Discussion on Curriculum Reform of Data Communication and Exchange

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Abstract. This paper briefly introduces the situation of "data communication and exchange" teaching at home and abroad, points out some problems existing in the teaching work, puts forward the goal of teaching reform, experimental teaching oriented to enhance students' knowledge absorption ability and practical ability, and expounds the concrete measures of teaching reform. Finally, the process of teaching reform is planned.

1 Overview

"Data communication and exchange" course is a professional courses professional network engineering, the audience positioning: never contact switches and other network equipment and the study of low grade students based computer network curriculum, in accordance with the "overall competency based, programming practice as the main line" of the design requirements, mainly to cultivate students' exchange and data communication as the key point, the network engineering module, ability oriented and based on "work to solve practical problems the idea of re constructing the knowledge system of the courses, take the case and task driven mode, combined with the construction of the core mode of inquiry learning content, students should not only grasp the basic principle and design technique of data communication and exchange, and the method should be used and network equipment debugging and testing of the master at least one common type switch device, for the follow-up professional courses Lay a foundation for data communication.

Anhui Information Engineering Institute selects the top-quality courses and teaching courseware of network engineering in major universities in china. The main purpose of the course is to introduce the basic concepts of the two layers VLAN, the concept of the switch and the configuration principle of the switch, and the important features of data communication and exchange: VLAN, STP, VTP and other related content and format. The purpose is to enable students to master the technology of switch configuration a mainstream, to understand the basic concepts of data link layer and method, and then learn to use the network knowledge to solve the general network obstacles, and lay the foundation for subsequent courses in program design. The domestic teaching materials generally specify a textbook, theoretical knowledge courseware in comprehensive and more specific, students can master the relatively solid basic skills, but domestic courseware content is large, small sections of finely divided, basic content than foreign basic content, but the actual application is insufficient. The curriculum is in favor of conceptual contents, such as what is VLAN, what is the access layer and core layer, what is STP, the courseware tend to explain the content, but not too much to explain why and how to practice. And domestic universities are mostly "internetworking with TCP/IP (1)", in 2009 by the publishing house of electronics industry, and most of the domestic reference books are college computer education textbook series, emphasis on theoretical knowledge and basic configuration, which is more suitable for students in school. Compared with the domestic foreign curriculum course content, more innovative, more abundant curriculum, combined with the current popular trend of research and application of re injection, but foreign course content is deeper and the need to have TCP/IP and mathematical foundation is solid, the domestic students, difficult to master.
The domestic university evaluation system by grades, extracurricular practice and theory examination combined assessment methods: course total score = grades (20%) + extracurricular practice (20%) + theory test (final exam 60%). The experimental assessment (curriculum design) requires students to complete project design in groups and submit them in the form of class reports and written reports. A Western University Evaluation System: course total score = (3 of the final project the theory examination scores of final*60%+grades*40%), the activities and project implementation process, encourage cooperation, but the network must be personally designed by ourselves, each problem sets and projects are 100 points, the final course according to weights.

This course, the difference between domestic and foreign evaluation system is the focus of the project evaluation results, but China will still have a paper version of the examination papers as reference, and abroad on whole project implementation process evaluation, pay attention to practical ability.

|                  | domestic                                      | abroad                                      |
|------------------|-----------------------------------------------|---------------------------------------------|
| Classroom teaching + teacher student discussion | Lecture + student discussion                  |
| Class + experiment                                      | Lecture + experiment                         |
| 48 hours + 16 hours                                      | 48 hours + 16 hours                          |

The teaching mode at home and abroad is a combination of teachers' teaching and students' discussion. The majority of domestic students before class are not ready to work. Only some of the new content has the advantages of simple preparation. Some even do not preview work, and the students' knowledge base is relatively weak, often on the courses are unable to grasp the knowledge points, so in the classroom is always passive acceptance of knowledge, so the classroom efficiency is low, the teaching effect is not very ideal. As a result of the process assessment system, students have strong self-discipline and self-learning ability, so they need to read a lot of references before class.

The home generally for a single course or a single chapter arrangement of the experiment content, students treat the attitude of careless, usually of the "one experiment, many people plagiarism phenomenon, often a experimental classes, reported experimental data of a class's repetition rate can be as high as 30%. The foreign experiment design is more difficult, more attention to practical, it is difficult to find ready-made answer.

