

## Research and application of inclusive practical teaching for Computer Network Course Designing

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### Abstract

**Computer Network Technology is a core computer course with theory and practice combination. This paper puts forward the reform of the practical teaching reform in the course of the design of computer network course design of computer undergraduate. The use of flip classroom to stratified progressive practice and the whole theory of teaching process integration, to promote the understanding of basic principles of knowledge to absorb. The use of innovative topics such as comprehensive network practice to break the boundaries of the curriculum, focusing on training network thinking and practical ability. In recent years, the implementation of the program shows that the program for students to lay a theoretical foundation to improve the comprehensive application of the ability to play a very positive role.**

### Keywords

**inclusive practical teaching, practice teaching, teaching mode, optimization.**

### 1. Understanding of the teaching mode of CDIO Engineering

A complete computer network teaching should include three aspects: classroom teaching, experiment and curriculum design. Classroom teaching, experiment and curriculum design are mutually reinforcing. Computer network course design as the last part of computer network teaching, in the consolidation of students' theoretical knowledge learning results, exercise students practical ability to play an important role. The purpose of arranging the computer network course design is two, one is to guide the students to abstract the concept of the book and the concrete realization of the technology together to deepen the study; the second is to eliminate the mystery of the students, to mobilize the enthusiasm and initiative of students to learn it<sup>[1]</sup>.

#### 1.1 the integration of inclusive practical teaching reform ideas

The basic idea of the integration of practical teaching reform is to design and implement the dual education goal of knowledge internalization and ability cultivation in a systematic practice. The so-called "fusion" has two meanings: one is to integrate practice with theoretical teaching in this course; Second, break the boundaries of the curriculum, the application of ability to penetrate into the follow-up compulsory links<sup>[2]</sup>.

Specifically, in the process of curriculum teaching, through the design of a series of closely integrated with the theory of teaching, stratified progressive practice tasks, the use of extracurricular completion, flip the form of classroom reports to overcome the lack of experimental problems to promote the digestion and absorption of the principle of knowledge<sup>[3]</sup>.The After the end of the course, the computer network and open experimental and innovative topics such as talent training links, through the design of network-related comprehensive, practical, interesting open topics, to encourage students to apply for innovative issues, to further develop network thinking and Comprehensive practical ability.

#### 1.2 the reform design

(A) for the application of technical personnel practice design

Since the graduation school in 2006, the author has instructed two students to carry on the course design of the computer network. In the process of guiding the course design, the author summarizes the following phenomena and puts forward the countermeasures.

[1] the number of students. In this case, we have grouped the students who participated in the course design. Each group consisted of 3 to 4 students. The course design was only required for the group, but it was required to clarify the number of students in the group. The division of the members. This has not only solved the contradiction between the large number of students and the relative lack of teaching resources, but also played the purpose of exercising every student's ability to participate.

[2] The difference between individuals is large. In order to solve the problem of great differences among the individual students, we made a request on the composition of the group, requiring a group of students with better grades and hands-on ability, but also some poor performance and relatively weak hands. Some of the students, so that through the exchange within the group can jointly improve and common progress.

[3] lazy hands. A considerable number of students do not want to write their own hands when they do the course design, but by searching on the Internet, looking for the relevant program or copying from the previous student's hand. In response to this phenomenon, we have increased the assessment measures and incentives, in the acceptance process not only to see the experiment.

Project 1, simple network programming. This experiment selected a few simple network programs, these network programs or we often use the network command, or network programming in the basic content. By selecting from a few single network of two of them, the purpose is to hope that students understand the basic process of network programming and basic methods, to master the TCP / IP Understand the basic process of network programming and basic methods, to master the basic realization of TCP / IP network protocol, the network implementation mechanism to further understand. This topic can be a few simple procedures can be used C + + network editor. Program package C++ provided in the programming interface to achieve, but because the C + + network package provides a higher level of packaging, shielding the network programming need to deal with the details of the problem, so the use of C + + as the realization of language students need to C + + network Package source code added to the preparation of their own source code, the C ++ network package in the implementation of the relevant code to analyze the details and in the experimental report reflect. HTTP client program, does not require the interpretation of HTML language; port scanning procedures. Echo program design; HTTP client program.

Project 2, Packet Capture and Analysis. The default operating mode of the network card contains the broadcast mode and the direct mode, that is, it only receives the broadcast frame and sends it to its own frame. If you use the mixed mode, a site's network card will receive the same network sent by all the data packets, so you can reach the purpose of monitoring the network information to capture. Ethreal is an open source network packet capture and analysis software, this experiment is installed through the use of Ethreal software to monitor the status of the local area network to capture the data packets transmitted in the LAN, combined with the computer network courses to learn the theoretical knowledge, The commonly used network protocol to analyze the data packet, to deepen the understanding and master the knowledge of online courses.

