

Research on Practical Teaching System in Network Engineering Speciality

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Abstract. This paper proposes the construction of practical teaching system for network engineering speciality, designs a practical teaching system composed of in-course experiments, on-campus practices and off-campus practices, arranges practical teaching according to the principle of hierarchical and progressive ability cultivation, and proposes a hierarchical and progressive practical teaching system. The practical results show that the implementation plan is conducive to promoting the construction of practical links of the specialty, improving the teaching quality, and cultivating high-quality qualified network engineering technology and network application talents for the society.

Keywords: Network Engineering; Practical Teaching System; Ability cultivation; Integrated Design.

1. Introduction

With the rapid development of communication technology and computer technology, network has become an indispensable part of people's social life. How to train qualified network engineering talents and improve the quality of talent training is an urgent problem for network engineering specialty.

Now it is difficult for enterprises to find satisfactory network talents, and network engineering graduates can not find satisfactory jobs, there is a contradiction between the cultivation of talents in colleges and universities and the needs of society. The main reason is that in the process of education, colleges and universities lack the training of college students' practical ability, do not pay enough attention to the practice link, and the training mode of practical ability is improper, which leads to spending a lot of time and energy but does not receive the ideal effect. Many network engineering graduates have theories, but they can't solve practical problems on the job site, and enterprises need talents who can solve practical problems. This requires universities to increase practical teaching links, pay attention to the cultivation and improvement of practical skills, carry out all-round and deep-level practical teaching reforms, and build a multi-channel and comprehensive practical teaching system for network engineering [1].

2. Analysis of The Current Situation of Practical Teaching System Research

Practical teaching system is an important part of school teaching, is the supplement and extension of classroom teaching, and is also an important means and essential process for students to combine theoretical knowledge with practice.

There are several practical teaching modes in foreign universities [2].

a. Cultivate students' practical ability based on school learning time, learn theoretical knowledge in class, consolidate theoretical knowledge in discussions, improve their ability to analyze and solve problems, and exercise and improve students' practical ability in various extracurricular activities.

b. Strengthen the contact with enterprises, establish a special internship base, and encourage students to start their own businesses.

c. Emphasize internship and regard internship as an important teaching tool. For example, many universities in the United States stipulate that the internship time of students in enterprises should not be less than 6 months, and the internship position must be consistent with their major.

There are many practices of foreign universities worthy of our country's universities, but there are also practices that are not suitable for our country's national conditions, such as our college

students can not suspend their studies for self-employment, in order to complete the course of study at the same time for self-employment is very difficult, most of our enterprises are not willing to accept students to the enterprise internship.

Many domestic universities and scholars have also adopted many ways to reform the practical teaching system.

a. Increase practical links in teaching activities, and cultivate students' hands-on ability through computer experiments and course design. However, most of these practical links are based on a single course, and students lack the ability to solve problems comprehensively. Most of the course design is carried out in groups, but it is basically completed by individual students, and there is a big gap between practice and field practice.

b. Go out for an internship. At present, the internship time of all colleges and universities is short, and the opportunity to participate in practical work is very few, and the internship is mostly just a formality, which is difficult to truly achieve the internship effect and improve the professional quality of students.

c. Establish an internship base. At present, the state has also issued relevant policies to actively promote the construction of college students' practical training bases, in which students can really get job opportunities and gain practical experience. However, due to the special internship base need to charge a certain fee, this is not every student can afford.

According to the actual situation of the school and the existing teaching resources of the school, this paper puts forward the idea of constructing the practical teaching system of the network engineering major, designs the practical teaching system consisting of in-course experiments, on-campus practices and off-campus practices, arranges the practical teaching according to the principle of hierarchical and progressive ability cultivation, and puts forward the hierarchical and progressive practical teaching system.

3. Construction of Network Engineering Professional Practice Teaching System

3.1 Network engineering professional practice teaching system

The major of network engineering belongs to the discipline of computer science and technology, and the students must first have the basic foundation of computer application, and then acquire the professional ability of the related direction of network engineering. The practical teaching system of network engineering specialty should be an organic combination of basic practical teaching, professional practical teaching and comprehensive practical teaching. Through the reform and practice of practical teaching system, network engineering practical teaching will be integrated into the teaching process, forming a scientific and reasonable practical teaching system, giving full play to students' enthusiasm, initiative and creativity, adhering to the principle of thick foundation, multi-direction, strong ability and emphasis on practice, adhering to the requirements of application-oriented talent training mode, adhering to the application-oriented and strengthening the discipline foundation. Emphasize practical ability, cultivate engineering and practical talents.

3.2 The structure of practice teaching system of network engineering specialty

The structure and setting of practical teaching system for network engineering major, the setting of practical courses, can be mainly divided into three categories: in-course experiment, on-campus practice and off-campus practice ^[3], as shown in Figure 1

a. In-course experiments are related experiments conducted in the network teaching laboratory, which is an important part of teaching practice and provides necessary conditions and environment for the implementation of teaching practice. As shown in Figure 1, the experiments in the course include program design experiments, data structure experiments, computer network experiments, network planning and design experiments, network programming experiments, network interconnection technology experiments and other course experiments. In the course of experiment guidance, the teacher introduces the engineering application background related to the experiment,

guides the thinking of analyzing the experiment, and points out the direction of completing the experiment. Under the guidance of teachers, students independently design experimental schemes, explore the completion of experimental methods, and test the feasibility of experiments. Through experiments in the course, students are inspired to solve practical problems and ensure that students master the basic skills they should have.

