

Exploration on the Professional Practice Curriculum of Electronic Information Engineering under the Perspective of the Higher Engineering Education Accreditation

Qi-Wei Lin

College of Information Science and Engineering
Huaqiao University
Xiamen, China

Gui Feng

College of Information Science and Engineering
Huaqiao University
Xiamen, China

Abstract—Aimed at the fact of practical ability was not strong enough around the engineering students, the improved professional practice curriculums for electronic information engineering students were proposed. The professional practice content and method, the comprehensive evaluation of practice result, the management mechanism for professional project and other aspects of professional practice for the electronic information engineering curriculum were discussed. The purpose of paper is to adapt the demand of higher engineering education accreditation, so that the students' ability and graduation requirements could support the achievement of professional training objectives, and the graduated students could possess the ability to analyze and solve complex engineering problems.

Keywords—*Electronic information engineering, Professional practical, Curriculum, Knowledge system*

I. INTRODUCTION

With the development of economic globalization, problems of national industrial competitiveness and innovation ability were attracted more and more attention [1]. Since 1949, Chinese higher engineering education have been development rapidly, basic engineering education systems at various levels and forms have been established, and a large number of engineering and technology talents had been trained for country development. But the fact was that the qualified engineering graduates were favored by society on the one hand, and the insufficient physical and innovation, on the other hand, were become a prominent problem of the current higher engineering education. Thus, to meet the needs of constructing an innovative country, higher engineering education in our country is still faced with big challenges [2]. So, it is widely accepted in education and engineering that an accredited system with international effective equivalence for the higher engineering education in China should be established.

In the 21st century, a series of reform for the higher engineering education had been launched in our country; these actions have clearly showed the signal of boosting the engineering practice. In 2006 the ministry of education of

China had organize and implement the major research project on "the engineering education reform and the innovative oriented national construction ", and the report on "Reform of Chinese Engineering Education for Achieving the Goal of an Innovative Country" was formed. According to the present situation and problems of engineering education in China, a reform framework and countermeasures of engineering education in China were put forward in this report. And a number of problems were raised, such as problems "disconnect of learning and engineering", "serious lack of engineering design and practice in education", "engineering education was bound to the old professional directory and the backward curriculum system", "engineering education in China has been committed to science education, even as the subservient to the science" and etc.[3]. These expressed a strong signal that the Chinese higher engineering education is need urgently to return.

In 2007, the "undergraduate education quality improvement project" was jointly launched by the ministry of education and the ministry of finance, and the first batch of 80 projects on "the test site for engineering education & personnel training mode innovation" were funded.

In addition, the "professional standards and professional education accreditation" project were set up under the scope of "educational quality project". The expert committee of professional education accreditation on national level was established for the accreditation of country engineering education. Under the background of applying for the Washington agreement for engineering education accreditation and deepened "outstanding engineers training plan", the professional education was requested to strengthen the competitive ability of practice, guarantee the quality of engineering students, and promote the internationalization of education at the same time. This is of great significance to improve the quality of higher education.

The core of higher engineering education accreditation is standard, the accreditation standard is the embodiment of the professional accreditation thoughts and ideas, and is also the fundamental of professional accreditation system. In 2015 version of Chinese engineering education professional

accreditation standard [4], seven requirements for the engineering students were set which include training objectives, graduation requirements, continuous improvement, curriculum system, teaching staff and support conditions. Three requirements in supplement standard for majors of electronic information and electrical engineering were curriculum system, teaching staff and support conditions. In accreditation standards, it were clearly highlights the engineering knowledge, the ability to analyze and solve engineering problems, the ability to design and development, the ability to use modern tools, professional norms, teamwork and communication skills, project management, and the ability of life-long learning. Based on engineering education professional accreditation standards, the practice curriculum setting for major of electronic information and electrical engineering were explored in this paper.

II. THE FACED PROBLEMS OF MAJOR OF ELECTRONIC INFORMATION AND ELECTRICAL ENGINEERING IN PRACTICE TEACHING

The foundation courses for major of electronic information and electrical engineering that mainly related to the practice teaching are electric circuits analysis, analog electronic circuits, digital electronic circuits, signals and systems, microprocessor systems, and etc. Due to the expansion of college enrolment, the lack of the experimental hardware and teaching staff, therefore in the whole teaching process there were the tendency of weighting theory and lighting experiment, the practical teaching process was rely too much on experiment boxes. As a result students could only be engage in idle theorizing, and did not have enough the opportunity to complete engineering training. At present, following problems are mainly existed in the experiment teaching process of electronic information specialty:

(1) Most of experiments are confirmatory experiments, and the contact between experiments is close enough, the experiment system design lacks of systematic, which made the experimental, system can't meet the purpose to raises student's independent thinking and innovative ability.

(2) In the experiment process, students do the experiment just according to the experiment instruction steps and teachers' guidance, so most of the students didn't understand the principles of experiment.

(3) As the compression of course hours, practice hours are also reduced accordingly. Theory curriculum burden are heavier, so the students' attention and interest on experiment are lower.

III. AIMING AT CULTIVATING ENGINEERING PRACTICE ABILITY TO REFORM THE PRACTICE CURRICULUM SYSTEM OF ELECTRONIC INFORMATION AND ELECTRICAL ENGINEERING PROFESSIONAL

To cultivate qualified engineering and technical personnel, we should have comprehensive consideration on the knowledge structure, application ability and overall quality. To meet this purpose, we may from following aspects to build the corresponding models.