Project 3, Web server simple design and implementation. This lab requires understanding the working principle of the Web server, designing and implementing a simple Web server, and testing.

Project 4, chat program simple design and implementation. Chat program is often used when the Internet network procedures, the experiment requires a simple chat program to complete the design and implementation.

Project 5, the simple design and implementation of dynamic website. Dynamic website students build a dynamic website, master the site to build the process, programming methods and deployment, operation and other basic skills

(B) student-centered teaching implementation methods

The practice of the various levels of students by the students to complete. For the combination of curriculum content with the analysis of practice, programming practice, requiring students to use spare time to complete the corresponding chapter of the theory of teaching by the students to report, discuss and test the learning effect. Virtual project requires extra-curricular acceptance. Focus on cultivating innovative design capabilities. According to the need under the guidance of the instructor to continue the project.

(C) multi-objective point of practice to evaluate the method

It is one of the difficulties to evaluate the practice. We use the task report, task operations, experiments and other objectives of the evaluation mechanism to evaluate the effectiveness of different aspects of practice: First of all, in line with the theory of teaching and analysis of the practice of practice and programming practice, requiring all students with spare time first Complete the task tasks, and then use the flip classroom time to specify the students to carry out the task report and group discussion. Teachers on-site evaluation of the subject report and give the results, assessment criteria, including content organization, view statement, PPT beautiful and Q & A interaction and other four aspects, grade is divided into excellent, good, medium and poor. The completion of other student subjects by the teacher to modify the students submitted to the subject job assessment results. Second, for the virtual experiment, the use of experimental machine inspection and acceptance, the students can submit an experimental report, according to the assessment results. In addition, for the ability to expand the open experimental and innovative topics, the college requires that each student graduation design must be completed before the opening, they can choose to provide by the laboratory.

## 2. Teaching process design

### 2.1 Course content design

Computer network comprehensive training course is to reinforce the students computer network technology foundation, cultivate network application talents, improve the professional quality of a pure training course, how to arrange and design the content of training is particularly important. The author tries to select the typical work item according to the social demand and the job demand in the course content, and integrates with the theoretical course knowledge. Through the integration of theory and practice teaching and flexible teaching methods and assessment methods, the vocational quality education runs through the whole Teaching process.

Computer network course design is a university computer professional a professional basic course. Therefore, the computer network technology courses to use the "three fusion" teaching model, the theory of teaching and practice of the application are in the laboratory or computer room together to complete, focusing on the combination of theory and practice and the combination of school and enterprise.

(A) teaching content

According to the "three fusion" teaching model features, in the preparation of teaching materials should also reflect this model. First of all, each chapter should first introduce the knowledge points taught in the community or after the application of the field, to do a knowledge of the social survey. Then, while teaching the theoretical point of knowledge, while the students contact the actual hardware or watch the simulation of the demo to deepen the understanding of repetitive theoretical knowledge, and then complete a chapter of the experiment, the experimental content must be the real practice of social content. Finally, summarize the knowledge points taught in this chapter and the practical application in society. After all the chapters are taught, a comprehensive experiment is designed to design a comprehensive experiment on the knowledge points and experimental content applied in each chapter. Teachers in teaching courses, consciously guide students to the community, to the market, understand the enterprise, understand the needs. Students on the basis of social survey, to learn the content of a perceptual knowledge, back to the classroom through theoretical learning and practice teaching a combination of sensibility to rise to rational knowledge, and then through social

practice experimental learning, will rational Understanding and emotional understanding of organic combination. Practice part of the teaching content to each chapter of the small experiment as the basis, the final comprehensive experimental requirements cover the knowledge of each chapter, integrated pud test can be designed for the future of the relevant training courses, as well as follow-up courses to do experiments bedding. Each student can choose a large topic, based on a comprehensive computer network technology experiments, after the training content are based on this comprehensive experiment to build, can be the basis for graduation design. Second, the teacher can be based on student learning and practical ability to lead students to participate in science and technology group, organize students to do some of the actual business projects, enhance students' practical ability.

#### (B) teaching methods

The teaching practice should highlight the cultivation of students 'comprehensive practical ability. The experiment is the most basic part of cultivating students' "application" ability, which influences the achievement of "application". Therefore, in the experimental teaching model should pay attention to the experimental project to increase the skills, design and comprehensive experiments, while reducing the verification test, cancel the unnecessary demonstration of the experiment.

