

# Research on the construction and application of computer network experimental technology teaching mode

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**Abstract:** In the development of modern society, the computer network experiment course can train excellent technical talents at the same time, continue to optimize the computer network experiment technology teaching system. Under the background of modern education reform, the traditional sense directly use the technology of network to carry on the teaching management mode, has been unable to meet the demand of students, so the education field according to the outline of colleges and universities and students' learning ability, made more perfect and suitable for the experiment content, only in this way can cultivate talents needed for the social development of new era. Therefore, on the basis of understanding the current development status of computer network experiment technology course, this paper mainly discusses the implementation effect of computer network experiment teaching with Cisco Packet Tracer tool as the core according to the curriculum reform ideas put forward in educational innovation, so as to achieve the expected educational goals.

**Keywords:** Computer network course; Network technology teaching; Cisco Packet Tracer tool; Teaching mode

## 1. Introduction

Nowadays, the computer network as an important technical platform for social communication, social development urgently needs a large number of familiar with the network principle and technical innovation ability of outstanding talents, only in this way to master the competitive advantage in the increasingly competitive market environment. Because of the high requirement of computer network technology for theory and practice, students should learn theoretical knowledge and application skills at the same time, but also through long-term training, only in this way can we truly understand the intrinsic motivation of computer network. [1.2.3]If the practice teaching loses the experimental link, it will be difficult for students to deeply understand the theoretical knowledge that is too abstract. Therefore, under the background of modern education innovation, how to construct a good experimental environment, design supporting experimental courses, cultivate students' hands-on practice and analysis ability, and fully stimulate their innovative thinking are the main issues to be discussed by university education personnel. According to the accumulated experience of computer network experimental technology teaching in recent years, the experimental content mainly includes application development, network management, network security, network components, operating system and so on. Among them, the hardware of computer network experiment includes switches, transmission media, modems and other contents, while the software environment refers to the management system, database, operating system and so on running on the host. Because computer network experiment is more complex than other education of computer major, and the knowledge content learned is more, so now colleges and universities should actively organize students to participate in experimental courses when cultivating professional talents, only in this way can they apply the knowledge they have learned to real life. Investigate how colleges and universities in our country's network teaching situation, even though most of the network course chose professional teaching materials and advanced technology, but different teachers of different professional Settings there is biggish difference experiment content, such as there are teachers to strengthen the training of the network equipment accessories, by teachers based on network protocol has carried on the deep analysis, Some teachers also pay attention to the training of web language editing.[4.5.6]

Computer network course is a computer professional senior student must participate in the learning course, one of the main is to consolidate deepen the students' theory study skills, avoid using network students to stay in this level, guides them to deeply explore the basic connotation of network system integration, independent participation in modern construction application of the computer network system, understand the application value of all kinds of network protocols. As one of the teaching that students majoring in computer science must participate in, computer network course is mainly to cultivate students' ability consciousness to solve network communication problems. From the current computer network experiment teaching, there are many problems: first, the traditional teaching relies on the theory of computer network course, most of the experimental content is to verify the textbook of professional knowledge, although can help students to consolidate deepen the content, but not conducive to guide students to use knowledge to solve specific problems; Second, the working principle of network middleware and parameters configuration belongs to the basic knowledge of computer network, in the experiment teaching needs to use more than one terminal equipment, switches, routers and other structures, the real network environment, demonstrates the basic principle of network transmission system, but because of the large hardware equipment, unable to move effectively, so laboratory in colleges and universities reserve resources are not rich, It is difficult to meet the needs of modern education; Finally, as the basic content of computer network course teaching, it is difficult to use real experiments to present the whole process of data transmission and analysis in the traditional classroom. Students need to have a certain imagination space for thinking modeling, so the consciousness ability of students is extremely demanding.

In this paper, according to the teaching program and students' basic situation of colleges and universities around China, the teaching mode of computer network experiment technology is formulated, and the Cisco Packet Tracer tool is used to optimize the design, so as to create a standard and perfect computer network experiment teaching system and cultivate more outstanding technical talents for the development of society.

## **2. Method**

### **2.1 Teaching Model**

According to the current problems in computer network experimental teaching, this paper starts from the perspective of mixed teaching and writing teaching, conducts a deep research on the technical means, tool platform, activity design and operation mode of practical teaching, and finally gets the teaching mode with Cisco Packet Tracer tool as the core, as shown in Figure 1 below:[7.8.9]

