

From CDIO to Engineering Education Professional Accreditation-Comprehensive Reform of Electronic Science and Technology Major

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Abstract: To cope with the new scientific and technological revolution and industrial transformation, support and service a series of national strategies such as innovation-driven development and "Made in China 2025", the construction of new engineering in China is imperative. Based on the construction foundation of "CDIO Engineering Teaching" and "Excellent Engineer Training Program", electronic science and technology major has carried out comprehensive professional reform under the guidance of China Engineering Education Professional Certification.

1. Introduction

Engineering education concept CDIO is an abbreviation of "Conceive", "Design", "Implement" and "Operate", which involves the entire life cycle process of modern industrial products. This education concept aims to develop students' ability of solving complex engineering problems.

"Engineering Education Professional Accreditation" is an internationally accepted evaluation system, which can guarantee the quality of engineering education. Since 2006, China has gradually carried out engineering education professional accreditation, and is committed to building a new model of engineering education in line with international standards ^[1].

CDIO and "Engineering Education Professional Accreditation" education concepts have different emphases on the engineering talent training. The former cultivates students based on industry needs, while the latter focuses on bottom line standards of quality of talent training ^[2-3].

2. The History of EST Major in CUIT

Electronic science and technology (EST) major of Chengdu University of Information Technology (CUIT) began to enroll students in 2000. For 21 consecutive years, EST major has been enrolling students from Sichuan and other provinces and graduated more than 2,000 students for the country. In 2009, EST major became national characteristic specialty and then it joined Ministry of Education's "the plan for educating and training outstanding engineers (PETOE)" in 2011. EST major was selected as national first-class undergraduate major construction points in 2019. In recent years, this major promoted engineering education professional certification. And it has passed the application for engineering education professional certification in 2019.

Over the years, drawing lessons from the international advanced engineering education concepts, this major took the lead in advancing CDIO engineering education reform in Sichuan province. It was constructed an OBE talent training system nowadays ^[1-2]. This major promotes the integration of science and education, implements the school-enterprise cooperative education mechanism. As a result, production-study-research-application integrated engineering talent training system is established in this major.

3. Promote the Reform of CDIO Education and Build an OBE Talent Training System

3.1. The Orientation of CUIT and the Social and Economic Development Needs

Electronic information is a special advantage of modern industries in Sichuan Province. Chengdu is the core area of Sichuan's electronic information industry. It is committed to building an electronic information industry ecosystem with international competitiveness, as shown in Figure 1. CUIT has formed a major chain for the electronic information industry. Services have involved electronic materials and devices, integrated circuits, instruments and equipment, network and information security and software and information services. Especially, EST major plays an important role in the field of electronic materials, devices and integrated circuits.

Based on national and regional economic and social development, considering the school-running positioning and characteristics of CUIT, EST major aims at cultivating talents for optoelectronics and microelectronics direction. EST major implements of the talent training concept of "student-centered, output-oriented, continuous improvement". It cultivates applied engineering and technical personnel with a solid theoretical foundation, outstanding innovation ability, and an international perspective.



Figure 1 Majors group chain of electronic information of CUIT.

3.2. Training Goals of EST Major in CUIT

This major conscientiously implements the Party's educational policy and cultivates qualified builders and reliable successors for the socialist cause with all-round development of morality, intelligence, physique and art. According to the development trend of the new generation of information technology industry and the needs of regional economic and social development in Sichuan Province, this major cultivates high-quality applied talents with healthy mind and body, good humanistic literacy, systematic professional knowledge of electronics science and technology, and solid practical ability. The graduates can be engaged in product designing, process manufacturing, research and development, operation and maintenance, and technical management in the fields of "optoelectronic technology" and "microelectronic technology".

3.3. The Rationality Evaluation and Revision Mechanism of Training Goals

EST major regularly evaluates the rationality of training goals from three aspects: talent demand status, external evaluation and internal evaluation. Among them, the external evaluation includes follow-up surveys of graduates about 5 years after graduation, peer-expert evaluation, enterprise experts evaluation, and employers evaluation. Besides, the internal evaluation contains campus experts evaluation, teacher evaluation, and the questionnaire on the career expectations of the current students in 5 years after graduation.

