Discussion on the Teaching Reform of Computer Network Course Based on CDIO Mode

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Abstract. With the popularization of computer technology and the Internet, the demand for computer network talents in the society has been increasing. Computer network technology education has become an important part of current university and social education research. How can universities adapt to the development of computer network technology, do a good job in teaching computer network courses, cultivate outstanding talents that adapt to the information society, and make the theory and practice practical, so that students can quickly adapt to their jobs, which is the current computer network curriculum reform in colleges and universities Questions that need to be considered and resolved. Combining the requirements of the three colleges to cultivate the goal of comprehensive application talents, we draw on the idea of CDIO engineering education as the basis for the curriculum system design of this curriculum reform, so as to improve the teaching quality and cultivate students' engineering practice ability and comprehensive innovation ability.

Introduction

In recent years, with the popularization of computer technology and the Internet, the demand for computer network talents has been increasing, and computer network technology education has become an important part of current university and social education research. The computer network course is a specialized course for computers and other related majors. The main task of the course is to enable students to master the basic principles of computer networks, computer network architecture, local area network and wide area network technology, structural characteristics of typical networks, and specific implementation methods and computer networks application, etc. Through this course, students can understand the terminology, concepts and new technologies involved in computer networks, master the typical computer network building methods and practical skills of various server construction.

Today, in the society, the demand for computer network skills is increasing. How can colleges adapt to the development of computer network technology, do a good job in teaching computer network courses, cultivate excellent talents that adapt to the information society, and make the theory and practice practical, so that students can adapt quickly to Jobs are issues that need to be considered and resolved in the current reform of computer network courses in colleges and universities.

The Status Quo of Computer Network Course Teaching in Colleges and Universities

Take the Traditional Teaching Mode of Speaking-listening

The traditional teaching mode is characterized by teachers, students listening, passively accepting knowledge, and mechanically repeating learning. This kind of teaching mode neglects the initiative of students' learning, and instills theoretical knowledge, which suppresses and hinders the development of students' personality, which is not conducive to cultivating students' ability of diffusion thinking and innovation.
Affected by traditional teaching concepts, there is also a lack of innovative ideas in the teaching of computer network courses. Traditional teaching methods are still used in the teaching of network technology knowledge, and multimedia courseware is used less in computer network technology teaching. Traditional teaching methods make it difficult for students to understand the content of the courses they have studied, resulting in low quality teaching. At the same time, the traditional assessment means that students can only master the knowledge through rote memorization, and the students' practical ability to operate and use the network is poor. This traditional teaching mode is difficult to adapt to the development of network technology. The students who are trained lack the ability to think, lose the ability to innovate, and have poor practical skills to meet the needs of the society for computer network technology talents.

The Knowledge System is Outdated and does not Adapt to the Development of Current Network Technologies

Most of the textbooks currently used in this course are outdated and do not meet the development requirements of computer network technology. It is difficult for students to learn new computer network knowledge and technology. At the same time, the level of teachers is also uneven, and some teachers lack understanding of new knowledge and equipment in computer networks. Professional knowledge, teaching concepts and methods are backward, which makes it difficult for students to access newer network knowledge and software. Lagging behind, the teaching level of the course is difficult to meet the requirements of the teaching objectives.

Lack of Network Training, Students Lack the Ability to Use and Manage the Network

The teaching of computer network courses in colleges and universities usually only pays attention to the teaching of theoretical knowledge. There are few or no training sessions for technologies such as network formation. Most colleges and universities have unreasonable allocation of the theory and practice time of the course. The students' practical skills are not high enough to meet the needs of the society.

The Student Level is Uneven. Adopting a One-size-fits-all Education Model Leads to an Unsatisfactory Level of Teaching

The course involves the foundations of computer culture, digital electronics, computer operating systems, computer components and interface technologies. At the same time, the course is also a professional basic course for other network professional courses, such as networking technology, Internet technology and so on. It is difficult for non-professional students to understand relevant network knowledge without a certain theoretical basis. Moreover, with the deepening of teaching, some students face difficulties in understanding professional terms and technical terms, which leads to a decline in teaching level. In addition, the lack of investment in hardware facilities required for teaching experiment training, and the lack of computer network education for a long time are also factors that cause problems in computer network course education.

Computer Network Course Architecture Design

Combining the requirements of the three colleges to cultivate the goal of comprehensive applied talents, we draw on the idea of CDIO (Conceive Design Implement Operate) engineering education as the basis for the curriculum design of this curriculum reform.

CDIO stands for Conceive, Design, Implement, and Operate. It takes the life cycle of product development to product operation as the carrier, allowing students to have active, practical, and organic links between courses. Way to learn engineering. The CDIO training program divides the ability of engineering graduates into four levels: engineering basic knowledge, personal ability, interpersonal team ability and engineering system ability. The outline requires students to achieve the intended goals at these four levels in a comprehensive training mode.
The concept of CDIO not only inherits and develops the concept of engineering education reform in Europe and America for more than 20 years, but more importantly, it systematically proposes 12 standards for operability, comprehensive implementation and inspection and evaluation. The Swedish National Higher Education Agency used these 12 criteria to evaluate 100 engineering degree programs in the country in 2005. The results show that the new standard is more adaptable than the original standard and is more conducive to improving quality. It is especially important that the new standard is the engineering education system. The development provides the foundation. So far, dozens of world-famous universities have joined the CDIO organization. The mechanical and aerospace departments have adopted CDIO engineering education concepts and syllabuses, and have achieved good results. Students trained in CDIO mode are well received by society and enterprises.

