

Research and Exploration of "Computer Network" Course Based on CIDO Mode

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Abstract

"Computer Networks" is a core practical course in computer application technology. It is mainly for students of computer application related majors and pays attention to the ability to cultivate students' team spirit and solve practical problems. This article starts with the actual situation of ordinary college students and closely integrates the current society's requirements for professional competence. It also develops an integrated curriculum for the "Computer Networks" course. It hopes to improve the students' comprehensive professional ability through this course. At present, there are many problems in the "Computer Networks" course offered by colleges and universities, such as the disconnection between theory and practice. When the theory is outdated, it cannot meet the needs of various business units. This article attempts to improve the students' learning ability and practical operation ability through the reform of the "Computer Networks" course and through the teaching method of CDIO, so that students of computer related majors can quickly integrate into the current computer network environment after graduation. Make graduates have more employment capital.

Keywords

Computer Networks Course, Course reform, CDIO.

1. Introduction

With the rapid development of computer network technology and the advent of network socialization, the Internet has ubiquitously affected the political, economic, cultural, military, ideological and social life of society. Computer networks have become a common platform for all walks of life. All kinds of information systems are attached to it. Once the network fails, the entire society will be in a stagnant state. For this reason, computer networks have become the focus of attention of all countries in the world today. In this context, computer-related majors in universities have all established undergraduate teaching courses in computer networks. The practical and technical content involved in the course is numerous and difficult. It is a professional course with high theoretical and engineering requirements, and new network technologies are constantly evolving and emerging. This also puts forward a comparison of students' self-learning abilities. High demand. However, the traditional computer network course teaching often has phenomena and drawbacks that theory replaces practice and theory emphasizes practice. Students can't really understand the application of computer network theory deeply, let alone fully grasp computer network technology and innovate technical engineering ability. to cultivate.

The CDIO[1] (Conceive-Design-Detail-Optete) model is a new model of engineering education curriculum reform proposed by the Massachusetts Institute of Technology (MIT). It incorporates

modern industrial products from conception, design, implementation to application. Life cycle thinking aims at improving students' engineering practice, and also includes training engineering science ability, technical practice ability, new knowledge learning ability, team communication ability and system coordination ability. The CDIO model has been well demonstrated in MIT's "circuit electronics" and other engineering specialty courses. It has been widely promoted in various universities around the world since 2005 and is one of the most influential teaching models in recent years.

Combining CDIO with the "Computer Networks" course[2] has given the course a clear direction of operation. The content of the teaching was modified with the CDIO method to improve the students' ability to think independently, which greatly improved the quality of the classroom effect and the experimental operation and was well received by the students.

2. Reform of Curriculum Teaching Model

The meaning of CDIO is Conceive, Design, Implement and Operate four parts (Fig. 1), it takes the product development to product life cycle as the carrier, allowing students to learn engineering in an active, practical, organic way between courses. The CDIO syllabus divides the engineering graduates' ability into four levels: engineering basic knowledge, personal ability, interpersonal team competence, and engineering system capability. The outline requires students to achieve the desired objectives at these four levels through a comprehensive training approach.

