

The Exploration of Research and Practice on Blended Learning Mode Based on “Internet +”

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Abstract—In the era of rapid development of information technology, the progress of internet technology changes with each new day, undergraduate teaching should keep pace with the times. This paper is concerned with the exploration of undergraduate teaching of computer network in the era of “Internet +”. The blended learning mode, combined the new internet technologies into design of teaching contents, teaching methods, evaluation modes and practical teaching, is studied and explored in many areas based on the starting point of emphasizing both theory and practice. The results show that the blended learning mode can engage students actively in learning process, and get good teaching results.

Keywords—Internet+; blended learning mode; computer network; undergraduate teaching

I. INTRODUCTION

The blended learning mode, which originated from the emote education and training, has brought the profound influence to the traditional classroom teaching in recent years[1-3]. By combining traditional face-to-face teaching and online learning, the blended learning mode not only plays a controlling role in teaching process such as teacher's guidance, inspiration and monitoring, and so on, but also fully reflects students' enthusiasm, initiative and creativity in teaching practice. In 2015, the “Internet +” first appeared in the government work report, and its aim is to apply internet technology to various industries, including education field, and put them together, thus explore new industrial forms[4, 5]. The rapid development of “Internet +” has brought new opportunities and challenges to the traditional college education, which must be reformed. How to integrate Internet with education has become one of the latest research hotspots[6-8]. This paper investigated the blended learning mode by combining the new internet technologies into all aspects of the computer network course teaching.

II. THE PROBLEM OF TRADITIONAL COMPUTER NETWORK COURSE TEACHING

A. The change of student's personality

With the development of our society and continuous scale expansion of higher education, contemporary college students are only children and they have strong personality. However, the teachers play a dominant role and students are merely

passive listeners in the traditional classroom teaching. Consequently, it arises unsuitability, and the current teaching effect is clearly not ideal, thus the reform of teaching methods is of real importance.

B. The internal characteristic of the computer network course

As a closely integration of computer technology and communication technology, computer network is one of important trends of computer development, and also is a comprehensive subject with rapid development and wide application in the information society. The computer network course is based on the computer network system hierarchy, and introduces systematically and hierarchically its basic concept and working principle. The students often have great difficulty in understanding because of obvious logicity, system and many basic concepts in the computer network. Meanwhile, computer network is a comprehensive disciplines, it involves communication technology and computer technology, and is strong theoretical, and increases the difficulty of learning. With the rapid development of information technology, computer network plays a major role in the field of mobile communication and Internet of Things. But in the traditional teaching process, there is little knowledge about new technology and application, and the course content gives priority to basic theory, the knowledge system is relatively backward.

C. The weakness of experiments

The computer network course takes the basic concept and theory while lightly the experiments in the traditional instructional model. There are many experiments in computer network course, such as the various server configurations, local area network (LAN) technology and network composing experiment, virtual local area network (VLAN) technology, network protocol analysis, and so on. In this project, experiments practice is strengthened to ensure that students get more opportunities to practice, the combination of theory and practice is beneficial to motivate the study enthusiasm and creativity of students.

D. The influence of mobile intelligent terminal on classroom teaching

As new information dissemination, mobile phones are used in various aspects of college students' life. While there exists

much malpractice, such as, students in the classroom usually give way to the temptation of mobile, thus talk on the phone, send text messages, browse the Web, play games, and so on. These have seriously affected the formal teaching order and effect[11]. Hence, it is necessary that how to guide the students to respect teachers, standardize mobile phone use, and how to encourage mobile phones as educational aids, and take full advantage of the power of mobile intelligent terminal. These can trigger the students' interest for study, promote the teacher-student interaction, consequently, mobile intelligent terminal can service for students' study and life better.

III. THE EXPLORATION OF RESEARCH AND PRACTICE ON THE TEACHING MODE OF COMPUTER NETWORK COURSE BASED ON "INTERNET +"

A. Constructing appropriate teaching system for students

There are many available teaching materials for computer network in all kinds of colleges, but it is basically similar in content. Computer network (6th Edition), compiled by professor Xiren Xie, is used in this project. The textbook is

used by dozens of universities, and is selected as a nationally planned textbook for the ministry of industry and information technology and twelfth five-year. The knowledge system of computer network course, which is adapted with the students' development in our school and matched the times, is constructed by combining the textbook content and current mainstream technology, and combining computer network technology and Internet of Things technology, cloud computing and and big data technology. The composition of curriculum knowledge system is shown in the TABEL I.

