The Development of Online Innovative Education Program In Our University

Hu Wei-hua, Du Jiang-tao, Zhou Qi-li, Hong Dao-ping, Wu Xiao-kai
School of Computing
Hangzhou Dianzi University (HDU)
Hangzhou, Zhejiang Province, China
E-mail: wh-h, djt518, zql, hdp, wxk@hdu.edu.cn

Abstract—Grants are offered for faculty to develop technology courseware projects in universities including Hangzhou Dianzi University (HDU). One of the important factors in courseware development is innovation. Approaches to strengthen innovation are used in the courseware project in Computer School of HDU. The project is aimed at reaching the most students per Chinese Yuan spent. Seminar courses are directed toward large interactive lectures courses through Internet and information technology.

Keywords-faculty; courseware; development; seminar

I. INTRODUCTION

Global student numbers will reach 160 million by 2025 [5]. The conventional classroom-based approaches of teaching and learning will not meet the escalating demand for higher education in the knowledge society. Hangzhou Dianzi University (HDU) is a medium-size university in China and has 25000 undergraduates now.

Massachusetts Institute of Technology (MIT) has published 1900 courses till Nov 2009 [1]. The development of the open courseware degree implies support for an open curriculum where students have the flexibility to select a range of individual units/courses to suit their personal needs for the development of expertise. Plenty of MIT courseware have traditional and simplified Chinese version. Competitive grants have been provided for faculty-developed technology courseware projects in China universities.

The development of Internet and information technology has greatly affected human life as well as education. Educational mechanism will greatly expand because of globalization and online education environment. Traditional one-way transmission and guidance from teacher to student mode, and passive study come to a stop. The IT technology brings life and work into rapid change. Study becomes two-way mode. It relies on interactive learning and teamwork. The Internet is extended to classrooms. The future education is student-centered learning methods, and focused more on information obtaining and problem solving. By using the Internet, learning is not limited by space, time, speed, distance.

Teaching innovation refers to approaches that effectively transform teaching, learning, and the organizations that support these activities. Courseware is the changing nature of student learning as a direct result of networked information technology [2]. Research shows that interactive and database-driven courseware is more innovative than course web sites. Multimedia technology in courseware made that courseware more innovative than one that provides students with the ability to interact with technology [8]. Successful innovation is based on diversity, on opportunity grasping, and especially on mobilizing creativity among people who are willing to run with a brilliant idea, even if it is still flawed and underdeveloped [7].

Fullan [3] bridged the gap between differing pedagogies within institutions and their often conflicting political, social, and financial factors. Such pedagogical models have taken on renewed urgency as a result of the ubiquitous computing initiatives implemented on college and university campuses [6] and the changing nature of student learning as a direct result of networked information technology [2]. Hannan and Silver [4] have attempted to understand educational technology innovations from the perspective of the educators, as well as how environment impacts the design and assimilation of innovations. Their two-phase, three-year study of 16 institutions of higher education in Great Britain suggested that innovation is directly tied to the next factors: how various community members interpret an institution’s culture; the level of discord within that culture; how innovations are received over a period of time.

Enhancing students’ learning effects improves teaching quality. It is necessary not only creating a good learning environment, but also other building auxiliary and additional teaching. The reasonable requirements, successful online learning education structure and excellent students learning environment promote the students learning effects.

The biggest influence of Internet technology on schools is the source of knowledge, from inside the school to expand the world's information received knowledge acquisition, no longer confined to learning mode. The establishment of the learning website lets the student to absorb knowledge not only from class teachers, but also all teachers, even all scholars and experts. The whole world becomes the biggest classroom of unlimited learning and communication through networks.

II. SYSTEM ANALYSIS

In software technology, graphics are expressed with essential knowledge transfer software. For example, in different stages of software development, users and programmers often use graphics to design and construct the
communication of software. It is often used in programming language teaching that the code execution and memory dynamic change are expressed in graphics. The software developing knowledge is expressed by means of graphics because codes and graphs can be tightly organized, although they are in different documents. Software design is not only program writing, but also the design and consistency maintenance of graphics that represent codes. It is a tedious and time-consuming work. But software or programming language teachers often show the difficult coding with the help and explanation of processes and memory status chart.

A. Online Tuition System

Teachers plan and manage courses and course constructions through the Internet. The theme of the course can be set. Teaching activities such as lecture, test, self-learning assisting guidelines, opinion exchange, topic discussion are supported in online system.

Homework solutions are sought in public or private manner. System provides students to participate courses by personal account. The personal data of ordinary users are accessed via the same homepage. Director can understand requirements of each student and establish a friendly learning environment to improve teaching effects. Teachers and students use self-evaluation with additional evaluation tool to improve learning effect.