A. According to the development trend of electronic information and electrical engineering technology to update the practice content and practice method

The unceasingly and rapid development of electronic information and electrical engineering technology, the course curriculum needs to integrate multi- subjects, which requires broadening the basis of professional courses, emphasis on the systematic, comprehensive and advanced. In the process of constructing knowledge system, the related knowledge of electronic information and electrical engineering should be include, and the trend of technology development must be think about at the same time. Basic theory courses are the base of professional courses; it must have the content of the thick foundation. Professional basic courses in the teaching system have the effect of connecting prerequisite courses and subsequent courses; they are an important part of professional knowledge structure. Through cooperate with professional specialized courses and professional selective courses, the curriculum system can ensure the demand of cultivating and developing trend.

Take the application ability and comprehensive quality into consideration, to train engineering students should adapt to the need of the engineering application and the demand of the market. So in the higher engineering education, the theory teaching should be fully considered the application, and in practice teaching should highlight the systemic and engineering properties. The integration trend of modern electronic technology made the discrete component, such as diode and triode, shares less portion on the market, therefore in the experimental curriculum needs to enhance the modular and integrated circuit training. The experimental content of corresponding foundational courses, at the same time, should be pay attention to projects of comprehensive type, design type, and innovative type. In this way, we can enhance students' professional skills, and lay the foundation for the medium or large comprehensive practice in subsequent course design and in graduation design.

The electronic design contest model should be introduced to the experiment of corresponding courses, in a certain way to open comprehensive experiment and engineering background experiment. Students in the form of team take part in the practice, complete the project within the time limit, and accomplish circuit design, simulation, circuit board production, debugging, parameter measurement, encapsulation and writing test report. Multi-level projects are set up for choosing, most of the students could actively participate in the practice, and to experience the modern engineering way of thinking and operating mode.

B. Improve the method and enhance the effect of practice teaching

Strengthening experimental preparation requirements, before the experiment the students must conduct theoretical analysis and computer simulation of circuits firstly, formed a complete preview report, know fairly well before entering the lab. In addition, the fixed function module circuit test and the simple combination experiment could be independently conducted by students in extracurricular time. At the same time,

in general the practice teaching were usually lagging behind the theory teaching, so this time can be used to as the step for students' perceive, introduces the main content, features, technical background, and the required equipment of the practice course, in this way to guide students conduct experiment preparation according to the personal interests and ability, and select the experiment project topic. Network platform is indispensable in the modern theory and practice teaching, make full use of network platform, and take it as a tool to acquire knowledge and information. As an important part of professional training, curriculum design for actual practice teaching system needs to be special strengthen, relevant laboratory can put every experiment courseware, such as the simulation file, comprehensive design experimental project requirements, theoretical foundation and circuit analysis process on the Internet, for sharing the resources, so the students can self-study and prepare after class.

C. Reform on the examine way , implement the comprehensive evaluation of practices result

Practice performance evaluation shall be comprehensively determined by several examination parts: for example, 30% for ordinary times practice, 10% for experimental preparation and experiment report, 40% for the comprehensive design practice, and 20% for experiment examination result. Through comprehensive evaluation practice result, students' comprehensive innovation ability, engineering thinking ability, master degree of course theory and practice ability could be well measured. Students' engineering practice, design and engineering innovation ability could be more accurate understood.

D. Pay attention to the practical requirements, enhance the cooperation of university and enterprise

Rapid updating of electronic information technology, electronic information and electrical engineering training must be joined to the related enterprises. According to the requirement of the enterprise to change the practice teaching plan, make the practice teaching plan more targeted. Set up the guidance mechanism of university-enterprise cooperation; hire the experienced enterprise engineers as part-time teachers to directly involve in the practice teaching activities, especially in the electronic process practice, course design and graduation design. To implement the system of teachers to companies as visit engineers, send teachers to the enterprise for engineering training, and participate in the technical consultation and research and development of enterprises. Improve the engineering practice ability of scientific research and teaching, and gradually formed the interactive mode of "social demand traction, combination of production and study, close cooperation between university and enterprises".

E. Establish engineering practice oriented management mechanism of graduation design

Take multimode mechanism for graduation design management to make students get various forms of practice. In

the graduation design the tutorial system could be carry out, encourage students to advance into the graduation project, get mentors before the graduation design. The graduation design management mechanism can be several ways: 1) the conventional cultivation management mode, the graduation design groups were directed by professional teachers; 2) the university-enterprise joint cultivation management mode, the students do the graduation design project in contract signed enterprise directly, and qualifications of teachers will be assigned as faculty adviser by the relevant enterprise. At the end of graduation design, the students back to university for making graduation thesis open reply; 3) the competition based management mode, combined with national undergraduate electronic design contest, "challenge cup" college students' extracurricular work electronic competition, and all kinds of competitions, assign the capable professional teachers to guide the graduation design project according to the specific circumstances to stimulate students' imagination and creativity.

IV. CONCLUSION

Aimed at the fact of weak practical ability around the engineering students, the improving ideas for electronic information and electrical engineering professional practice curriculum were proposed. The object is to adapt the demand of the higher engineering education accreditation, so that the ability and graduation requirements can support the achievement of professional training objectives, and can have the ability to analysis and solve complex engineering problems. In the process of construction professional practice curriculum of electronic information and electrical engineering, guided by the engineering education accreditation, followed the instructive principle of electronic information and electrical engineering teaching committee, adhered to and developed the advantage of university, so as to deliver more qualified and excellent talents for the development of national economy of our country.

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