Based on the results of the rationality evaluation for the training goals of EST major, Talent Cultivation Program Revision Committee proposes revision opinions. Then, the EST major leader implements the revision and forms the first draft. After review and approval by "Revision Committee" and the relevant departments of school, a public training goals of EST major will be formed.

4. "Student-centered" Innovative Practice Ability Training Model

4.1. Complete professional practice system for engineering needs

The practice teaching system of EST major includes four categories: public basic experiment, subject basic experiments, professional experiments, and comprehensive practices and social practices, as shown in Figure 2. EST major creates an integrated practice teaching system of "innovative activities", "discipline competition", and "scientific research training". It's great effective to launch innovation and entrepreneurship education and enhance students' practical innovation ability.

Students majoring in EST have participated in various discipline competitions. In recent 3 years, the students have won 8 national awards and 69 provincial awards, and have undertaken nearly 70 projects of "Undergraduate Innovation and Entrepreneurship Training Program".

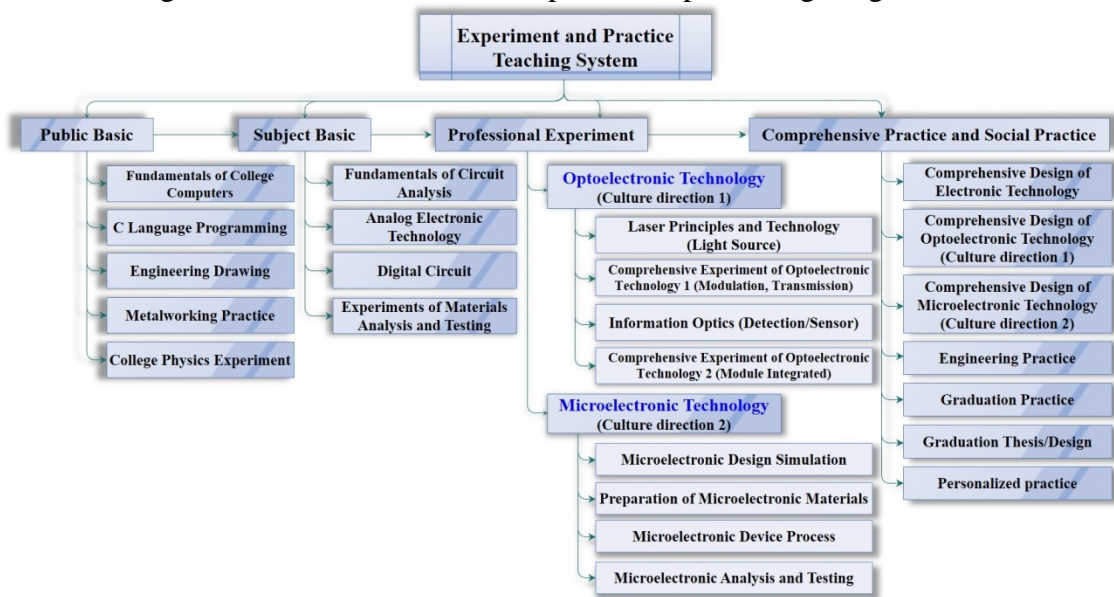


Figure 2 The practice teaching system based on OBE concept.

4.2. School-enterprise Joint a Cross Curriculum System

The enterprise training sessions are synchronized with the school training session ^[3]. Corporate education is integrated with school curriculum learning and engineering practice projects. The organic connections between knowledge and application, school and enterprise, and students and society are realized. Oriented by engineering talent training, EST major establish a cross curriculum system, as shown in Figure 3.

