

Research on Teaching Reform of "Computer Network Technology" Course based on Huawei eNSP

Jinfeng Su, Li Ai and He Li

School of Information and Control, Shenyang Institute of Technology, Shenyang 110000, China

Abstract

This paper aims at several problems existing in the traditional "Computer Network Technology" course, so that students can make full use of the eNSP platform to conduct simulation experiments on the knowledge in the course, fully mobilize students' enthusiasm for learning, and at the same time, it is not limited by equipment, time, and place, which can reduce course construction. The required resources are also convenient for teachers to explain and demonstrate, so that students' practical ability has been further improved.

Keywords

Huawei eNSP; Computer Network Technology; Practical Teaching Reform.

1. Introduction

"Computer Network Technology" is an important course for students majoring in communication engineering and electronic information engineering, and occupies a very important position in the entire teaching system. This course plays an important role for students to master computer network technology, have the ability to design network topology and solve practical network problems. Through the study of this course, students can comprehensively master the basic principles, basic concepts and various network practical technologies of computer networks, understand new technologies, new achievements and new trends of computer networks, cultivate students' practical ability, and enable students to be able to independently complete small-scale local area network design and establishment, laying the foundation for subsequent communication and network-related courses, so as to adapt to the development requirements of the future society for informatization.

The main objectives of the course are to train students to build simple local area networks, perform basic configuration of routers and switches, and implement IP addressing schemes. Be able to apply knowledge of computer networks to analyze general problems encountered in small networks and give solutions. Be able to have certain hands-on ability, the ability to analyze and design problems and solve problems, and initially cultivate students to use the general Huawei eNSP virtual platform and Huawei data communication equipment to analyze and design small local area network networks, and have certain engineering practice ability.

2. Key Issues and Innovations in Curriculum Reform

2.1. Problems Existing in Teaching at This Stage

2.1.1. Emphasis on Theoretical Teaching

For a long time, most of the computer network-related courses offered by many domestic colleges and universities are mainly based on theoretical knowledge, and theoretical knowledge is relatively boring and abstract. When students study theory, they simply study theory, which makes it difficult to achieve the expected effect of theoretical study. They cannot do experiments while doing theory, which leads to the disconnection between theory and

practice. Students are more repulsive to theoretical learning, and cannot effectively combine the theory in the stage of experimentation. Combining theory and experimentation.

2.1.2. Simply Teaching Methods

Due to the influence of the traditional teaching mode and teaching concept of computer network technology courses, teachers have always occupied the main position in the teaching process, which makes the relationship between teaching and classroom appear "you teach and I learn". In combination with the content of the textbook, teachers let students mark some important and difficult knowledge points, so that students are always in a state of passive learning and passive acceptance. And in classroom teaching, the interaction between teachers and students is basically less. The distance between students and teachers is getting bigger and bigger. When some students encounter problems in the learning process, they rarely ask teachers for advice, which is not conducive to the establishment of a good teacher-student relationship. Therefore, this makes many students take the course of computer network foundation as a more difficult theoretical course to understand. Some students begin to have serious resistance and rejection, and some students even have serious fear.

2.2. Problems Existing in Teaching at this Stage

2.2.1. Reform of Theoretical Teaching Methods

The traditional computer network technology course focuses on the theory of network model and is mainly explained by teachers. This reform highlights student-centered teaching and gives full play to the initiative of students. Taking this method is mainly to reposition the roles of teachers and students, and change the students' "I want to learn" to "I want to learn". The design scheme of the network, but to explain the design method of the network to the students, let the students start from the actual situation set, and complete the demand analysis and network design through thinking and discussion, so that the students have a strong interest, through the teaching of this method, Make students realize that they are the main body of teaching, the master of learning, and the owner and driver of knowledge and skills. Each layer of the TCP/IP model is explained in combination with the application in the actual equipment, and based on the Huawei virtual platform, students are allowed to talk and practice. Strengthen the understanding and application of knowledge in practical network design and configuration.

2.2.2. Reform of Practical Teaching Methods

The traditional practice course is that the teacher designs the network design idea before the experiment, and the students can complete the network configuration as long as they follow the requirements of the experiment instruction book, so the content of the experiment may be completed smoothly, but the degree of student participation is relatively low. The practical requirements of this course are very strong, so the teaching method integrating theory and practice is used in the teaching process, so that students can apply knowledge more proficiently on the basis of in-depth understanding of theoretical knowledge. In view of this, it is proposed to increase the participation of students in the process of practical teaching. After the problems to be solved are raised, students are required to think independently about designing the network, conduct group discussions, and finally complete the construction and configuration of the network independently.