Students can not only use the learning mode, but also contribute teachers with feedbacks and suggestions. Not only learning from one teacher, but also learn from teachers with interactive mode. It is centered by students and active instead of passive exploration are encouraged. The courseware contents integrate new information technology with school textbooks. Students and teachers can participate together the new teaching mode.

Students can not only use this system for learning, but also for provisions, cooperation and high efficiency through this mechanism. The educational resources of university can be accumulated by managing this online system, because it attracts and enroll more students or even non-students because of their great interest and with inheritance. Good courseware has easy systematic management and integrates various multimedia resources. It is not only top-down transmission of knowledge, but also provides horizontal communication among students, encourages collaboration.

System’s network courseware is accessible anywhere with Internet connection 24 hours a day, 7 days a week. This system, not only the role is to help students, teachers can help more effective become all classes of individual students guidance. This system also have the purpose to provide the teacher fully Internet learning condition of students and tutorial information, make suggestions to help students quickly teachers write programs to solve the problems encountered by students. Students feel like there is an exclusive teacher especially for him/her. One traditional teacher can only teach dozens of students in a class with passive learning mode, the system is used by lots of more students in active learning process, and each student gets more individualized instructions.

System architecture and Web design will affect students' learning. Being able to browse online textbooks or attending visual class is not the most important. It is important that system provides interaction mechanism between teachers and students in every course such as online discussion and online assessment. The interaction teaching activities are carried out smoothly no matter geographically near or far away. Online teaching mainly uses asynchronous teaching methods. Teachers compile textbooks for learners’ learning online multimedia teaching, or synchronize recorded teaching audio and video for learners. It is an important index how network interactive teaching is achieved in Internet education. The courseware is planned with two kinds of online discussion interaction modes, BBS and group chat room.

B. Learning Community Online

In order to establish friendly online learning environment, besides related hardware construction, more work should be done to combine interaction and communication functions in network learning community planning. Everyone has their professional knowledge and skills, through a virtual learning community experts can teach in a learning environment with communication, discussion, interactively finding solutions to problems, and building up information communication channels and knowledge construction system between experts and students. Internet community has similar interests. They actively build trust and develop interactive characteristics. Standard learning community exchanges design tools timely. Two forms of communication tools are designed to promote communications.

C. Online Assessment

Learning evaluation is important in education. Teachers' evaluation focuses on teachers for online teaching participation and interactive online statistic and evaluation. Students' evaluation is to assess online learning achievements. Online education needs some online exams. Students make use of designed question-set and use random sampling to automatically form exam-sheets. It offers different subject tests with students' learning outcomes. To get reliable assessing is always a problem of online learning. Although planning system of evaluation function of student online, it can be the target for repair or counseling, students' learning achievements of teaching are reflected in the normal teaching specific learning evaluation. Considering further development the Internet, data signature and physical authentications such as fingerprint or face recognition technology should be used in the system.

D. Multimedia Teaching Environment

In courseware-on-demand components, students can access rich CAI multi-media teaching software according to their interest in the course. It stores multicasting system into digital archives, and combines with other multimedia tools of image and sound system and related photography, scanning video, hardware tools. Future system building should consider realistic 3-dimension virtual environment in order to raise usability.
III. SYSTEM DESIGN AND IMPLEMENTATION

A. Architecture

System resources include courseware, customer resources, and storage resources. Resource management includes storage, organization, and using of the resources. Resource storage and organization have direct influence on system's performance and user convenience. Management is responsible for resource usage, modification, deletion, access and access control. It includes the online teaching system and the main application of supporting system.

Master/slave multimedia network teaching system is a relatively independent system. It realizes virtual teaching classroom, teachers and students can two-way interact in lecture classroom through any network terminal real-time. The content of the class can be stored as multimedia courseware for real-time usage. User management system is responsible for user authentication and management. It is the foundation of other management systems. User management system contains personal virtual network space. Courseware management is responsible for installation and unloading. It provides searching and browsing. Users can access any part of the courseware with browser. Network examination subsystem is responsible for examination management, including examination sheets generating, score marking, and examination management. Network examination system provides adaptive self-test online, and offers large volume of various forms of examination.

User application layer provides support of system application functions, related resources organization and services. It coordinates applications to the supporting system, provides effective services according to user's needs, ensures platform available for various applications and customers. The lecturing classroom on the application platform uses the embodiment of courseware management system, courseware, examination system, user management system as the foundation. It provides teaching management personnel of unified platform. The system is mainly expressed in layers of user interfaces. It usually uses Web page to provide users with a convenient, practical human-computer interface.

B. Module Design

General network interactive module is the most commonly used online communication applications, such as discussion forum, chatroom, and so forth. These procedures play important roles in teaching and are the basis of interactive online platform. Basic service module is to provide services to other application modules. User authentication is an example that almost all application modules invoke the service module. Application support module is direct service to users of all kinds of application system, such as the test, test platform, courseware management, and so on. Integrated application of network teaching platform, and integration of various modules are reflected in the classroom application platform. Different typical activities such as the teaching, learning and interactions of teachers and students are achieved via online classrooms.

