Study on Specialty Construction of Process Equipment and Control Engineering Major from the Perspective of Professional Accreditation

Zhen-Hui LUAN, Yong-Bin LAI and Yi-Jun ZHOU
School of Mechanical Engineering, Anhui University of Science and Technology, Huainan, China

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Abstract. The professional accreditation system can effectively improve the quality of specialty construction, establish continuous quality improvement mechanism, and enhance students' engineering practice and innovation ability. In order to improve the construction quality of process equipment and control engineering major, the teaching reform of the specialty was carried out in accordance with the standards and requirements of professional accreditation, the training plan was formulated, the core courses of the specialty were set up, and the practical training link of engineering was added. The study indicates that the students trained under this program have strong engineering practice and innovation ability.

1. Introduction

The professional accreditation system is an important guarantee to improve the quality of engineering personnel training. It is an important basis for China's higher engineering education to participate in international competition. At present, major developed countries in the world have established education quality assurance system suitable for their own countries, and carried out bilateral or multilateral cooperation extensively, established regional and international education quality assurance organizations. In order to facilitate the mutual recognition of engineering degrees and the international exchange of engineering technicians, a growing number of countries and regions have established education accreditation regimes for international projects aimed at multilateral mutual recognition, such as the Washington Agreement.

In order to improve the quality of engineering talents training and promote the standards of engineering talents training in China to be in line with international standards, China became a preparatory member of the Washington Agreement in June 2013, and became the 18th official member of the agreement on June 2, 2016. Joining the Washington Agreement will help improve the quality of our project education, promote China's training of engineers and improve the quality of engineering and technical personnel in accordance with international standards. It is the foundation and key to promote the international recognition of China's engineer qualification. And it is of great significance for China to cope with international competition and go to the world in the field of engineering technology [1].

2. Characteristics of Professional Accreditation of China

In China, the professional accreditation began in 1992. In 2007, the national engineering education professional accreditation committee was established. In 2012, according to the requirements of the Washington Agreement, the China Engineering Education Accreditation Association (CEEAA) was established. This association is the only legal organization to carry out project education professional accreditation in China. According to the implementation method of the project education professional accreditation (trial), the project education professional accreditation can be divided into two stages: the self-evaluation of the institution and the entry examination of the expert group. Basically, there are six steps: to apply for accreditation, the school self-evaluation, review of the self-assessment report, field check, review and draw accreditation conclusions, supervision and arbitration [2].
Among them, self-assessment is key. When the school conducts the self-assessment work, it shall check whether the specialty receiving the accreditation meets the standard requirements one by one according to the accreditation standards, and supports it with data or descriptive data. Through self-evaluation, the school can find the problems and deficiencies in the teaching system, and accepting accreditation can provide the motivation for professional self-improvement.

The professional accreditation is characterized by both process and conclusion. As a process, it evaluates professional education quality, and promotes the professional refining features, improves education quality. This process focuses not on the end of results, but on the goal of reform and sustainable development. As a conclusion, it provides the public with the authoritative judgment of professional education quality, and guides and promotes the teaching reform, construction and management of subject majors in colleges and universities. The professional accreditation is characterized by voluntary participation. It is a mechanism to conduct qualification evaluation with minimum standards and to help the evaluated specialty establish a voluntary self-examination [3].

3. The Standards of Professional Accreditation of CEEAA

The three main talents cultivation ideals, “student-centered”, “outcome-based education” and “continuous quality improvement”, have been generally concerned in the field of domestic and abroad higher education. Of course, these ideas must be embodied in accreditation standards. The professional accreditation standards of CEEAA are composed of the general standards and the professional supplementary standards. The general standard stipulates the basic requirements of engineering education professional accreditation. This includes students, training objectives, graduation requirements, continuous improvement, curriculum system, teachers troop and support conditions [4]. The supplementary professional standards include 17 engineering education majors, such as geology, surveying and mapping, chemical engineering, textile subject and machinery specialty and so on. In accordance with the different characteristics and requirements of professional development, the supplementary standards put forward more specific accreditation requirements from the three aspects of curriculum system, teaching staff and professional conditions. In order to pass the professional accreditation, under the premise of meeting the general standard requirements, the involved specialty must also meet the requirements of the supplementary standards.