2 The Existing Problems

By aiming at the "data communication and exchange" course survey found that most of the students despite switches and other courses, but still do not know how to use the network knowledge to design and complete the corresponding project, through the comparison of domestic and foreign textbooks and research papers, we summarize some reason:

The textbooks are too theoretical, and most textbooks contain data communication, because the title is data communication, and most teachers concentrate on grammar teaching rather than concept training. And the textbook always focuses on grammar but ignoring the practical thoughts, cause students memorizing grammar and cannot understand the concept of the phenomenon. Most of the teaching tools stay in multimedia, most of the object oriented courses are only explained by using multimedia, students operate less, which leads to the class can not fully understand the teacher's explanation. The teaching contents in the data link layer network knowledge no specific landing if a specific switch to achieve, often learning effect is not obvious, so for students to find a suitable switch application scenario is very necessary.
Study results are often based on knowledge network is difficult in the actual scene. In the flexible use of most of the students said that even if the teacher kept the grammar knowledge, but because the network design model has no practical support, often the basic knowledge is difficult to understand and grasp, even if the solution of how to use, do not know how to use in the actual project in. Especially in the understanding of STP and VTP, it is difficult to express.

3 Goal of Reform

To enhance the practical ability of students to enable students to achieve the level of small and medium-sized enterprise network administrator, master the configuration method of mainstream network equipment, familiar with the network plan; to enable students to participate in the network project and network obstacles to the actual work to promote learning; update the examination plan, increasing the experimental accounts for the proportion of the assessment, increase the final examination. Let the student carry on network project in the real network environment, assessment of their ability and knowledge conversion ability. In order to avoid the situation of the basic knowledge of data communication and practical application of separation in the domestic most of the courses, courses in teaching content to guide the project as a starting point for students, tailored to a focus on the practical application of knowledge and ability to solve problems with the knowledge content.

3.1. Based on the Problem Solving Knowledge Structure Development Ideas, Grasp the Teaching Materials, Accurate Positioning

This course in the January 2017 by the people's Posts and Telecommunications Publishing House of the "CISCO Networking Academy Program" for teaching materials, the teaching goal is to cultivate students ability to analyze and solve problems; to cultivate students' ability of network construction and the training of students' network project design and modeling ability. The textbook is mainly to cultivate students to establish VLAN exchange concept as the focus, the network engineering module, and based on ability oriented "to solve practical problems of network knowledge model thinking to construct the knowledge system of the courses, take the case and task driven mode, combined with the inquiry mode of constructing the core learning content, use of the mainstream about CISCO switch that is easy to teach and learn and acquire knowledge from problems, strengthen the knowledge from the project.

3.2. Based on Competency Oriented Application Oriented Personnel Training Requires Decomposition and Reasonable Design of Iterative Version of Teaching Cases

This course involves a total of 6 comprehensive case, and the 6 cases of varying degrees of difficulty, from the beginning of the design of the network to the final generation network, each case has a corresponding design model and knowledge, in the process of implementation according to the network demand different learning related to the difficulty of data communication, and the teaching content of the same case different versions of the iterative way to explain, through a case of each version, students can master some basic knowledge to ensure the application and the actual application, this "learning path from simple to complex" gradually evolved, and so that they can more easily the relationship between understanding knowledge. For example, students in the knowledge learned second chapter and the sixth chapter after the completion of the actual design router-on-a-stick, then on the basis of the design, puts forward the demand and function of the new requirements, and on the basis of the analysis of re optimization model based on new requirements, such as with DHCP and NAT network, the last update in the 1 version of the original code. The optimization project is to achieve the same iterative approach to knowledge acquisition and learning.
3.3. Based on the Modular Structure Knowledge Division Designs the Teaching Content Reasonably

Data communication and exchange design is the core basic course of network engineering specialty. With the case characteristic, the course content is divided into three parts. The first part is the design part, mainly for the basic knowledge of network are introduced, and the concept of thinking leads to the data link layer and network layer construction thinking model; the second part experiment, the abstract knowledge model specific, grasp the basic network settings; the third part is to improve, cultivate students' Comprehensive ability of network design. The course consists of 7 chapters. Chapter one, chapter second and chapter third mainly introduce the basic concepts of VLAN and the principle of network layering. The fourth chapter, the fifth and the sixth chapter introduce VTP and STP, and use these two technologies to better assist the design of the network. The seventh chapter describes how to build LAN using wireless technology.

