedback and so on. And the achievement degree of graduation requirements and the training objectives of electronic information majors in our school were also analyzed. According to the 12 graduation requirements listed in the general standards of engineering education certification in China and combined with the characteristics of electronic information majors in our university, 12 graduation requirements covering all the general standards and formulates the training program of this major were put forward. Practice has proved that the teaching reform is effective. Through the construction of a new teaching model, students can learn independently, and students’ ability to solve complex engineering problems and the quality of education were improved. By that means the training objectives under the background of engineering education professional was achieved.

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