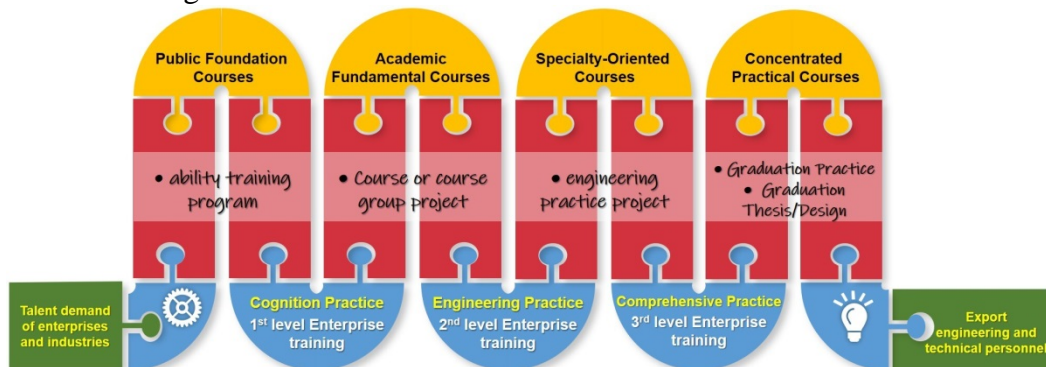


Figure 3 School-enterprise joint a cross curriculum system.

5. Quality Assurance and Continuous Improvement System

Based on the concept of OBE ^[4], EST major has set each link of talent training programs, such as

graduates tracking feedback and evaluation, graduation requirements achievement and evaluation, curriculum system setting and evaluation, teaching process quality monitoring, as shown in Figure 4. EST major has built the continuous improvement mechanism of training goals, graduation requirements, curriculum system, and course goal and so on.

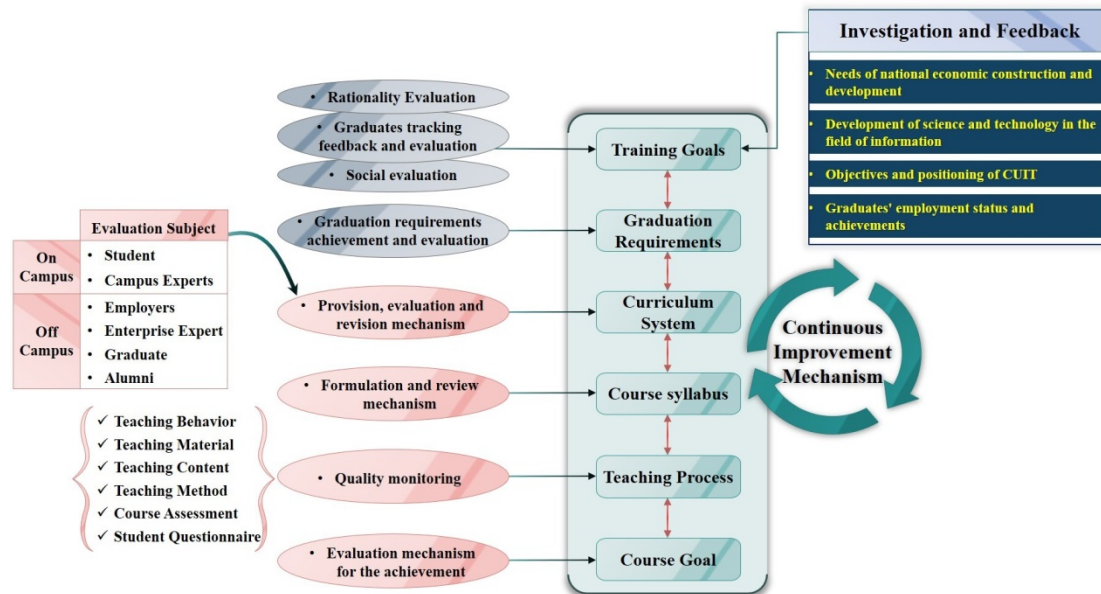


Figure 4 Quality assurance and continuous improvement system based on OBE concept.

6. Conclusion

EST major has carried out comprehensive professional reform, including promoting the reform of CDIO education and constructing the OBE talent training system, exploring the "student-centered" innovative practice ability training mode, and improving quality assurance and continuous improvement system based on OBE concept. The ultimate goal is to effectively improve the quality of talent training for EST major in CUIT.

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