

Modern Exchange Principle Course Reformation and Practice

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Abstract

Modern switching technology is an important professional basic course in communication engineering. According to the characteristics of the exchange technology teaching, the problems existed in the course of theory and practice teaching are pointed out. And then put forward the concrete reform plan which is adapted to the theory and practice of the course. The plan links theory teaching with practice to promote students' understanding of the curriculum principle and improve students' practical ability.

Keywords

Modern switching technology; Teaching characteristics; Reform program.

1. Introduction

The development of modern communication technology has a history of more than 100 years. From point-to-point communication to the exchange of information between any two terminals through the communication network, it has brought a revolutionary impact on people's life style. Communication technology can be divided into two categories: one is transmission technology, the other is switching technology. Modern switching technology is the core component of communication network. From the perspective of switching mode, the development of modern switching technology has gone through seven stages: circuit switching, packet switching, ATM switching, IP switching, MPLS switching, optical switching, soft switching, etc. At present, all kinds of switching technology and equipment coexist in China. As the nerve center of communication network, the function and performance of "switching" are particularly important. Therefore, modern switching technology course is an important professional course of electronic communication specialty. It is necessary to study the teaching of modern exchange technology [1].

At present, under the guidance of national policies, local colleges and universities seize the opportunity to transform into application-oriented local undergraduate universities. Therefore, the setting and reform of modern exchange technology curriculum should be closely around the word "application". Through the long-term follow-up and Research on the market demand of electronic communication specialty, and combined with the actual needs of the transformation and development of colleges and universities, the main teaching objectives of the course are: through the study of this course, students can master the basic principles and technology of program-controlled digital exchange and switching network, and can independently complete the communication network by using switching equipment, and understand the current switching technology The development status and development trend of communication network lay a solid theoretical and practical foundation for the development, development, production and maintenance of SPC switching equipment in the future [2].

2. Teaching Characteristics and Existing Problems of Modern Exchange Technology Course

At present, Huainan Normal University (hereinafter referred to as "our college") offers a total of 72 hours of modern exchange technology courses, of which 54 are theoretical courses and 18 are practical courses. At the beginning of the course, we introduced the experimental teaching equipment ck-iii program-controlled exchange experimental system provided by Beijing Jingyi Dasheng Technology Co., Ltd. to complete the teaching task together with classroom teaching. The textbook selected in 2009 is "modern switching technology" published by people's Posts and Telecommunications Press. The content is divided into basic knowledge and detailed explanation of each technology, mainly including digital switching and digital switching network, hardware system of SPC exchange, software system of SPC exchange, ATM switching technology, MPLS switching technology, soft switching technology and new switching technology [3]. Through the teaching activities in the past few years, the author found that the teaching of modern exchange technology course has some characteristics different from that of other courses, as well as the problems and challenges faced at present.

2.1. Teaching Characteristics of Modern Exchange Technology

With the development of communication technology for many years, the switching system has developed from various simple link switching at the beginning to the complex system with the integration of various technologies [4]. In this context, the teaching of modern switching technology presents the following characteristics:

- (1) This course involves many basic theories and leading courses, such as computer network, embedded system and communication principle;
- (2) This course involves a lot of professional concepts and terms, such as circuit switching, packet switching, ATM switching and asynchronous time division multiplexing;
- (3) This course involves many switching technologies, such as circuit switching, packet switching, ATM switching, IP switching, MPLS switching, optical switching, soft switching, etc;
- (4) Because there are many exchange technologies involved, the experimental teaching platform of this course usually adopts comprehensive experimental box, but the experimental process is relatively simple, and it is difficult to master the exchange technology in depth.

2.2. Problems in Theoretical and Experimental Teaching of Modern Switching Technology

Combined with the characteristics of the course and some teaching experience in recent years, the paper sums up some problems and deficiencies in the theoretical teaching and experimental teaching of the course:

- (1) It is difficult to select teaching materials. There is no textbook on switching technology on the market, which not only contains the theoretical knowledge of various switching technologies, but also contains the operational practical knowledge such as routing settings. When teachers teach the course, they need to refer to a large number of other textbooks, which increases the difficulty of students' learning.
- (2) It is difficult to master professional terms and concepts. There are too many professional terms involved in this course, including not only the professional terms of this course, but also many related concepts of the pilot course. At present, the foundation of the students is generally weak, and they are not familiar with the pilot course and just contact with the content of this course, which makes it more difficult for students to understand the course.
- (3) The concept principle is abstract and difficult to understand. Many concepts and principles involved in this course require learners to have strong logical analysis ability and practical basis.

In the case of weak basic knowledge and low practical structure, it is a great challenge for the students to choose the basic knowledge and practice.

(4) Theory is out of touch with practice. Most of the local undergraduate universities use the experiment box as the teaching platform. However, the project and operation of each experimental box are fixed by the production unit. Teachers can not gradually improve the experimental project with the improvement of the theoretical teaching system. Gradually formed the theory teaching and the experimental teaching is not synchronized, even is not the same situation.

3. Teaching and Practice Reform Plan of Modern Exchange Technology Course

3.1. Theoretical Teaching Reform Plan

3.1.1. Build A Reasonable Theoretical Knowledge System

At present, the knowledge system of modern exchange technology course is still based on the selected textbooks, but this method is not suitable for all colleges and universities. Taking our college as an example, the leading courses of communication engineering major include computer network, communication principle, embedded system and EDA development and design, but not communication network course and routing technology [5]. Therefore, the theoretical system of switching technology course should include communication network, switching technology and routing technology. Among them, the communication network part should include the development of communication network, basic technology and basic classification, as well as the relationship between communication network and switching technology; the main content of switching technology includes circuit switching, packet switching, ATM switching, IP switching, MPLS switching and other principles; the main content of routing technology includes the basic configuration and management of switches and routers, and Redundant link management and routing.