In the general standard, the graduation requirements include (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 standards; (9) individuals and teams; (10) communication; (11) project management; (12) lifelong learning.

The curriculum system is the center of specialty construction and the guarantee for students to meet the graduation requirements. As for the curriculum system, the accreditation standard gives the specific credit proportion requirements: (1) mathematics and natural science courses met the graduation requirements of this major (at least 15% of the total credits); (2) engineering foundation courses, professional foundation courses and professional courses met the graduation requirements of this major (at least 30% of the total credits); (3) engineering practice and graduation design (thesis) (at least 20% of the total credits); (4) general humanities and social sciences education course (at least 15% of the total credits).

4. Major Profile of the Process Equipment and Control Engineering

The major of process equipment and control engineering in our school was developed on the basis of the major of chemical equipment and machinery which was established by Huainan Chemical Engineering School of the former Ministry of Chemical Industry in 1958 [5]. It started as a 3-year junior college. In 2004, the undergraduate major of process equipment and control engineering was approved. In 2009, the power engineering and engineering thermophysics master degree was authorized. In 2012, the major was selected as a pilot major for comprehensive reform [6]. The graduates of this major mainly serve the industries of chemical industry, machinery, light
industry, petroleum, construction and installation, etc. After more than 10 years of construction, it is gradually forming its own professional features.

5. Construction Plan of Process Equipment and Control Engineering Major

In order to meet the professional accreditation standards, we have developed the construction plan of process equipment and control engineering.

Training goal: to cultivate process control professionals who can adapt themselves to the needs of national development and construction, master the basic knowledge and application ability of process equipment design, manufacturing, testing and control, and have good social scientific literacy, sound personality, good professional ethics and social responsibility. Students can meet the following requirements after five years or so of actual work: (1) can be engaged in the research and development, design and manufacture, test and control, safety guarantee, operation and maintenance of process equipment in the fields of chemical industry, metallurgy, light industry and building materials; (2) have good humanities and social science literacy, social responsibility and engineering professional accomplishment; (3) have good teamwork, organization, management, communication and communication skills, capable of independently engaging in the related technical and management work of the profession; (4) have lifelong learning ability, and meet the needs of social, economic and technological development.

According to the training goal, the general standard and the professional supplementary standard of CEEAA, we have developed the core curriculum plan of the process equipment and control engineering. It mainly includes: Higher mathematics, Probability theory and mathematical statistics, Linear algebra, Calculation method, College English, College physics, Engineering chemistry, Theoretical mechanics, Mechanics of materials, Fluid mechanics, C programming language, Computer graphics Auto CDA, Mechanical principles, Mechanical design, Electrical and electronic technology, Machinery manufacturing, Numerical control technology, Principles of chemical engineering, Thermodynamics, Heat transfer, Engineering materials, Control engineering, Process fluid machinery, Process equipment design and Process equipment control technology and so on.

The main practical aspects of the plan include: Metalworking practice, Professional production practice, Engineering cartographic practice, Electronic circuit training, Graduation practice, Course exercise of principles of chemical engineering, Course exercise of mechanical design, Professional comprehensive course exercise, Graduation project (thesis), Science and technology innovation, Discipline competition and Social practice and so on.

The credits of mathematics and natural science courses are 30, which accounts for 15.2% of the total credits. The credits of Engineering, Professional foundation and Professional courses are 70, which accounts for 35.4% of the total credits. The credits of the engineering practice and graduation design are 45, which accounts for 22.7% of the total credits. The credits of general humanities and social sciences education courses are 35, which accounts for 17.6% of the total credits.

6. Conclusion

The specialty construction plan of process equipment and control engineering added training in engineering practice and technological innovation, and improved students' innovation ability. In recent years, the student have won outstanding achievements in the "challenge cup" national college students extracurricular academic science and technology competition, national college students mechanical design innovation competition and national college students process equipment practice and innovation competition. At present, the major is applying for professional accreditation. we hope to continue the construction of the major through professional accreditation to better serve the national economy.
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References