B. Designing of appropriate course evaluation system

In order to encourage students to study actively, and guide students' learning behavior actively, the appropriate course evaluation system is designed in this project. Based on student's needs, many evaluation indexes, such as, the frequency and quality of answering questions in the class, students' hands-on ability and participation in practical teaching, the overall condition of students' completion of homework, the record of attendance and the score of examination are incorporated into the comprehensive evaluation system of student performance, as defined in TABLE II.

TABLE I. THE COMPOSITION OF CURRICULUM KNOWLEDGE SYSTEM

OSI architecture	TCP/IP architecture	Protocol architecture with five layer in teaching	Main content	Teaching method
Application layer Presentation layer	Application layer	Application layer	1) File Transfer Protocol (FTP) 2) Dynamic Host Configuration Protocol (DHCP) 3) World Wide Web (WWW) 4) E-mail protocol 5) Domain Name System (DNS) 6) Internet of Thing, cloud computing	Combined with the current mainstream technology and practical application, such as, some network service, and Internet of Things technology, the working principle of each application layer protocol is introduced.
Session layer				
Transport layer	Transport layer	Transport layer	1) Basic concept of transport layer 2) User Datagram Protocol (UDP) 3) Transmission Control Protocol (TCP) 4) Traffic control, congestion control	With the cases of the communication system or postal system, the contents are introduced.
Network layer	Network layer	Network layer	1) Basic concept of network layer 2) Internet Protocol (IP) 3) Internet Control Messages Protocol (ICMP) 4) Address Resolution Protocol (ARP) 5) Routing protocol 6) IP multicast, mobile IP 7) IPv6	The students' understanding about routing protocol, switch and router is strengthened through case with related experiment, e.g. ARP experiment and IP address configuration.
Data link layer	Network interface layer	Data link layer	1) Three basic problems in data link layer 2) Point-to-point channel 3) Broadcast channel 4) Working principle of bridge and switch 5) Ethernet and wireless LAN	Divide students into groups, decompose knowledge points of data link layer and assign them to each group. Meanwhile, LAN networking experiment can be introduced
Physical layer		Physical layer	1) Function of physical layer 2) Data communication foundation 3) Transmission medium 4) Channel multiplexing 5) Network access technology	This content is strong theoretical. The comprehensive wiring experiment can be carried after theoretical class, which can strengthen students' understanding of the transmission media.

C. Building an online classroom teaching platform based on exam cool

The exam cool network teaching platform is designed for the network examination teaching, and it also has the management function of classroom teaching and students. On

this platform, it reflects the teaching ideas about learning. The learning is process and visual, and is more conducive to clear learning objectives, build knowledge systems. Modularization and datamation of teacher teaching is conducive to efficient teaching management. The basic process is as shown in Fig. 1.

TABLE II. THE EVALUATION SYSTEM OF COMPUTER NETWORK

Evaluation Indexes	Performance in Class				Final
	Participation	Practice	Assignments	Attendance	
proportion	10%	20%	10%	10%	50%

