Research on Computer Network Teaching Reform Based on Simulation Software

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Abstract: This paper first analyzes the concept and development status of computer network technology, then expounds the problems existing in computer network practice teaching, and finally makes an in-depth analysis on how to formulate strategies to solve the problems existing in computer network practice teaching, including the detailed discussion and planning on the reform of course examination methods, the improvement of course setting and the study of software and hardware. Based on the current situation of computer network development in China, the practical teaching of computer network is continuously improved, which makes this course carry out smoothly in teaching.

1. Introduction
The advancement of society promotes the rapid development of network technology. As one of the most basic courses in network technology, computer network technology plays an important role in college teaching. Computer network technology belongs to engineering, but according to the data, it is difficult for many students to complete the experiment independently after learning the course of computer network technology, such as setting up websites and creating databases. Therefore, teachers must be aware of the importance of practice in computer network teaching. Constantly improve teaching methods and students' daily assessment methods make students realize the importance of combining theory with practice, cultivate students' hands-on operation ability and innovation ability, and realize the reform of computer network practice teaching.

2. Concept and Development Status of Computer Network Technology
The combination of computer technology and communication technology is called computer network technology. It is the core work of computer network to connect independent and scattered computers in life according to network protocol. Optical fiber and twisted pair are the main carriers of computer network in the process of information collection and dissemination, and the network information mainly depends on TCP/IP protocol in the transmission process. Figure 1 is the layered and commonly used protocol diagram of TCP/IP, and Figure 2 is the architecture of TCP/IP. Computers and networks are the contents of computer networks. Computers are usually composed of hardware and software, and networks are linked by independent websites and hosts. The teaching of computer network technology in colleges and universities generally includes courses such as database principle, network security management and maintenance technology, HTML and JavaScript, Linux system and network...
management, Java network program and PHP server script language. For students majoring in computer science, computer network technology is the basis of their major, so colleges and universities pay more attention to students' study of computer network. In addition, computer level 2 is an exam that all undergraduates need to complete. However, for students majoring in computer science, computer level 2 certificate does not help them very much. Students majoring in computer science should at least get computer level 3. Therefore, carrying out the course of computer network in colleges and universities is of great help to students who have not offered the course of computer network technology in their majors. According to the survey, there is a common problem in college students' study of this course, that is, students' study of this course is limited to theoretical knowledge, and they can't use the theoretical knowledge they have learned to operate by themselves. At this time, the importance of practical teaching appears, especially the computer network course, which belongs to the engineering category. Teachers should pay more attention to practical teaching in the teaching process, and cultivate students' operational ability and innovative thinking ability.

| Application Layer | Telnet, FTP, DHCP…… |
| Transport Layer   | TCP, UDP            |
| Network Layer     | IP, ICMP, IGMP, ARP, RARP |
| Data Link Layer   | PPP, X.25……        |

Figure 1 TCP/IP Layering and Common Protocol Diagram

| Client A |          | Client B |          |
|----------|----------|----------|----------|
| Application Layer |          | Application Layer |          |
| Transport Layer   |          | Transport Layer   |          |
| Network Layer     | Internet layer | Internet layer |          |
| Network Interface Layer | Network Interface Layer | Network Interface Layer | |

Figure 2 Architecture diagram of TCP/IP

3. Problems Existing in Practical Teaching of Computer Network

3.1 Backward teaching equipment and weak teachers
The emergence of network technology and its continuous upgrading all prove that network technology has become an important part of people's lives. Computer network technology is a part of network technology, and most undergraduate colleges offer the course of computer network technology. However, with the continuous upgrading of network technology, the equipment requirements for studying computer network technology have also been improved. However, the relevant teaching equipment in most undergraduate colleges still stays at a backward stage, which brings more troubles
to the practical teaching of computer network, and students cannot clearly understand the construction process of some network protocol systems. For example, most of the equipment used in teaching this course in undergraduate colleges are computers, and no real multi-layer central switch has been established; In addition, the computer network card, twisted pair, CPU, sound card and other assembly and maintenance tools are relatively backward, and do not provide a good environment for students' practical study. The weak teaching staff is also a current problem in computer network practice teaching in undergraduate colleges. With the increasing demand for computer professionals in society, the number of students applying for computer majors in undergraduate colleges is increasing day by day. However, most of the teachers recruited by undergraduate colleges are directly employed after graduation from undergraduate or graduate schools, lacking teaching experience. Therefore, the knowledge and understanding of switches and routers only stay in the theoretical stage, which is not helpful to students' practice, and has certain obstacles to the development of computer network practice teaching.