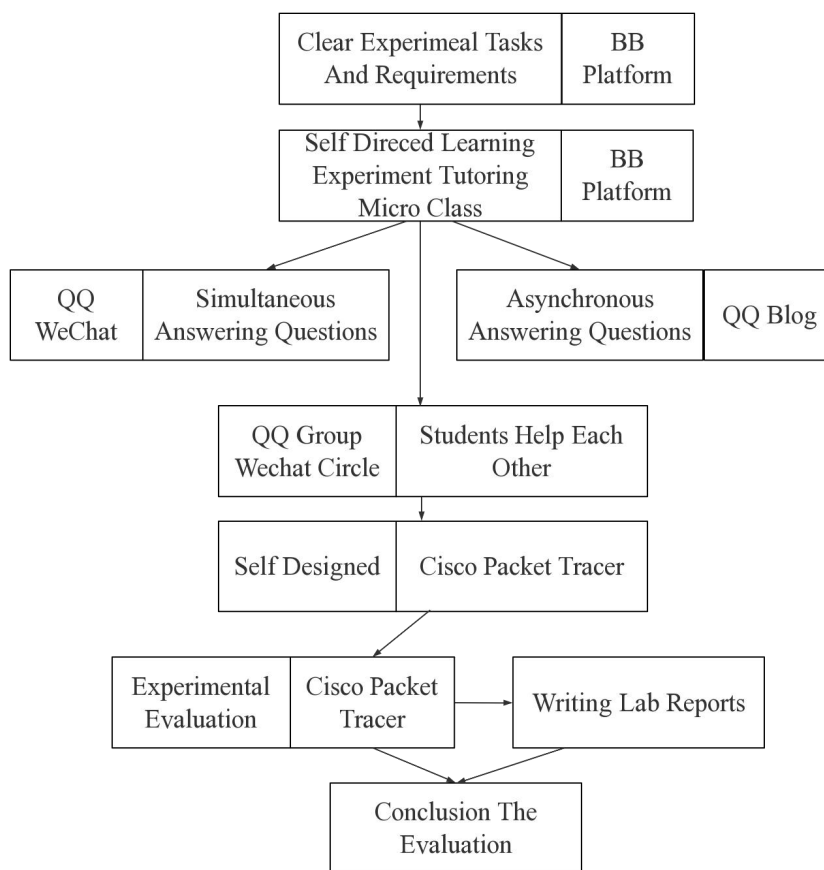


FIG. 1 Structure diagram of teaching mode

Combining with the above analysis, the design will be social tools and the network platform as the main of collaborative learning environment, using the Cisco Packet Tracer tools to build simulation experiment platform, the micro class as the main teaching resources, actively carry out the combination of online teaching, build a combination of hybrid classroom teaching mode. From the perspective of practical application, the overall teaching consists of nine steps, including the specific collection of experimental guidance, experimental operation, experimental evaluation and other links, and each activity process has the corresponding tool platform and technical means.

Before the formal class, teachers should comprehensively sort out the experimental teaching tasks and teaching materials, put them on the BlackBoard teaching platform, let students download the required materials independently, and determine the basic tasks and final requirements of experimental teaching. At the same time, professional teachers should transform the basic principles and main operations of the experiment into micro lessons, so that students can log on the platform anytime and anywhere to learn independently. In this process, teachers should use QQ or wechat and other social platforms to reasonably guide students to participate in the collaborative learning process, focus on typical and common problems, and upload them to the teaching platform after integrated analysis.

In the practice teaching process. According to the experimental tasks and basic requirements, students should use the Cisco Packet Tracer tool to design experimental schemes independently and carry out effective operations. Cisco Packet Tracer tools to effectively simulate the real application scenario for the equipment and the real environment, students can choose according to the experimental project in the implementation model experiment equipment, the construction of experimental environment, and also provides the network skills assessment tool, teachers can guide the function of the activity, according to the main content of the experimental setting examination questions, After being given to the designated student, the system will compare and analyze the student configuration with the plan set by the teacher, and finally obtain the corresponding score.

After classroom teaching, students can not only download the network topology map saved in class at any time to continue training operations, but also write experimental reports and use Cisco Packet Tracer tool to design operation experiments for infinite times, so as to clarify their own problems in experimental operations. Most of the students who have not completed the experiment in the classroom can also carry out experimental training at any time and anywhere, and teachers can help students to answer questions through the course platform, so that they have a deeper understanding of computer network experimental technology teaching.[10.11.12]

## 2.2 Cisco Packet Tracer

According to the problems existing in the teaching of computer network experiment technology, the introduction of simulation tools in the course design can provide students with visual simulation environment, real-time observation of the network running conditions, and facilitate students to carry out personalized operations. Cisco Packet Tracer tools mainly provide a variety of network equipment, terminal equipment, connection equipment, using these virtual equipment, teachers and students can break through the limitations of physical equipment, according to the personalized needs to set up the network architecture, understand the network environment and running state, so as to determine the basic principles of computer network. The connection diagram of the device is as follows:

