

Establishment of Continuous Improvement Quality Culture for Computer Course Group of Electronic Information Engineering Specialty

Xianlun Yu, Yunxi Xiang, Xiangfei Nie, Guoping Lei

School of Electronics and Information Engineering, Chongqing Three Gorges University, Chongqing 404120, China

Abstract: The implementation of engineering education certification in university engineering undergraduate education can fully guarantee the export quality of students. The paper expounds the development status of electronic information technology in the new engineering era and the quality standards for personnel training of electronic information engineering majors, analyzes the continuous improvement strategy of computer course teaching in electronic information engineering majors under the paradigm of engineering education accreditation, and proposes the establishment of continuous improvement in engineering education accreditation. Ways to improve quality culture. The formation of a continuous improvement mechanism in the teaching of computer courses in the major of electronic information engineering can effectively promote the acquisition of students' final learning outcomes.

Keywords: Teaching mode; Engineering education; Continuous improvement; Quality culture

Fund Project: The Chongqing Municipal Education Commission Key Research Project (No. 202101), the Chongqing Municipal Education Commission Postgraduate Education and Teaching Reform Research Project (yjg213127) and the Chongqing Three Gorges University Graduate Office Project (No. XYJG201903).

1. Electronic information technology in the new era

Electronic information technology generally refers to the study of information acquisition, transmission, processing, storage and display methods, and a technology for the design, development, application and integration of electronic equipment and information systems. Over the past 200 years, electronic information technology has been making continuous progress, and great breakthroughs will be made in the fields of microelectronics, computers, networks, communications and artificial intelligence in the future. Electronic information technology can reflect a country's potential productivity, and electronic information resources have become an important strategic resource for a country, marking the degree of modernization of a country.

After human beings entered 2010, the third world industrial revolution with far-reaching influence based on electronic information technology has arrived. Countries such as Europe and the United States have put forward strategic development plans for future information technology, such as the "National Manufacturing Innovation Network" in the United States and the "Industrial 2050 Strategy" in the United Kingdom. ", Germany's "Industry 4.0 Strategy", France's "New Industry France II" strategy, etc. In 2018, the Ministry of Industry and Information Technology of China launched a number of strategic actions and major projects to form a collaborative innovation chain including technologies and standards, accelerate integration and innovation, and make up for the shortcomings of computer chips, high-frequency devices and other industries. Six major tasks and nine. It is a major project to basically form the development goal of an internationally competitive industrial ecosystem. During the "14th Five-Year Plan" period, China put forward a series of strategic plans, such as "Information Industry Development Guide", "14th Five-Year Plan for China's Electronic Information Manufacturing Industry", "Development Status of China's Electronic Information Industry Park and 14th Five-Year Plan", etc. Guide the healthy, stable and sustainable development of the electronic information technology industry.

This paper mainly aims at the training plan of engineering certification talents for electronic information engineering, and puts forward suggestions on the construction of quality culture such as relevant teaching objectives, teaching strategies, teaching methods, teaching evaluation, and continuous improvement in computer theory, experiment, engineering practice and other course groups. There are rules and books to follow in the training of electronic information engineering professionals, which can provide a way for the training of electronic information engineering professionals.

2. Cultivation standards for electronic information engineering professionals

In the past 20 years, Chinese colleges and universities have been implementing engineering education certification in engineering majors. As of 2021, nearly 1,700 majors in China have been certified. The core of engineering education certification is OBE (Outcomes-based Education) education concept, OBE is an education model based on learning output, and Speart's definition of OBE is "clearly focusing and organizing the education system to ensure that students get in The experience of substantive success in the future life." OBE emphasizes that the teaching goal of the course is the final learning outcome obtained by all students through the teaching and learning process, that is, the final result obtained by the students, and points out the process of internalization of students to the depths of their hearts through learning. , including students' acquired knowledge content, skills and abilities, values, moral ethics and emotional factors ^[1].

The core of OBE is "student-centered, output-oriented, and continuous improvement", which emphasizes four aspects: What kind of learning outcomes will students achieve in the course teaching? What avenues can students take to achieve such learning outcomes? How can the teaching team effectively help students achieve these learning outcomes? How does the teaching team assessment team assess that students are achieving the expected learning outcomes? In OBE, continuous improvement runs through the entire teaching and learning process, and runs through the overall talent training process, including training objectives, graduation requirements, curriculum system, syllabus, teaching process and quality evaluation and other all-round continuous improvement.

In 2018, my country officially promulgated the first national standard for higher education teaching quality, the National Standard for Undergraduate Professional Teaching Quality in Ordinary Colleges and Universities (hereinafter referred to as the "National Standard"), which involves all 587 undergraduate majors and is an undergraduate major in ordinary colleges and universities. Teaching quality evaluation standard. The "National Standard" firmly grasps the most advanced concepts of the development of higher education in the world, the core guidance of professional construction and personnel training, and the core monitoring of professional school-running quality, so that the guidance, supervision, and accountability of higher education teaching quality are based, evidence-based, and Accurate, and clearly apply the requirements of majors, training objectives, training specifications, curriculum system, teaching staff, teaching conditions, quality assurance and other aspects. The talent training objectives under the OBE education paradigm completely match the quality requirements for talent training stipulated in the National Standards.