3.2 Unaware of the importance of combining practice with theory

According to the survey, the traditional teaching methods are still used in undergraduate colleges in China, but with the continuous development of network technology, the traditional teaching methods are gradually being replaced by innovative teaching methods. Undergraduate colleges pay too much attention to the explanation of theoretical knowledge when teaching the course of computer network technology, which leads to the lack of students' practical ability. For example, when college teachers explain the architecture of TCP/IP and ISO seven-layer model, they mostly explain it directly according to textbooks. They only explain the meaning and components of TCP/IP, the contents of ISO seven-layer model, the role of each part, etc., and find no actual cases for students to show. Students only understand that GTP is a general data transmission platform, RTP is a real-time transmission protocol, RSVP is a resource reservation protocol, PPTP is a point-to-point tunnel protocol, etc., but they can't build these protocols by hand. When some teachers explain the use of routers and switches, students only know the relevant theoretical knowledge, but how to use them in real life is rarely mentioned by teachers. The disconnection between theory and practice is also one of the problems that computer network practice teaching faces at present, so teachers should be aware of the importance of combining theory with practice when teaching this course.

4. Strategies for Perfecting Practical Teaching of Computer Network

4.1 Reform of curriculum assessment

The assessment of students' courses is to test students' normal learning situation. The assessment of computer network technology is mainly divided into online assessment and offline assessment, which are practical operation and theoretical knowledge respectively. The examination of theoretical knowledge is the same as the traditional examination method, which adopts examination paper examination. The examination of practical operation requires students to complete relevant experiments through Cisco Packet Tracer Simulator, and usually need to complete some confirmatory experiments. Finally, comprehensive experiments can be completed in groups, and the whole experiment can be completed through the joint efforts of groups, and then each person's division of labor and individual completion degree can be scored according to the group leader. The average scores of online and offline scores are summarized as the final assessment scores of students. This assessment method realizes the joint assessment of students' theoretical knowledge and practical ability, which is helpful to the development of computer network practice teaching. Figure 3 shows the comprehensive experiment of network.
4.2 Improvement and reform of teaching curriculum

As one of the contents of network technology, computer network technology plays an important role in the teaching of undergraduate colleges and universities. It contains many courses, including front-end development such as HTML, dynamic interactive JavaScript, programming Python, Java, etc., but some courses are not necessary chapters of computer network technology, such as the emergence and development of computer network, the application of computer network technology in life, etc. Therefore, schools can divide courses into distributional electives and free electives. According to the syllabus and the definition of students' preferences, the distributional electives firstly carry out the basic configuration of switches, and then make students understand the Cisco 2960 switch commands through the Packet Processor simulator, and then make the application layer server configuration, so that students have a certain understanding of the working principles of HTTP, DHCP, DNS and other protocols, and can use IPconfig to view TCP/IP configuration. HTML commands and SQL statement commands are often used to make students familiar with and understand the language of network technology. Finally, a simulation experiment is carried out on the structure of TCP/IP system to make students understand which protocol it belongs to and how to repair it after failure. In addition, the construction of simple LAN is the most basic and important experiment among all required courses. According to the order of ISO model, students can understand the production and requirements of twisted pair and the connection among network layer, transport layer and application layer. Free electives are determined by students' orientation of future employment. There is a certain connection between free electives and distributional electives in content. In the selection of teaching materials, teachers of free electives can explain basic theoretical knowledge first, then explain each model in TCP/IP, and finally configure the example part of the protocol, and finally apply the learned knowledge to engineering cases. In addition, network security attack and defense, Linux, etc. can be added to computer network technology as optional courses to expand students' knowledge and make them have a deeper understanding of their majors.

4.3 Improvement of teaching equipment

It is a key problem that the computer network practical teaching is difficult to develop because the teaching equipment is old and derailed from the scientific and technological era. To solve this problem,
it is necessary to strengthen the improvement of teaching equipment. For example, the school can set up a special network laboratory, combine C3560, C2960 and the central router with the branch router, and then connect with the experimental terminal through the Ethernet switch to build a complete network environment. In the construction of the network environment, the configuration of C2960 is more important. Figures 4 and 5 are the three configuration modes of C2960; Secondly, the replacement and addition of assembly equipment, the school should establish an assembly and maintenance laboratory, and equip the laboratory with assembly tools such as sound card, twisted pair, CPU, etc., and increase the number of computers in the laboratory to meet the needs of students doing related experiments.

5. Concluding remarks:
The continuous progress of society has promoted the development of scientific and technological civilization. In today's fast-paced society, in order to meet people's needs, the network technology is updated rapidly. As a part of network technology, computer network technology plays an important role in its development. Undergraduate colleges must pay attention to the combination of theory and practice, cultivate multi-functional talents and realize the reform of computer network teaching.

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