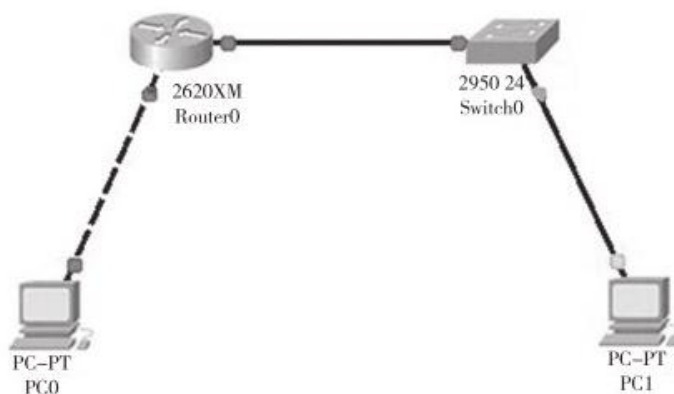


Figure 2 Device connection diagram

## 2.3 Experimental Summary

In teaching, when students first contact the Cisco Packet Tracer tool software, they may not understand the interface, design and specific operation, so the teacher will give a brief introduction to the overall software operation functions, as shown in Table 1 below:

Table 1 Functional analysis of Cisco Packet Tracer tool

Interface	Function
The menu bar	File, edit, options, view, tool help, and other contents, you can find open, save, copy, paste, zoom in, zoom out, print, and set the basic commands similar to other software menu bars
The main toolbar	Provides shortcut keys for common function commands
Common Toolbar	Provide some commonly used tools in software; Select, delete, add remarks, enlarge, and add protocol data units
Logical and physical workspace conversion bar	Click this key to switch between the Logical workspace and the physical workspace
The workspace	The workspace is the main operation area of the software. You can create network topology, track packet sending and receiving, verify network communication, and view packet contents
Real time, analog conversion bar	Click to switch between the realtime mode and simulation mode
Network equipment library	Select a device type and then select a specified device
Device type library	Contains different types of network equipment, terminal equipment, components, connection lines, etc
Specific device library	Displays different models and specifications of the same type of devices, and provides multiple device models for users to choose
Packet window	Used to manage packets added by users

For example, students can build the network topology by dragging and dropping on the work interface. They can configure the application devices in this topology through the graphical interface or commands.

### 3. Result analysis

Teaching effect evaluation is the main standard for testing teaching methods. There are many common evaluation methods, such as survey, interview, questionnaire and so on. In this study, 36 students majoring in computer network in the Department of Computer science are studied by questionnaires. The questions include: 1. How do you learn the teaching content of this class; 2. Whether the simulation tool software is helpful to teaching; 3. Whether the teaching form is satisfactory or not. The actual survey results are shown in Table 2, Table 3 and Table 4 below:

Table 2 Survey results for Question 1

Student Response Item	Very good	Better	General	Bad
The number of students	19	11	5	1
Proportion (%)	53	31	14	2

Table 3 Survey results for Question 2

Student Response Item	A great help	Help	General	There is no help
The number of students	25	10	1	0
Proportion (%)	70	28	2	0

Table 4 Survey results for Question 3

Student Response Item	Very satisfied with	Satisfied with the	General	Not satisfied with
The number of students	20	13	2	1
Proportion (%)	56	36	6	2

Based on the above analysis, it can be found that most students can basically understand and skillfully use the knowledge taught in this class, and the application of tools and software can help students understand the theoretical content. Most students like this teaching method very much. From the perspective of practical education, the network teaching experiment system with Cisco Packet Tracer tool as the core can make the teaching design easier, the practical operation more simple, and effectively solve the problems faced by the current network laboratory design. At the same time, Cisco Packet Tracer tool is specially provided for experimental teaching design, which can not only fully mobilize students' interest in learning, but also help students to master more knowledge in the future teaching guidance. It should be noted that this experimental teaching scheme can not simulate all the operations of network equipment, so the experimental teaching design should be combined with the existing hardware and software equipment to complete the experimental teaching guidance. On the basis of understanding the characteristics of Cisco Packet Tracer tool software and according to the basic requirements of computer network experimental technology teaching, this paper puts forward a new experimental teaching guidance strategy, which can not only reduce the cost expenditure, but also facilitate the comprehensive management of teacher education personnel, and combine it with other software and hardware. To get a more perfect and effective computer network experimental technology teaching system, the original experimental teaching before class preparation, classroom operation, after-class training and so on have a positive impact.[13.14.15]

#### 4. Conclusion

To sum up, under the background of modern educational reform, facing more and more high educational guidance requirements, how to meet the cultivation goal of computer network major students, how to construct the teaching mode of computer network experiment technology, and how to actively respond to the national educational development policy are the main issues discussed in our education field at present. Therefore, under the background of modern education innovation, the use of Cisco Packet Tracer tool software to build a new computer network experimental technology teaching system can not only solve the problems faced by traditional computer network teaching, but also provide more learning opportunities for students, so that they can learn independently and exercise effectively. To master more valuable theoretical knowledge and application experience, improve the comprehensive level of professional teaching guidance, and cultivate more computer technical talents for social construction and development.

#### Acknowledgements

Project Name and No.: School-level educational reform project "Research on Practical Teaching Mode based on Innovation Ability Training-Taking Engineering Major as an example" (2022XJJG44)

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