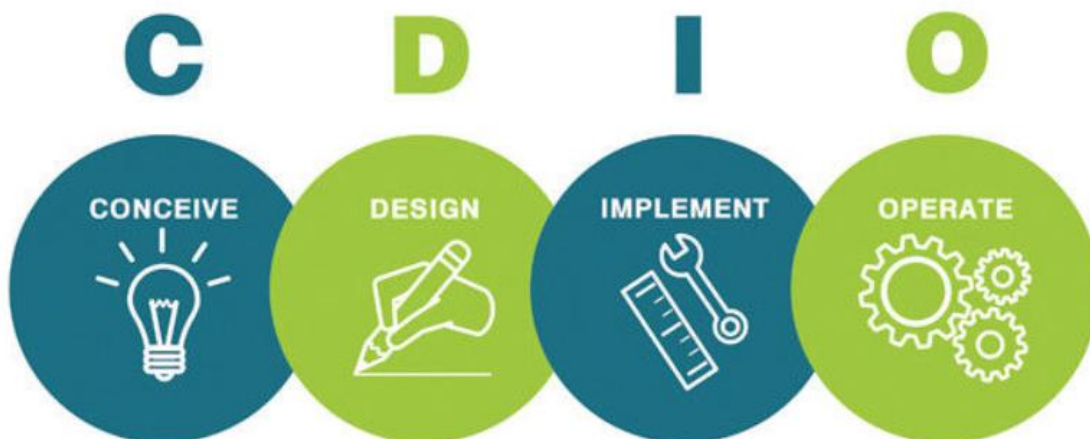


Fig 1. The four elements of the CDIO

The core of the CDIO model of the reform of the curriculum teaching model is a course teaching idea combining theory with practice and returning to engineering practice, which represents the development trend of international advanced engineering education. By using the ideas of CDIO for reference, a new type of teaching model for "computer networks" courses is designed (Fig.2). First, the teaching objectives of the curriculum are determined. After clarifying the teaching objectives, the curriculum is divided into theoretical teaching and practical teaching. Through the introduction of self-designed experiments by students, students' participation in the practice teaching process is enhanced. At the same time, there are classroom teachers who grasp the overall experimental direction and ensure the integrity of the teaching curriculum. After the completion of practical teaching, students are allowed to self-learn with the problems in the theoretical course to cultivate their abilities of self-learning. After the end of each chapter of teaching, the student scores and evaluates the teaching content. The teacher corrects the previously specified teaching goal by viewing the student's evaluation, and improves the teaching quality in the teaching process.

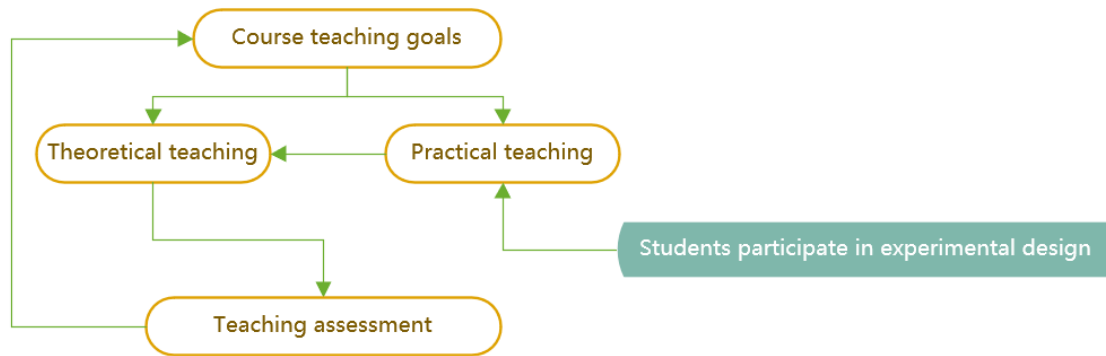


Fig 2. CDIO interactive teaching model

In order to improve student interest in the course, we must first reform the teaching method. The first aspect is that the pedagogy has adopted three modes of discussion, openness, and project-driven[3]. Seminar teaching is mainly used in classroom teaching, open teaching is mainly used in experimental teaching, and project-driven teaching is mainly used in the final two weeks of curriculum design guidance. The second aspect is the use of integrated learning[4], active learning[5] and experiential learning[6]. Integrated learning refers to the student-centered, curriculum theoretical knowledge, personal social ability, and engineering practice skills. Active learning is the part where students actively participate in thinking and practice. They participate in class discussions and open-ended questions without standard answers. , Engineer role simulation and other activities to carry out; experience learning is conducted under the project-driven teaching method, through case analysis, project development, simulation and other means, focusing on cultivating students' ability to acquire knowledge and engineering practice, to stimulate students' sense of innovation. The above methods run through the whole computer networks classroom teaching and experimental teaching. Curriculum learning feedback and evaluation is also an important part of teaching activities. It establishes a bridge between teachers and students to communicate with each other. It is an important basis for adjusting and constructing the curriculum and the entire professional training objectives and system. This study uses multivariate data collection methods to evaluate, including the discussion of teachers and students, the evaluation of the project's practice performance, the students' evaluation of the teacher's teaching process, the mutual evaluation of teamwork students, self-evaluation, etc. The final evaluation results will be jointly used by the teacher, the educational administration department and the students to serve as a reference for adjusting the teaching objectives, professional teaching training objectives and student learning methods.

3. Innovative Teaching Model

According to the CDIO model, I proposed a new teaching flow method (Fig.3).

The introductory "first lesson" mainly tells students about the teaching objectives and methods as well as part of vocational education. The use of visual and interactive methods helps students understand the importance of computer networks courses in scientific theory and engineering practice, encourages students to integrate this course into their future career plans to fully stimulate students' interest in learning and innovation.

The modular chapter content refers to the blocks of the traditional teaching materials, which are composed of computer network commands, settings of the second-tier switches, router settings, settings of the three-layer switches, and complex network planning. After each module course is completed, a summary of course experiments, major assignments, and small tests is performed to reinforce the consolidation and application of theoretical knowledge. This is an important embodiment of the convergence of theory and practice required by the CDIO model. With the use of Packet Tracer software developed by CISCO and teaching in an open manner, students can choose package combinations consisting of confirmatory, design and experimental research projects. Large operations

are often combined with theory and practice, focusing on research. In the form of the report, students are required to conduct research on topics related to the current hot issues related to the content of the computer network and the modules of this section, such as various types of problems caused by various types of network failure events caused by an industry, etc.; Focus on the assessment of the knowledge of computer network theory.