3. Introduction of eNSp Virtual Platform

3.1. Introduction to the Platform

eNSP (Enterprise Network Simulation Platform) is a free, scalable, and graphical network device simulation platform provided by Huawei. It mainly performs software simulation of enterprise network routers, switches, WLANs and other devices, and perfectly presents real

device deployment scenarios. , support large-scale network simulation, students can carry out experimental tests and learn network technology without real equipment.

3.2. Platform Features

The eNSP provides a convenient graphical operation interface, making complex networking operations easier, allowing you to intuitively feel the device shape, and support one-click access to help and query device information on Huawei's website.

The simulation is carried out according to the support characteristics of the real equipment. The simulated equipment has many forms, comprehensive support functions, and a high degree of simulation.

Support binding with real network cards, realize the connection between simulated devices and real devices, and make networking more flexible.

eNSP not only supports single-machine deployment, but also supports server-side distributed deployment on multiple servers. The distributed deployment environment can support more devices to form a complex large-scale network. For details, see Flexible Deployment.

4. Teaching Application Case

In the teaching practice of "Computer Network Technology", the most typical application is the basic configuration of the router. In the study of the supporting theoretical courses, the meaning of the OSI 7-layer model and the TCP/IP model is mainly taught. The network layer is closely related to this practical project, and the most concise language is used to describe the network layer - addressing. And how IP achieves all this depends on one of the most important tools: the router. In this project, students not only have to configure the router again, but also understand the basic principles of the router and how it implements the routing of IP packets. Here, this article refers to the project to illustrate how to conduct simulation teaching.

4.1. Introduction to the Practical Project

First, introduce the scenario to the students: the core network of an enterprise is simulated with three routers, which undertake the data transmission tasks of different departments, and can communicate with each other. Then the project tasks are derived from this scenario: AR1, AR2, and AR3 are the three routers in the application scenario, as shown in Figure 1. Now all three routers need to communicate with each other.

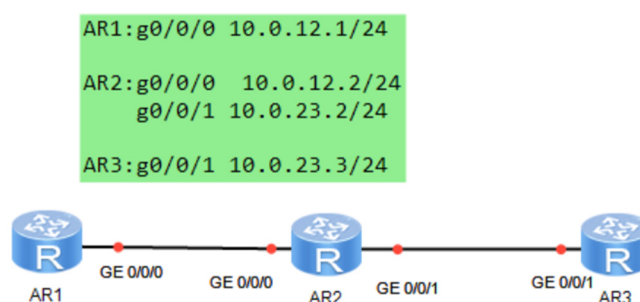


Figure 1. Network topology

4.2. Design Scheme

Students first conduct group discussions, analyze the task objectives of the project through task analysis and other methods, determine the configuration ideas and configuration steps of the task, and finally determine the configuration content and steps.

4.3. Configuration Implementation

Students complete the project tasks step by step according to the summarized configuration on the simulation experiment platform eNSP.

1. Students select the corresponding network equipment on the Huawei eNSP simulation platform according to the network designed by themselves, and establish the network topology.
2. Start the device and rename it: Start and test the device, and the students name the device according to the required serial number.
3. Configure the IP address: Configure the IP address of each network device interface according to the planned IP address, and check the configuration result to test the connectivity of the directly connected network.
4. Deploy routes: Deploy static routes on AR1 and AR3 respectively, check the configuration results, and test network connectivity. Verify that AR1 and AR3 can access each other by running the ping command. The configuration command is as follows:

```
[AR1]ip route-static 10.0.23.0 24 10.0.12.2
```

```
[AR3]ip route-static 10.0.12.0 24 10.0.23.2
```

To verify whether AR1 and AR3 can access each other, the ping command can be used to test. The test result is shown in Figure 2.

```
<AR1>ping 10.0.23.3
PING 10.0.23.3: 56 data bytes, press CTRL_C to break
Request time out
Reply from 10.0.23.3: bytes=56 Sequence=2 ttl=254 time=140 ms
Reply from 10.0.23.3: bytes=56 Sequence=3 ttl=254 time=40 ms
Reply from 10.0.23.3: bytes=56 Sequence=4 ttl=254 time=40 ms
Reply from 10.0.23.3: bytes=56 Sequence=5 ttl=254 time=50 ms

--- 10.0.23.3 ping statistics ---
 5 packet(s) transmitted
 4 packet(s) received
20.00% packet loss
round-trip min/avg/max = 40/67/140 ms
```

Figure 2. Test results

5. Summary

The teacher is the input in the curriculum system, and the students are the output in the course learning process. By reforming this course, the system can get the ideal output, that is, students can master the basic theory of computer network technology and the basic grammar of Huawei operating system, and also master Ability to solve practical problems. In addition, simulation teaching can also be extended from classrooms to families or dormitories. Especially under the influence of the current epidemic, online teaching has to be chosen. Students can practice the experimental content repeatedly without the participation of teachers, or they can repeatedly design their own designs. The experimental scheme has greatly improved the students' learning motivation.

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