In the course of the experiment, teachers should play a leading role, abandon the traditional "hand" type of teaching methods, from the point of view to guide students to solve the problem of targeted guidance, give full play to the main role of students, encourage students to refer to teaching materials, online help And to discuss each other to complete the provisions of the experimental tasks; experimental lessons in addition to the experimental report, but also requires students to write experimental summary and experience in order to help students to strengthen the summary and continuously improve. Training is to guide students to think and solve the problem of independent thinking, is the cultivation of students' creativity, so that students in technology and ability to have a greater improvement. Combined with theoretical and experimental teaching content, focus on one to two weeks under the guidance of specialized teachers to carry out training for a particular course of specialized skills training. Such as the installation of LAN operating system, configure the local area network, etc., from the perspective of practical application of students' engineering awareness, to play the advantages of teachers practice experience, so that students solve the practical application of abstract problems, a better understanding of network theory The The combination of the use of case studies, field visits, on-site teaching, demonstration teaching, physical teaching, training, comprehensive skills training, curriculum design and other means, combined with the characteristics of strong network practice, the theory combined with the actual, students to develop practical ability to improve teaching quality. For example, in teaching the network topology, the students to the campus network or other on-site teaching, so that students see the bus, star network networking, deepen the impression. In addition to the classroom, combined with the field visit to complete the computer network curriculum design, so that the final learning and the actual environment combined to achieve the teaching of teaching objectives.

Heuristic teaching methods Briefly speaking, teachers are not directly to the ready-made knowledge to students, but to guide students to independently find the corresponding results of teaching methods. The key to heuristic teaching is to effectively inspire the minds of the students and to activate the students' thinking. In the course of teaching, the teacher puts forward a learning problem, guides the students to solve it, and obtains the experience of solving the problem. Then the teacher will raise some questions related to the above questions The problem further guide, and gradually solve, thus forming the overall experience. Heuristic teaching ideas against the kind of "full house irrigation", "spoon-fed" teaching methods, emphasizing the strengthening of teachers and students, communication between students, the formation of a different view, different ways of thinking teaching atmosphere, to encourage students Positive thinking, dare to ask questions, be good at asking questions, to achieve better teaching results, and promote the cultivation of students' innovative spirit, so as to enhance the innovative skills.

## **2.2 teaching model design**

At present, the vast majority of teachers in the teaching process, are used in the "spoon-fed" teaching methods and "two lines" teaching mode. The so-called "spoon-fed" teaching methods, refers to the teachers in the classroom teaching around the teaching materials, are basically teachers, students listen to the model, is a teacher-based teaching model. "Two-point line" teaching model, refers to the teacher in teaching computer professional theory, students in the laboratory or computer room to complete the skills training or verification theory. This kind of teaching method and mode is feasible for colleges and universities mainly based on examination-oriented education. To accomplish this task.

## **3. The Significance of Teaching Application of Fusion Teaching in Computer Network Course Designing**

### **3.1 to encourage students to self-study**

The rapid development of the network, for the network learning and mobile learning has brought great convenience, fast. In the way of learning, the network teaching allows students to freely arrange their learning content and progress according to their own time, and can effectively carry out the pre-learning practice. You can also use the network course to expand the resources to expand the knowledge space. Learning content, you can also use online courses for tutorials; in the learning content, online courses rich in content, learning choice, in addition to the content, there are ways to expand knowledge, similar courses outside the network courses and other resources.

### **3.2 more full interaction between teachers and students**

Students in the spare time through the online course of study, completed a new course of knowledge learning, network course study period, teaching level

Taiwan has a special interactive area, students ask questions, teachers answer, or to discuss a problem, QQ, WeChat, easy letter and other means of communication, teachers and students can communicate, life and life provides a very convenient channel; In addition, the network teaching platform also provides a place for students to take notes, in the course of learning, students can take notes on a question, for the follow-up study to provide a reference; can also be in the course of the operation to discuss and exchange. In this way, the teacher in the classroom teaching has become part of the classroom, more teachers and students, between life and life interaction, including Q & A, practical exercise.

### **3.3 to improve the overall quality of students**

Through the teaching mode of innovation, project orientation, case teaching and so on in the teaching process of use, through more counseling and practice, is no longer the traditional spoon-fed teaching and learning, fully stimulate the students' innovation, so that students can not only Master the course of knowledge, basic theory, basic skills, but also improve self-learning ability, hands-on ability, innovation ability, so as to achieve better teaching results.

### **3.4 to promote the professional development of teachers**

The rapid development of the Internet, the extensive application of information technology, affecting people's learning habits, teaching habits, as teachers,

How to improve the quality of their own ability at the same time, to help and guide students to face and adapt to this change, education science has become an urgent problem to be solved. As a designer of the course, the gatekeeper, make full use of the convenience of information technology, can learn the national and the world's excellent teaching resources, teachers through the observation of learning, to promote professional development at the same time, you can also design and develop a school teaching resources.

#### 4. CONCLUSION

Computer network is a very theoretical and practical disciplines, requiring teachers to talk about the basic theory at the same time, should be combined with practical teaching, and "three fusion" teaching model, in line with this teaching philosophy, is the professional ability to Ben, to the needs of enterprises as the basic basis to employment-oriented, to adapt to the principle of industrial technology development. This kind of computer network teaching mode, through the practice of teaching exploration, and achieved some results, but still need to further explore and improve.

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