Electronic information engineering is an important field of electronic information technology in international and domestic engineering disciplines. In the "National Standards", the main goals of domestic electronic information engineering majors are specifically stipulated, one of which is to cultivate talents with electronic technology, information technology and computer technology. Basic knowledge, comprehensively apply the knowledge to engage in the design, development, operation and maintenance of product systems related to this major, and have the professional ability to engage in the research, design, manufacture and application development of electronic equipment, information systems and computer systems. Our school's electronic information engineering major is based on this direction. We have always adhered to the engineering certification standards and the OBE education concept in the training of professional talents.

3. Continuous Improvement Strategies for Teaching Computer Courses for Electronic Information Engineering Majors

According to the requirements of the "National Standards", the OBE education concept and the international engineering education certification standards, according to the demand for social talents in the new engineering discipline of electronic information technology, and according to the characteristics of our school's electronic information engineering major, we formulate our school's electronic information engineering professional talent training plan, and continue to Improve.

In the teaching process of computer courses, the teaching content, teaching methods, teaching methods and teaching evaluation are carried out around the final income of students, and continuous improvement is emphasized in the teaching process. After years of teaching practice, the continuous improvement strategy of computer courses is mainly reflected in the following aspects:

Strategy 1: In a cycle, the continuous improvement of curriculum teaching needs to form a complete closed loop, and each link needs to be developed more openly.

Strategy 2: The starting point, end point and final result of course teaching are students, and the beneficiaries of continuous improvement are students. Therefore, in the closed-loop system of continuous improvement of computer course teaching, we need to insist on:

① Student Oriented. The continuous improvement of course teaching can be oriented to all students, aiming at the final learning results of students, and promote the comprehensive development of students' computer knowledge and ability. ② Focus on the actual needs of enterprises and employers. The teaching content, teaching objectives and continuous improvement of computer courses must be based on social development, enterprise needs and feedback from employers, so as to ensure the consistency of computer teaching and social needs to the greatest extent. ③ Re-foundation, re-application and re-combination. Emphasis on basic computer knowledge, emphasis on experiment, practice and application technology, emphasis on the application of computer tools to solve complex electronic information engineering problems. ④ Emphasis on continuous improvement and curriculum logical relationship. The teaching of computer courses needs to pay attention to the continuous improvement mechanism, pay attention to the correlation logic between computer courses, and the teaching design of the whole course should conform to the epistemological point of view from the shallower to the deeper.

Strategy 3: Adopt a new teaching mode to promote continuous improvement of course teaching. In the teaching of computer courses for electronic and information engineering majors, we always adhere to the engineering certification standards, always adhere to the people-oriented principle, fully pay attention to the cognitive level of students in teaching, meet the needs of enterprises, and take the knowledge, ability and technology that students can actually accept and master. The premise determines the final learning outcomes of the student's course.

In the teaching process, the principle of full connection between schools and enterprises is adopted, teaching design and implementation are led by the teaching team, scientific and empirical teaching methods based on the OBE concept are adopted, and teaching is treated as a professional activity. In the course teaching mode, a new model of "teacher-led, student-centered, and school-enterprise cooperation" is adopted to continuously improve the teaching level of teachers. Teachers play a leading role in teaching, leading classroom teaching, leading students' learning and promoting, and students' own learning. In the teaching process, schools and enterprises need to fully contact and cooperate fully to complete the teaching tasks together.

Strategy 4: Establish a normal teaching monitoring system to ensure continuous improvement. The teaching normal monitoring system is based on the curriculum quality standard framework, strengthens the main body of schools, colleges, and grass-roots teaching organizations, improves the teaching organization structure and process, and ensures the continuous improvement of the quality of curriculum monitoring. The quality framework includes six quality elements of teaching objectives, teaching content, teaching strategies, assessment feedback, learning support, and learning outcomes, as well as the quality standards corresponding to each quality element. It consists of student information officers, teachers listening to lectures and information feedback mechanisms.

Strategy 5: Adhere to the five links of "teaching-assessment-evaluation-feedback-improvement" in the teaching of computer courses. The continuous improvement of computer course teaching forms a closed loop within the course, and the five links of teaching process, course assessment, result evaluation, information feedback and continuous improvement are the components of the closed loop.

In the closed loop within the course, the teaching team assesses all aspects of the students during and after the teaching, judges and evaluates the assessment materials and assessment results, calculates the achievement of the course teaching objectives, and analyzes the achievement of each teaching goal. It will reflect on the students' mastery of the course, analyze the reasons and put forward improvement measures, which will be used for the continuous improvement of the course, and will be practiced in a new round of course teaching, forming a closed loop in the course, with a cycle period of 2 years. According to the specific work involved in the closed-loop in the classroom, the relevant responsible persons of each link are identified, relevant system documents are established, and a long-term improvement mechanism is formed to effectively improve the quality of teaching.