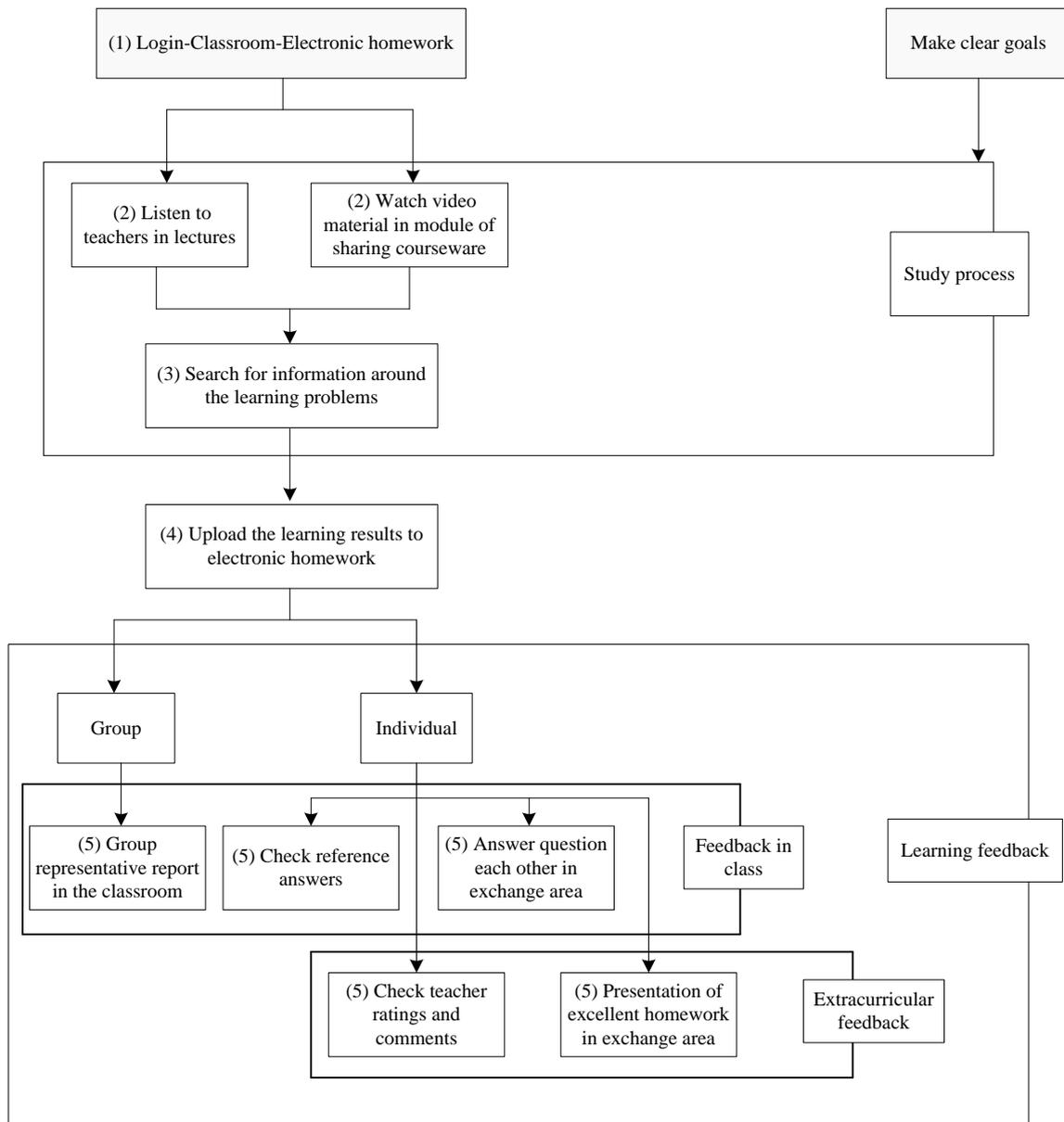


Fig. 1. The construction of online classroom teaching platform based on exam cool.

At the same time, in the experiment and practice teaching, the teacher can edit the experimental steps, experimental requirements and results into electronic homework, and pass

into cool exam, and then students can preview through the mobile phone. Students can conduct experiments according to the requirements of electronic homework, and submit the

results into the exam cool platform after filling in the experimental results by mobile phone, then, the teacher grade and assess the experiment reports.

D. Strengthen the experimental teaching

By increasing the experimental content and students' practice opportunities, it can motivate the study enthusiasm, and achieve the teaching goal of integrating theory with practice. For example, in the experiment of RJ-45 Ethernet interface connection, the students complete the connection with twisted-pair lines, and complete the configuration of network equipment by themselves, complete network engineering project experiments as a team. These experiments can increase students' interest. At the same time, we have built a comprehensive wiring laboratory for network engineering, in which students can really integrate theory knowledge with practice, such as, structure observation on twisted-pair lines, optical fiber fusion welding, switch configuration, router configuration, and other experimental content closely combining with theoretical courses.

E. The blending of mobile intelligent terminal and "Internet +" in teaching

The exam cool application can be used in smart phones. The integration of smart phones with the internet technology can break the traditional learning limit of time and space, and it is more advantageous to students outside the classroom for autonomous learning, and the classroom becomes a communication platform between teachers and students. This platform is mainly used for discussions, presentation. It is good for students to increase their ability of raising question, analyzing question and solving question.

IV. SUMMARY

By introducing the concept of "Internet +" into the classroom, the project explore blended learning mode, and explore that how to cultivate students' autonomous learning ability and practice ability. From three aspects, including knowledge architecture, teaching mode and course evaluation system, the teaching mode of computer network is expored. The practice results show that the students can actively

participate in the study, change the passive learning into the active learning, and obtain good teaching effect.

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