

Discussion on the Comprehensive Experimental Teaching of Computer Network under the Mode of Entrepreneurship and Innovation Education

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Abstract: With the continuous development of Internet information technology, the use of computer networks for curriculum teaching has become an important measure for teaching reform. At present, the experimental teaching pays more attention to basic experimental teaching, and ignores the importance of designing comprehensive experiments, which makes students unable to integrate the knowledge they have learned, and ultimately results in students' poor practical ability. Therefore, it is important to carry out effective comprehensive experimental design on the basis of experiments. Only in this way can students' innovative consciousness and innovative ability to be further improved, so that students' interests in experiment can be stimulated.

Introduction

Computer network is one of the most core core courses of computer majors. It is a highly experimental professional course, and comprehensive experiments have an extremely important position in computer networks. Therefore, when carrying out the comprehensive reform of computer networks, universities should start from the training objectives of curriculum and carry out new planning and design of experimental content to improve the comprehensive experimental teaching model and further cultivate students' innovative awareness and ability.

1. Problems in comprehensive computer network experiments

1.1 Ignoring the importance of comprehensive experiments

In the experimental course of computer network, the experimental operation is complemented by related teaching content. Therefore, these experiments are designed according to the important principles or protocols in the chapters of the teaching course. Such experiments only serve to assist teaching. In these basic experiments, no matter what the content of the experiment is, they are only performed for a single protocol or a single principle, including virtual experiments on the simulator and protocol analysis experiments. For example, in the HTTP experiment, it enables students to have a better understanding of the working principle of the HTTP protocol through analyzing the HTTP messages, but it cannot enable students to understand how the HTTP request messages are sent to the network, and how the network transmits the message to the receiver. These processes cannot be reflected in basic experiments, so that students cannot learn really useful computer network knowledge.

1.2 Relying too much on virtual experiments and ignoring physical experiments

In the case of experimental equipment such as routers, switches, and network protocol analyzers that are relatively expensive and their replacement speed is fast, it is difficult for experimental teaching to keep up with the update of network technology, so experimental courses cannot meet students' needs for knowledge and research capabilities^[1]. In recent years, many universities have continuously focused their experiments on analog instruments, tried to use analog instruments instead of things to conduct experiments, such as Packet Tracer, NS2. Virtual experiments can prevent experimental risks caused by equipment aging, prevent problems caused by backward equipment, and allow students to simulate various experiments through simulators. However, the

simulation instruments are sometimes virtual experiments and can not really simulate the real world network, especially when performing equipment configuration experiments or protocol analysis experiments, virtual experiments are still different from physical experiments. Therefore, in the face of the same network failure, the failures encountered by students through virtual experiments with simulated instruments are much different from the failures that occur in real networks. Perhaps students can solve the failures in virtual experiments, but they cannot find and solve the problems when facing the real network failures.

1.3 Students' failure to understand the knowledge

In the comprehensive experiment of computer network, the basic experiment of protocol analysis is to analyze each protocol in a targeted way, such as FTP experiment, which usually analyzes the message format, working principle, title and other contents of FTP protocol in a targeted way to get the working process of the protocol ^[2]. In the process of FTP transmission, it is not directly sent by the host, but it is sent through a series of messages such as DNS and ARP. In addition, no matter what degree of network transmission process, even the simplest network transmission can be completed by coordination of multiple protocols. For a single basic experiment, students cannot understand the real process of message transmission in the network. Therefore, when students face the network phenomenon, they are often unable to effectively analyze the problems. As a result, students can not use the existing theoretical knowledge to solve the problems.