Website as a virtual school: The website acts as an ordinary school, therefore it includes ordinary school affairs.

Bulletin board is created for teachers to publish teaching information. It includes curriculum, teaching progress, course plan, multimedia courseware, lecturing information, attendance polling, projects, coursework, tests and exams, and so forth. Students hand in their coursework solutions, get coursework judge or scores via network.

Primary teaching contents are released via the site, it is easy for students to preview or review contents, or to self-teach systematically according to teacher’s course plan. Experiments are especially well prepared by students in this way by browsing experiment requirements. Exercise database management allows teachers to publish homework and tests according to the actual process of courses. The home page of online education site of the project is shown in Figure 1.

Figure 1. Home page of online education site.

Lecture notes or textbook editor: It helps to design multimedia teaching material. It supports and cooperates with the way editing practice teaching, making the program with test data, etc. The answers with multimedia system integration system must provide very simple materials and tools, let teachers without computers and related technical knowledge can use this tool. Teachers can use the compilation and teaching online.

Implementing community: Teachers and students in virtual classroom can share, cooperate, discuss problems and seek solutions. System can provide solutions to problems of teachers and students in teachers' suggestion options to select the most suitable option, through the Internet can send quick question of students. Teachers can use the artificial way, will solve the problem of advice and tips, input system and to
students. The system can accumulate knowledge and increase its error and the ability to provide tips, toward the goal of automatic system becomes.

Students to learn after landing, the community with other students or teachers exchange their learning experiences and doubt. Two online real-time discussion modes are provided: one-to-one private conversation, and public speaking. The latter fits to advice or solution to common problem because it is visible to all online attendants.

Administration: Students’ completed homework and other assignments, answers to tests are submitted to the site by students. Students check review, scores or even attendance in the system. The school rolls and curriculum administration are managed this way. Students make selection on various optional courses. The system let students themselves to make schedule/timetable before the deadline. A fair and unbiased evaluation system sums up various tests to update curriculum status and credit certification.

Using the Internet and Internet users to interact with the program flow, simplifying design analysis and code written procedure, also let programmers can regularly maintenance modification of the code. Features are programmers can use graphics on behalf of the user interaction with steps, edit the node of the nodes in the code. Work in web design and programming, courseware development will be continued. The cumulative experiences will be highly appreciated. The interaction and uniting principles into coding can help beginners in programming and support teachers in the visual design of computing and programming research.

C. Implementation

Courseware consists of front end and back side. The front end provides user interface, the back side is error handling and processes handling. The teacher interface offers the selection of functions such as editing, assigning exercise, replying message, and so forth. The teacher in the selection, released after the group exercises topic for students to start system. System in the program compiled or students, after several suggestions for teachers in response to provide teachers with options, reply to the students. If there is no suitable reply message in the system to some question, teacher is given chance to start search engine and edit new reply message. The new message is then added to system as well as sent to the student who asked this question. The purpose is to deposit system in the continuous increase of value with teaching system to provide information of fault detection. The information can be promoted to other colleges and universities because the topics are known. Not only in Chinese but also a bilingual website is built to increase the usability and significance of educational courseware. The approach may occur in various stages of development. When students develop program it continues to be collected by the teaching system. The system is continued being improved to provide more information in education.

The functions of student-users’ interface include receiving exercises, program uploading, message receiving and replying. Students from students user interface to receive the teacher select start after exercises. Programmers after completion of the user interface through a student to the server. After the server and the teacher select to reply message server information, reply to students, and by the student user interface to show students receiving. The back side server offers error handling and prompt treatment. When a student delivers server his program, server compiles the program by error check. If there is mistake, the reason of mistake is suggested with grammar error messages and feedback is sent back to user via interface. If there are no mistake, logic errors is diagnosed. The program is executed with case parameters previous stocked in the library. If the expected results with the same logic, that should be correct. If correct, the logical structure and check student program structure of right answers, if not a teacher again as shown by screening for another feasible solution. The feasible solution to the question is added to database. On the other hand, if the logic is incorrect, the system compares student program structure to the correct structure, and finds the difference between them. The found difference is passed over to teacher’s interface for reference. If it impossible to locate such difference, it will prompt teacher to write reply message and tuitions and store the correcting advice in database.

IV. CONCLUSIONS

Online tuition system makes use of the Internet and information technology. Innovative courseware is targeted in the design of the project in Computer School of HDU. Multimedia education environment is achieved, many online teaching, learning and communication function are implemented. Architecture and modules are designed, website is built and well administrated. The visual simulation school is in similar way of a realistic school.

ACKNOWLEDGMENT

The authors would like to thank an educational fund/grant, and the grant is Nation-Level Computer Courses Teaching Faculty.

REFERENCES