3.1.2. Choose A Reasonable Teaching Method

(1) Various teaching methods, "chalk + CIA"

"Chalk" teaching method is the most traditional means of teaching, through the blackboard writing way to present the focus and structure of classroom teaching content. Modern exchange technology is not a simple course of mathematical formula piling up or theory introduction [6]. Therefore, in addition to blackboard teaching, it is also applied to computer aided instruction (CAI), which can use computer as information transmission and processing medium to assist teachers to complete teaching and training tasks. In view of the difficulties and key points of real-time, dynamic, abstract and time-space combination in exchange principle, this course adopts advanced computer and animation technology to make vivid and vivid multimedia teaching courseware, which makes some abstract and difficult to understand vivid and easy to understand, solves the teaching difficulties and emphasizes the key points of teaching.

(2) Combine the leading courses to enhance the understanding

There are many basic knowledge involved in this course. We should combine the principle and practice in the leading course of the school-based specialty to enhance the grasp of the principle and practice in this course. For example, the explanation of the program-controlled switching hardware system should be combined with the knowledge of the single-chip microcomputer hardware system design and the content of the program-controlled switching software system. In essence, it is the practical application of the embedded system and ATM switching and MPLS switching can Combined with the computer network protocol part of the explanation. In the process of knowledge learning, students can establish a connection between this course and other courses of their major by using reference method, analogy method and progressive

method in the process of knowledge learning, which can not only enhance the understanding of this course, but also build a comprehensive and clear knowledge system.

3.2. Practical Teaching Reform Plan

3.2.1. Building A Comprehensive Experimental Platform

At present, the Exchange Technology Laboratory of our hospital is mainly program-controlled exchange laboratory, including 25 sets of experimental boxes and computers. The experimental items are mainly the verification items of the experimental box. The single experimental equipment and the simple experimental items will make the teaching effect not ideal. Therefore, it is necessary to build diversified experimental platform and innovative experimental projects. Considering comprehensively, the experiment project should aim at improving the practical ability and increasing the understanding of theory. The exchange technology laboratory should be composed of the following three laboratories: program-controlled switching laboratory, FPGA laboratory and switching technology training room. Among them, the program-controlled switching laboratory is expanded on the basis of the previous one, adding Huawei, Cisco and other routers, which can train students' ability of actual networking and routing configuration; FPGA laboratory is an existing laboratory, which can provide experimental operation platform for generating, processing and sending signals in switching system; switching technology training room is mainly used to complete a basic communication Change the necessary tools of the system, such as: computer, welding table, engraving machine, etc [7].

3.2.2. Choose A Reasonable Experimental Project

(1) A variety of practical methods, "verification + training"

At present, the experimental mode of our hospital basically uses the experimental box as the platform for confirmatory experiments. The biggest advantage of this experimental method is simple, convenient and easy to operate. However, its disadvantages are obvious. Students can not master its mechanism well through confirmatory experiment, and can only grasp the theoretical knowledge involved in the course from the perceptual. Using EDA to verify some devices of the switching system can make students familiar with the generation and processing of signals, but they still can't see the whole picture of the switching system. Therefore, it is necessary to add appropriate training projects. Through the study of practical training projects such as routing configuration of the actual switch, students can not only have a deeper understanding of the hardware and software systems of the switching system, but also be familiar with the popular switches on the market, master the practical skills, and adapt to the actual needs of the society for Communication Talents.

(2) Combining with other practical courses, we can further enhance our understanding and practical ability

In the practical training project of exchange technology, we should also provide the practical project of system construction, let students make hardware and software system by themselves, build a simple exchange system, further combine theory with practice, and cultivate a group of high-quality talents who both understand theory and have practical ability. In the process of building the system, we need to apply the theoretical and practical basis of a series of pilot courses, such as embedded system development, FPGA design and development, analog/digital electronic technology and so on. Combining these basic theory and practice with this course, we can build a complete system, which can comprehensively improve the professional quality of students.

4. Conclusion

The development of specialty is inseparable from the construction and reform of core courses. This paper discusses the teaching and practice reform methods of modern exchange technology

specialty course by adopting diversified teaching mode and multi-directional innovation practice link. For the electronic communication specialty with strong engineering, only by combining the theoretical knowledge with practical ability, the setting of curriculum knowledge system and the social demand for professional talents, can the comprehensive ability of students be improved, and a batch of high-quality professionals can be trained to meet the requirements of the industry.

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References

- [1] Qin Ningning. Exploration and Research on teaching reform of modern exchange technology. Value engineering, 2010, (5): 177-178.
- [2] Yang Yi, Fu Xuan, Wang Rong, et al., "modern exchange technology" teaching research and discussion. Journal of Shenyang Institute of Technology (SOCIAL SCIENCE EDITION), 2013,9 (2): 253-254.
- [3] Qin Qin, Tang Tinglong, Xia Pingping. Teaching reform and practice of modern exchange principle. Journal of electrical and electronic education, 2008,30 (4): 67-68.
- [4] Chen Shu, Rong Kongwei, et al. Teaching reform and practice of modern exchange technology. Science and education, 2014, (265): 86-87.
- [5] Song Na. Teaching method reform and practice exploration of modern exchange principle course. Journal of Langfang Normal University (NATURAL SCIENCE EDITION), 2014,14 (1): 123-124.
- [6] Cheng Wenqing, Bao Hui, Che LV, et al. Research and practice of experimental teaching method of modern exchange technology. Laboratory science, 2012,15 (3): 15-17.
- [7] Tang hailing, Chen Wanli, Li Liping, Li Xiaoliang, etc. discussion on experimental teaching reform of modern exchange principle based on EDA. Science and Technology Square, 2011,11:215-217.