2. How to improve the comprehensive experimental teaching of computer network under the mode of entrepreneurship and innovation education

2.1 Combination of theory and practice

In the computer network course, the teaching core of the theory course is "protocol", and the learning of protocol is not just to understand the protocol, but to understand the transmission process of various data in the network deeply on the basis of learning various protocols, which is the teaching goal of the computer theory course ^[3]. Therefore, in the design of comprehensive experimental courses, teachers should guide students to understand that protocol learning is not a single learning of theoretical knowledge, but a combination of theory and practice on the premise of mastering theoretical knowledge. Only in this way can we effectively solve the problems in the network. This requires that when designing the comprehensive experimental teaching, teachers should firstly make clear the purpose of the experiment, and understand what theoretical knowledge is needed in the experiment process. In addition, they should fully grasp what aspects of students' ability need to be exercised in the experiment, so as to design more perfect comprehensive experimental courses, which makes the comprehensive experiment reasonable and scientific.

2.2 Effective combination of virtual experiment and physical experiment

Compared with virtual experiment, physical experiment has its incomparable advantages, but there are some problems in physical experiment. Therefore, teachers should effectively combine virtual experiment and physical experiment in the design of comprehensive experiment, and design a more scientific and reasonable comprehensive experimental teaching mode of computer network through the effective combination of virtual and reality ^[4]. First of all, students can get useful data packets in the real network environment through the use and analysis of various tools in the physical experiment, including the data received and sent by various applications in the transmission process. At the same time, in the process of protocol analysis, the computer's theoretical knowledge is fully grasped, and the real experimental results can be achieved through the application of its working principle. Secondly, students can design and build the network by using the simulation instrument to exercise their own hands-on ability, and can also remove the network fault through the simulator, so as to improve their practical operation ability and effectively achieve the effect of "immersive". Finally, the effective combination of virtual experiment and physical experiment can help the course design of comprehensive experiment to be more reasonable,

so that the knowledge points of each basic experiment can be integrated, helping students continuously improve their cognition of theoretical knowledge. And it needs to gradually integrate the theoretical knowledge of computer network into practical operation to cultivate excellent computer integration of students^[5].

2.3 Improvement of students' creative ability

In computer network teaching, cultivating students' innovative ability is one of the most important factors for students to carry out comprehensive experiments. In the process of comprehensive network experiments, teachers should distribute the experiments to students in the form of a single project, and indicate the ultimate goal of the experimental project, so that students can carry out experimental operations with experimental purposes, and they can continuously verify the experimental purpose in the experimental process to complete the experimental project well^[6]. In addition, the experimental steps and methods of the project should be handed over to students for designing and arranging by themselves, instead of following the basic experiment practice, and letting students perform experiments in accordance with the experimental steps arranged by teachers. In this way, students can't complete the experiment step by step, and they can't learn useful knowledge and operation. When conducting computer network experiments, students should start from the purpose of the experiment and design the experimental process and steps by themselves to successfully complete the experiment and cultivate their ability of comprehensive experiments.

2.4 Effective combination of the "thinking" and "doing" of the experimental process

In the process of designing the experiment, the teacher should set up some experimental questions according to the purpose of the experiment, especially in protocol analysis experiments such as Wireshark packet capture. The experimental steps are much simpler than the configuration experiment. The main significance of experiments similar to this is to effectively analyze the data packets that have been obtained, and to analyze the protocols in the data packets. Therefore, when carrying out such comprehensive experiments, the design of experimental steps should consider the entire data transmission process. It cannot be determined only by the analysis of a single experiment, but the working principle of the protocol involved in each level of experiments should be analyzed in depth to show clearly the working situation^[7]. In addition, we should design relative experimental questions for students based on the knowledge points that need to be tested in the experiment, so that students can master theoretical knowledge in the course of the experiment, and integrate the theoretical knowledge into the experiment. At the same time, according to these topics, students can be more skillful in the captured data packets, and their practical ability can be further improved. Only by guiding students to carry out comprehensive experiments, can students fully integrate theoretical knowledge with practical operation, so that the knowledge points learned by students can be integrated^[8].

Conclusion

In summary, in computer network teaching, we should increase the emphasis on comprehensive experiments of computer network, improve students' practical ability, and cultivate students' innovative consciousness and ability, so that students can learn more useful knowledge in comprehensive experiments and solidify their professional skills on the basis of entrepreneurship and innovation experiment.

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