Strategy 6: The continuous improvement of computer courses is deeply integrated with other aspects of the training of electronic information engineering professionals.^[2]

4. Establish a culture of continuous improvement in quality in computer courses for electronic information engineering majors

The international engineering education certification and the OBE concept emphasize that talent training is always on the way, and the knowledge goals, ability goals, and quality goals of computer-based course teaching will also be on the way. The course teaching content, teaching process, student learning process, and teaching effect evaluation also Always on the road. Promoting the formation of the OBE education paradigm for computer courses and building a culture of continuous improvement of quality in the training of electronic information engineering professionals are our main tasks and goals, which are mainly reflected in the following

aspects.

Quality culture 1: In the teaching content, establish a “people-oriented” quality culture. The teaching content of computer courses needs to be determined according to the characteristics of the major and the characteristics of the students. It is necessary to fully consider the basic computer knowledge and the acceptance level ability of the students themselves, and take a step-by-step method to set relevant knowledge goals, skills goals, quality goals, and teaching content. The supporting teaching goal must be the goal that students can achieve after a certain amount of effort. Every certain period, we need to use certain evaluation methods to evaluate the achievement of curriculum teaching objectives, continuously improve its unreasonable factors, give full play to the advantages and characteristics in the teaching process, and form the characteristics of the times and their own characteristics. Students-oriented, continuously improve the teaching content of computer courses, and establish a people-oriented course teaching content system.

Quality culture 2: In the teaching objectives, establish a quality culture of “strong foundation, thick practice, and emphasis on quality”. In the OBE education paradigm, the teaching objectives of computer courses are determined under the support of graduation requirements, which are in line with the characteristics of electronic information engineering, curriculum characteristics, social needs and student base. The objectives of computer courses are oriented by subject knowledge, and deduce the required basic knowledge, experimental skills and quality abilities. Based on the professional characteristics of our school, the characteristics of the electronic information technology era and the needs of social enterprises, we set the knowledge, ability and quality objectives of computer courses, and therefore formulate the syllabus of the course. The teaching objectives emphasize the acquisition of basic knowledge and practical skills. The training focuses on the significant improvement of students’ own quality and ability.

Quality culture 3: In the teaching process, establish a quality culture of “combining students with social needs”. The core of the OBE education paradigm is to confirm whether the graduates meet the established quality standards recognized by the industry, which is the standard of student output. Therefore, the teaching of computer courses needs to refer to this standard. Through schools and colleges formulating a series of relevant documents for engineering certification teaching guarantee, the quality standards and teaching process of course teaching in the OBE education paradigm are systematically guaranteed. The teaching process should be scientific, systematic, oriented and operable. It is necessary to describe the implementation rules of the teaching process, give the rationality of the content, sources, and collection methods of the teaching process data and the basis for the analysis of the correlation with students’ abilities, and establish a quality culture that combines the needs of students and the reality of society.

Quality culture four: In the teaching monitoring system, establish a quality culture of “one framework, two systems, and three supports”. The teaching quality monitoring system is the guarantee for improving teaching quality and adhering to the OBE education paradigm. In the teaching quality monitoring and evaluation system of computer courses, we adhere to the quality monitoring and evaluation system of “one framework, two systems, and three supports”. One framework is student-centered. The two systems refer to the quality evaluation system and the quality monitoring system, with three supports, constructing a three-dimensional system of expert evaluation, student learning experience investigation, and normal monitoring of teaching status.

References:

- [1] Zhang Wenxue, Wang Sunyu, Li Wei, Research and Suggestions on Accreditation Standards for Higher Engineering Education Professionals [J], Higher Engineering Education Research, 2006, 5: 22-26.
- [2] Jiang Zongli, The characteristics, index system and evaluation of engineering education certification [J], China University Teaching, 2009, 1: 36-38.

About the author:

- 1.Xianlun Yu (1967-), male, born in Liangping, Chongqing, professor, research direction: constructivist teaching and humanistic educational theory research, etc.
- 2.Yunxi Xiang, female, 1992.12, Han nationality, born in Chengkou, Chongqing, graduated from Shanxi Agricultural University with a postgraduate degree in physical electronics, now works as a teaching assistant in Chongqing Three Gorges University, research direction: constructivism teaching.
- 3.Xiangfei Nie, male, 1973.11, Han nationality, native of Qujing, Yunnan, graduated from Beijing University of Posts and Telecommunications with a doctoral degree in communication engineering, now works as a professor at Chongqing Three Gorges University, research direction: constructivism teaching.
- 4.Guoping Lei, male, 1981.5, Han nationality, born in Dianjiang, Chongqing, graduated from Chongqing University of Posts and Telecommunications with a postgraduate degree in communication engineering, and now works as a professor at Chongqing Three Gorges University. His research direction is constructivism teaching.