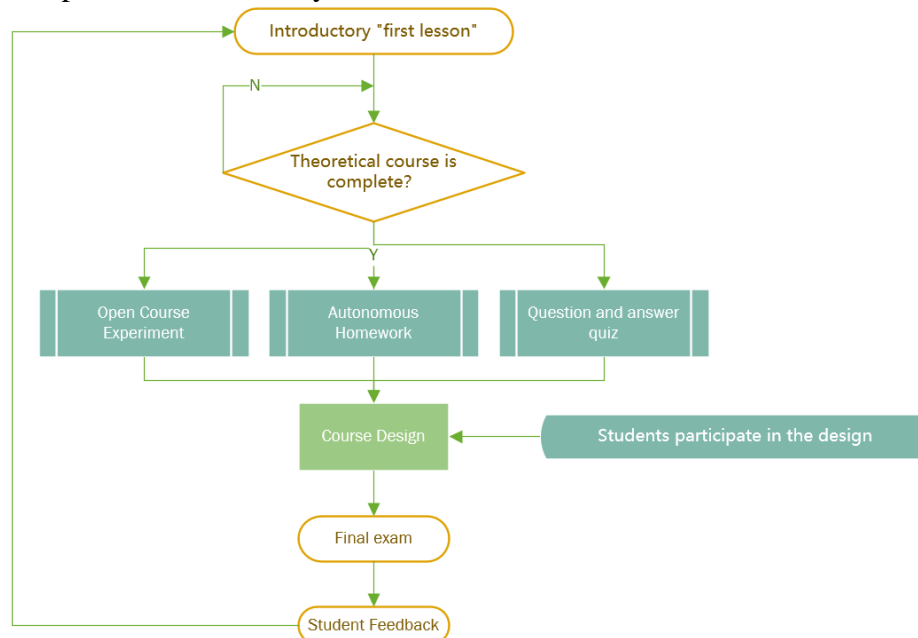


Fig 3. A new teaching flow method with CDIO

After all the theoretical courses are completed, a two-week project-based curriculum design will be conducted after the final exam. The topics of the project include three types of innovative experimental projects that students independently explore, engineering development projects for corporate instructors, and engineering scientific research projects for school instructors. The innovative experimental projects independently explored by students focus on cultivating students' innovative ability in finding problems and solving problems. Students are required to select topics from their own computer networks needs and customize their own project goals. For example, some students use the use of the Internet in connection with dormitory speeds. ACL (Access Control List) technology and QoS (Quality of Service) technology solve the problem of slow Internet access in dormitories. The enterprise tutor's engineering technology project focuses on technology development. The topics often come from the actual network operating environment, such as the mac address-based network interface binding, cross-region DHCP service assumptions, etc. These topics often require students to become familiar with the basics of textbooks. In addition to knowledge, there are also some emerging technologies that are currently used. The engineering research project of the school tutor is often pre-researched. The topic comes from the tutor's longitudinal research project, which mainly includes the penetration of STUNT technology in the intranet and the improvement of IPV6 technology. This is the future for masters or even doctoral students. The study lays a solid foundation of knowledge. Project-based curriculum design also has a very important role is to cultivate students' teamwork and project engineering capabilities, which is an important connotation of the CDIO model.

4. Conclusion

As an applied undergraduate college, QuZhou University pays attention to the cultivation of applied talents. In 2014, computer network courses were introduced into the CDIO model to achieve initial results. First, students responded positively, and they have even learned that during the year of implementation. The senior students of the door course came to learn again. Throughout the implementation of the teaching reform, the students cooperated closely and the teacher-student

interaction was good. The teaching evaluation and feedback indicators were significantly better than in previous years, and the internship units and employers also gave Students are highly rated. As soon as the students entered the internship training stage, they performed well in information system maintenance and design, network planning and design, project learning and follow-up, team cooperation and communication, and surpassed previous students in the school.

Introducing the CDIO mode into computer network course teaching is an exploration of engineering education. Practice has proved that the CDIO philosophy has been effective in the reform of this course. It has greatly improved students' interest in learning, stimulated their sense of innovation, and cultivated their practical skills and engineering literacy. Career laid a solid foundation. In fact, digital communication principles, compiler principles, operating systems, and other courses can all adopt the CDIO engineering education concept to further strengthen students' engineering thinking ability and practical hands-on ability, thereby more comprehensively improving the overall quality and professional skills of students.

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