Transactions on Computational and Scientific Methods | Vo2. 1, No. 1, 2022
ISSN: 2998-8780
https://pspress.org/index.php/tcsm
Pinnacle Science Press

Research on Practice Teaching of Communication Engineering Major Based on Engineering Education Accreditation

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Abstract: With the goal of engineering education certification, a communication engineering practice teaching system is constructed under the school-enterprise cooperation mode in this paper. The system and its corresponding certification indicator points are described in detail. It has been proved that the system is perfect and it is expected to provide useful reference for the construction of other universities.

Keywords: Engineering education certification; Practice teaching; Communication engineering.

1. Introduction

In 1989, educational institutions in the United States, the United Kingdom, Canada, and Ireland signed the Washington Accord [1]. Contracted member countries recognize each other's undergraduate engineering qualifications. That is, the ability of certified professional graduates is equivalent. In 2016, China is a full member of the organization. The purpose of China's joining the organization is that engineering education in China is recognized. The engineers trained are treated fairly and can participate in international projects.

Many local colleges and universities in China are subject to many restrictions due to objective conditions. In order to accelerate the development of local colleges and universities, many schools cooperate with enterprises. On the hand, schools use enterprise resources to improve school conditions. On the other hand, the training program and teaching content are adjusted to improve students' competitiveness based on the needs of enterprises. Through the cooperation between schools and enterprises, enterprises provide a high-quality practical teaching environment for schools, promoted the improvement of the school's practical teaching level. At present, various colleges and universities actively apply for engineering education certification. In order to achieve the certification standards, under the school-enterprise cooperation mode, the practice teaching reform of the communication engineering profession is imperative. Under the back background of engineering education certification, the practical courses system for mechanical design-manufacturing and automation specialty is introduced in literature [2]. The problem of engineering technology talents training model is discussed in literature [3].

2. Practical Teaching Framework Based on Engineering Certification Standards

There are 12 standards for project certification, they are engineering knowledge, problem analysis, design/develop solutions, research, using modern tools, engineering and society, environment and sustainable, development, professional norms, individual and team, communication project management, lifelong learning. In order to meet graduation requirements, practical teaching is essential. In-class practice and extracurricular practice constitute the practice segment in the training program [4]. In-class practice consists mainly of course experiments, basic practice, professional

practice and comprehensive practice. The main forms of extracurricular practice are students' participation in academic research, participation in academic competitions, acquisition of professional qualification certificates, and entrepreneurial practices.

Table 1. Relationship between practical teaching and graduation requirements

category	practice segment	Graduation requirements
In-class practice	course experiments, basic practice, professional practice, comprehensive practice	design/develop solutions, research, using modern tools, engineering and society, environment and sustainable, development, professional norms, individual and team, communication project management
extracurricular practice	academic research, academic competitions, acquisition of professional qualification certificates, entrepreneurial practices.	

3. In-Class Practice

3.1. Experimental Course

In general, the experimental course and the theoretical course are carried out simultaneously. Its main purpose is to help students understand the theoretical content. The basic operations involved in the experimental course also require students to master. Communication professional experimental courses are mainly divided into three categories. The communication professional experiment courses are mainly divided into three categories, namely, electronic, communication technology and computer. In the table 2, the main experimental courses are listed.

Table 2. Experimental course

category	Course
Electronic experiment course	Circuit Theory, Analog electronic technology , Digital Electronic Technology, Communication Electronic Technology
Communication technology experiment course	Signals and Systems, Principle of Communication, Digital Signal Processing, Data Communications and Computer Networks, Optical Fiber Communication, Mobile Communication
Computer experiment course	C Language Program Designing, MATLAB Programming and Application, Python Programming and Application, Microcomputer Principles and Interface Technology

3.2. Professional Practice

Professional practice mainly includes Cognition Practice, Practice in Metalworking, Electrical and Electronic Practice, Graduation Practice. During professional practice, students should gradually accumulate engineering experience. After professional practice, students should understand how their learning should be applied in practice.

3.3. Comprehensive Practice

Comprehensive practice includes Curriculum Project of High Frequency Electronic Circuits, Curriculum Project of Digital Signal Processing, Simulations of Communication, Graduation Design (Project), etc. It involves the development of computer software system, the design of electronic hardware system and the construction of communication system. Through this segment,

students' ability of software and hardware system design, literature review and innovative thinking will be fully cultivated [5]. Under the mode of school enterprise cooperation, the advantages of enterprises are brought into full play. Enterprise projects are introduced into school teaching, students have the opportunity to contact actual engineering projects.

3.4. Relationship Between in-Class Practice and Graduation Requirements

The graduation requirements indicator points supported by the in-class practice are as follows: Students can design experimental protocols based on professional theory.Students can choose the right tool to complete the experiment.Students can reasonably analyze experimental results and experimental phenomena, and form the report.Students can integrate into team work and abide by professional ethics.Through in-class practice, students have developed hands-on skills, learned about engineeringmanagement methods, and have engineering experience.

4. Extracurricular Practice

The main forms of extracurricular practice are students' participation in academic research, participation in academic competitions, acquisition of professional qualification certificates, and entrepreneurial practices. In order to better help students complete their studies, an undergraduate tutor was established. One of the main tasks of undergraduate tutors is to guide students in extracurricular learning. Undergraduates support students to participate in the teacher's research projects. At present, various types of competitions are held in the society, including software development, communication technology and electronic design, for example, ACM Contest and Electronic Design Contest. Undergraduate tutors encourage students to participate independently or in teams. Each team will have an instructor. Obtaining professional qualification certificate is another form of extra-curricular education. Students spend a lot of extra-curricular time to obtain certificates to prove their ability and level. In addition, the school holds entrepreneurship training lectures to help students who want to start a business.

Various forms of extracurricular activities expand students' horizons, exercise students' abilities, and effectively support students' Graduation indicators, mainly including the following points.

Students can use their knowledge to analyze the specific needs of communication engineering problems, define technical indicators, propose reasonable solutions, design modules or systems, and reflect the spirit of innovation.

Students can analyze and evaluate the impact of the project on society, health, safety, law, culture and sustainable development.

The students have an international vision, understand the science and technology and development trends in the related fields of communication engineering, have the ability of foreign language application, and can conduct cross-cultural communication.

In the process of engineering practice, students can use engineering management principles and economic decision-making methods, and have certain project planning and cost control capabilities.

Students master the method of autonomous learning and have the ability of autonomous learning.

In extracurricular practice, we can not ignore the role of enterprises, especially the school enterprise cooperation. The students can not be divorced from social needs. The employment demand of enterprises is an important basis for testing teaching quality. So, extracurricular practice should be close to the actual work of enterprises.

5. Conclusion

This paper expounds how to set up practical education links under the background of engineering education. The practice teaching of school enterprise cooperation specialty should make full use of enterprise resources. However, it is more important to set up practical teaching content properly. Practical teaching content is the core of Engineering Education Certification.

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