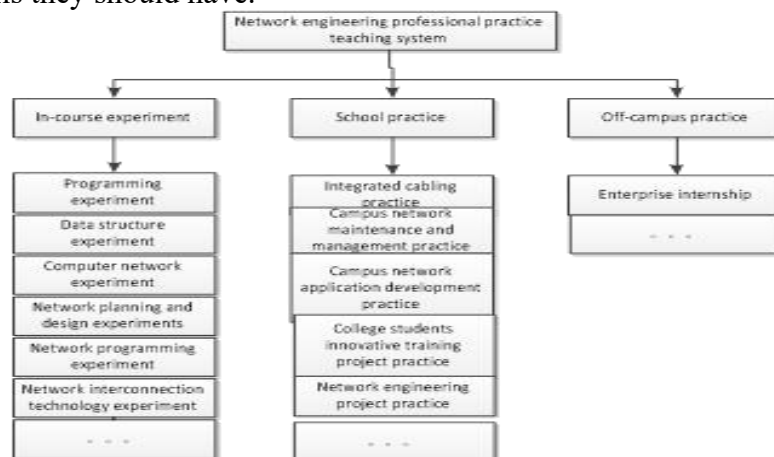


Fig.1 Network engineering professional practice teaching system

b. On-campus practice means to cooperate with the information Technology Center of the school, take the information technology Center as the practice base, carry out the maintenance, management and application of campus network, participate in network engineering projects, and improve students' practical operation ability. Through the internship in the information technology Center, the teacher guides the students to learn how to wire and how to maintain the network and other practical work. Through the practical work, the students can come into contact with a lot of practical network problems, and cultivate the students' ability to combine theory with practice and analyze, research and solve problems from the reality. By participating in network engineering projects, students can develop the habit of budgeting, design, construction, testing, completion and other engineering designs according to the norms. Because the teachers of the Information Technology Center have rich network experience, they can lead students to participate in various network events, as well as various projects such as the innovation training program for college students, and participate in these activities to cultivate the innovation and hands-on ability of network engineering students.

c. Off-campus practice is to cooperate with off-campus enterprises and take off-campus enterprises as the practice base, which can cultivate the professional comprehensive ability of network engineering students.

3.3 Hierarchical and progressive practice teaching system

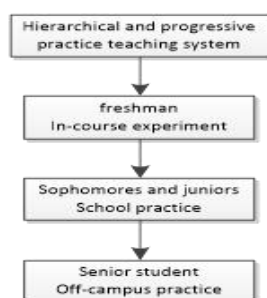


Fig.2. Hierarchical and progressive practice teaching system

The establishment of practical teaching system for network engineering majors breaks the restrictions of the academic year and takes ability training as the main line. From the perspective of time, practical teaching system runs through the four-year undergraduate education of network engineering majors. The practical teaching is arranged according to the principle of hierarchical and progressive ability cultivation. The hierarchical and progressive practical teaching system is shown

in Figure 2. In the first year, the curriculum experiments are mainly conducted to cultivate the basic ability of network engineering major. In the sophomore and junior years of students to carry out campus practice, through practical work to develop professional ability. Conduct off-campus practice in the senior year to cultivate professional comprehensive ability^[4].

3.4 Key issues to be addressed

According to the situation of the school's network engineering major, this paper intends to solve the following key problems:

a. Emphasis on theory and light on practice. In the process of education, colleges and universities lack the cultivation of college students' practical ability, and they do not pay enough attention to the practical links. Students cannot actively solve problems encountered in the practice process, resulting in poor practical ability.

b. Lack of practical teachers. Network engineering is highly practical, and the teachers of professional courses are basically graduates from computer science and technology or communication engineering, and most of the teachers have no experience in network engineering project implementation.

c. Laboratory construction can not meet the requirements. Network engineering requires computer network laboratory, network engineering laboratory, integrated wiring laboratory, network performance testing and analysis laboratory, broadband access network laboratory and other professional laboratories, all of which are built with huge investment, so the school only builds a few major laboratories, and there is a serious shortage of experimental sets and backward experimental equipment. Can not meet the needs of the experiment.

Based on the actual situation of the school and the training needs of network engineering talents, this paper formulates a curriculum system that conforms to the training mode of practical and engineering talents, comprehensively utilizes the resources of the information technology center of the school, takes the information technology center as the practical teaching base for network engineering majors, and cultivates students' practical ability to combine theory with practice. Can effectively solve the above key problems.

4. Summary

At present, we have made some achievements in the construction of the practice system of network engineering major. In view of the strong practical characteristics of network engineering major, we have constructed a practical teaching system composed of in-course experiments, on-campus practices and off-campus practices, arranged practical teaching according to the principle of hierarchical and progressive ability cultivation, and proposed a hierarchical and progressive practical teaching system. Through the construction of this system, it can effectively exercise the practical ability of network engineering students, accumulate experience, consolidate theoretical knowledge, expand students' knowledge, and increase the employment competitiveness of network engineering graduates.

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