In the setting up of the computer network course architecture, we divide the course content into two parts, namely basic knowledge and practical skills. The practical skills section has three directions. Under the premise of mastering the basic knowledge, the students conduct systematic experiments and learning in a teamwork manner according to the three practical directions, so as to achieve the goal of training students' individual ability and teamwork ability.

1. The basic knowledge part is mainly to lay the theoretical foundation for the practical teaching. According to the three directions of the practical skills part, the theoretical knowledge is taught in a targeted manner, and the novelty and practicality of knowledge should be paid attention to. And fine, not too much and mixed.

2. The practice skills part of the study is mainly to cultivate students' hands-on ability, which is the core part of the course. Combined with the idea of CDIO engineering education, group experiments were conducted in a team-based manner, and three practical directions of LAN formation, server construction, and network security were set up, the objectives of the experiment were clarified, and the contents of the experiment were systematically enhanced, thereby enhancing the course practicality.

3. Conducting experiments in a project-driven manner, taking case-based teaching, case-based practice case-driven teaching method, taking some classic engineering projects such as computer network technology, network engineering, and network security in the current society as examples. Closely connect theory with practice, and train students' ability to analyze and solve problems, so as to cultivate students' systematic, comprehensive learning ability and practical ability in computer network.

**Reform Measures in Teaching**

Reform measures can be solved from the aspects of teaching philosophy, teaching material construction, basic education and hardware investment.

**Changing Traditional Teaching Concepts and Methods**

In the course of the course, students should be motivated by the subjective initiative, give full play to students' individual thinking, and activate students' innovative consciousness to cultivate students' ability of independent thinking and innovation. While teaching theoretical knowledge, we should make full use of modern teaching methods, increase the practical frequency of multimedia courseware, and explain some complex network theories and techniques to students in an intuitive form through advanced teaching methods. Poor students provide a good way to learn. Increase the arrangement of training sessions, increase the proportion of training sessions, reform the assessment methods, implement the process evaluation program, strengthen the assessment of practical operations, and combine theoretical assessment with practical operations. Conditional schools can also arrange for students to participate in social internships in network technology to achieve the combination of the knowledge they have learned and the actual work. Consolidate the teaching results.
Reform of Course Materials

Ordinary colleges can organize the development of network skills of first-line teachers with rich experience in teaching, independently write computer network teaching materials, and timely track the progress of network technology, adjust the corresponding content in the textbooks, so that students can learn the latest computer network technology. The teaching team is the core component of teaching, strengthen the training of teachers, and improve the level of teaching by improving the quality of the teaching staff. By hiring well-known experts and technicians outside the school as part-time teaching staff to introduce advanced network technology knowledge. Open up the horizons of students, and participate in the network technology practice in the society, let students understand the latest network technology, stimulate students' interest in learning network knowledge, and improve students' practical ability.

Strengthening Computer Basic Education

Under the premise that students already have a certain basic knowledge of computers, they will teach computer network technology. At the same time, according to the student's professional direction and training objectives, the level of knowledge, the corresponding teaching plan and outline should be formulated, and appropriate textbooks should be selected as learning tools.

Strengthening the Hardware Construction of Network Technology Education

Using computer multimedia software, large-screen projection, network hardware equipment, Internet and other advanced educational methods to replace the traditional chalk plus blackboard teaching mode, improve teaching quality, build and improve the campus network education information system EIS, and fully realize the modernization of school education technology. It is convenient for courseware generation and acquisition of teaching information. Education information exchange can be expanded through the Internet. The establishment of the campus network information system provides an ideal network information environment for various teaching links such as multimedia courseware production, management, on-demand demonstration, learning, practice, examination and evaluation. You can also freely explore, discover, and solve problems based on your level of knowledge and ability.

Conclusion

Computer network technology is one of the important skills in the Internet era. CDIO is the latest and successful engineering education model in the world. It introduces the CDIO concept in the teaching process of computer network, which is in line with the teaching objectives of the course. The teaching content of the course is divided into two parts: basic knowledge and practical skills. Through the case-driven teaching method of “learning in the middle, doing in the middle and practicing in the middle”, the course experiment process is adopted in the teaching process of theoretical basic knowledge. The project-driven teaching method is adopted to realize the CDIO talent training concept. The actual teaching shows that the proposed reform program has achieved good teaching results. Flexible and diverse teaching methods can stimulate students' interest in learning, autonomy and creativity, improve teaching quality, and cultivate students' engineering practice ability and comprehensive innovation ability.

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References