4 Specific Measures

"Data communication and exchange" course closely around the location planning and Training Institute of applied talents, through the construction of information teaching service platform, to further promote the reform of teaching mode, teaching evaluation and resource system, the full implementation of individualized learner centered learning system, the real implementation of the "school-based" teaching mode, as follows the main measures.

4.1. Uses the Network Basic Laboratory to Accomplish the Traditional Transformation of "Teaching" and "Learning"

According to the data communication and exchange of curriculum objectives and learning content, give full consideration to the current industry, industrial core technology and capacity requirements, construction of learning resources and database knowledge framework, which is compatible with the course of knowledge system by experimental teaching. Through the experiment, the guided teaching instead of the traditional lecturer theory, leads the students to establish the network concept. The traditional teaching method, the lecturer for conceptual and grammatical knowledge is often through teaching or PPT traditional teaching mainly to explain the process of teachers often still plays the authority of knowledge possession, transfer, interpretation of the role of the network design of classroom teaching practice focus on language standardization and the case teaching, hope the students through some memory of the more carefully understand students' knowledge, more passive, but more students' questions. The adoption of experimental teaching platform will greatly strengthen the visualization of network knowledge, and make it easier for students to understand the knowledge. Students with autonomous learning through the network lab, can arrange their own study time according to their own learning habit and ability, improve the efficiency of learning, classroom mandatory passive learning to targeted learning. And for different knowledge points, the students can adopt different learning methods.

4.2 Teaching Mode Reform

The course of "data communication and exchange" adopts "teaching + experiment + design" mode of "three in one" teaching mode. And the formation of standardized teaching materials for the model, including: learning guide, personalized lesson plans, implementation plans and experimental resources. This kind of teaching mode in experimental thinking training, knowledge of complementary; Lecturer mainly carries on the design analysis, according to experimental design language and grammar to explain the difficulties; according to the students in the laboratory study and consolidate knowledge. Finally, through the design of the needs analysis, model design to the final network configuration completed, to achieve the entire thinking of innovative training teaching.
4.3 Assessment Model Reform

The results were evaluated by the combination of experimental examination (30%) + network design (20%) + final examination results (50%). The experiment tests 8 sets of questions, the student draws out a set of questions, immediately needs to complete in the laboratory, the willing experiment, completes the effect score. Take the network design network design project, currently the most popular Internet cafes such as: NAT+, MPLS VPN, router-on-a-stick design, wireless metropolitan area network OSPF FIT+AC network design, the students after the completion of the design, according to the practical score. The final exam uses the latest CISCO CCNA, HUAWEI HCDA and the Ministry of industry network administrator similar questions, close to reality.

5 Processing Arrangement

The program has been opened since 2016 and has nearly 100 students. Beginning in June 2016, in view of the orientation and planning of the course, the leaders of the organization and the teachers' team carried out the lecture notes for the course.

In January 2017, he chose the course of "CISCO Network Technology Institute", and in March of the same year, he was formally put into use as a 2015 class student course material.

In September 2014, the lab was officially built with two layer switches, three layer switches, routers, AC, AP and firewalls. In October 2015, complete the syllabus, curriculum planning and documentation of chapter planning. From November 2016 to January 2017, the experimental mode teaching course was established and all the knowledge contents were entered. Including knowledge points, display content, exercises, micro video and other related resources. In January 2017, the laboratory apparatus was further improved, including optical fiber splicer, optical time domain reflectometer, LAN tester and wireless tester. In February 2017, with all the resources, we completed the prototype program after the reform of teaching mode, including the mode of teaching reform, the examination implementation plan, the detailed arrangement of the teaching schedule and so on. At the end of February 2017, the spring semester of grade 15 "data communication and exchange" course and 2016-2017 in our hospital during the first week officially began teaching, teaching time for a period of 16 weeks, each class 3 hours a week, a total of 48 hours of class time. And in the course of teaching, lecturers are still accumulating problems in the process of teaching, and timely summary and summary, for next year's new resource optimization and mode adjustment, preparation.

The expected results for students to master the second layer data link layer of computer network knowledge; network master configuration of two layer switch and LAN; principle and use familiar with CISCO and H3C series switches.

Conclusion

"Data communication and exchange" is an important professional course of network engineering, its purpose is to cultivate students with strong practical ability, this paper expounds the specific objectives and measures of teaching reform of the course, demonstrates the necessity of teaching reform. After teaching reform, the teachers and students' spirit have undergone great changes, especially in the following aspects, such as learning grade, science and technology research and development projects, academic competitions, patents and papers published has greatly improved than before.

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