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Development Status of Computer Experiment Assisted Teaching in Colleges and Universities and its Urgent

Stefa Zwig, Has Kesen

Technical University of Munich, Germany

Abstract: This paper explores the evolving role of computer experiment-assisted teaching in higher education, focusing on the development and challenges faced in China's college systems. It examines the characteristics that distinguish computer lab-assisted instruction from traditional methods, including its operational and practical applications that significantly contribute to the cultivation of application-oriented talents. By analyzing the current status, the paper identifies several pressing issues such as poor management of online assignments, inadequate security measures, and limited system functionality which hinder the effectiveness of computer-assisted teaching environments. Proposed solutions emphasize a systematic, scalable, and teaching-focused design for computer-assisted teaching systems, aiming to enhance the educational experience and operational efficiency. The paper concludes by discussing the implications of integrating advanced technologies in computer labs to expand learning opportunities and improve resource utilization.

Keywords: Colleges and Universities; Computer Labs; Aided Teaching and Learning.

1. Introduction

Computer laboratory teaching throughout the college teaching practice activities, is an important part of teaching practice, computer laboratory teaching with its operational, practical and verification of the cultivation of application-oriented talents has a very important role. With the development of China's computer technology and network platform, computer applications have changed from the traditional stand-alone operation to a network platform based on the server and client mode, at the same time, the university computer laboratory teaching is also facing teaching reform and development. In this paper, we start from the characteristics of computer laboratory teaching courses, describe the development status of computer laboratory teaching in colleges and universities in China and the current problems that need to be solved, and explore the corresponding solutions.

2. Characteristics of Computer Lab-assisted Instruction in Higher Education

Compared with other courses, computer experimental teaching has the following characteristics: (1) The computer platform can be used to complete the experimental tasks arranged by the teacher in the experimental process. (2) The electronic file form of the laboratory report is convenient and fast. (3) Each student's question can be answered through the computerized platform, and the same question can be answered only once, saving more time for counseling other students.

(4) It is easier for the experiment teacher to correct and count the students' experimental assignments and grades. (5) The computer management personnel can protect the students' individual data through the program, to prevent students from destroying the system unintentionally and intentionally, which will affect the normal progress of the experiment. (6) Teachers can control the operation of students through computer-aided software to control the progress of experiments and ensure the successful completion of experimental tasks.

3. The Current Status of the Development of Computerized Laboratory-Assisted Teaching in Higher Education

At present, the domestic research on computerized experimental teaching system mainly has the following two aspects: one aspect is based on the computer network platform for experimental teaching system, research on how to remote monitoring of some meters, instruments, so as to provide the experimenter with the use of equipment regardless of the location and time.

On the other hand, based on the simulation of the experimental teaching system, research on how to utilize the computer program and the network to conduct experiments and simulate the results of experiments, and how to solve the problem that fewer instruments can not carry out experiments or the risk factor is unable to carry out experiments with fewer equipment or not being able to carry out experiments with a high degree of risk.

Foreign research on computer experiments in colleges and universities to assist teaching mainly in the following areas: (1) the laboratory as the object of the teaching system to a certain extent limits the scope of application of computer experiments to assist teaching system, that is, it can only be used in the experimental class, the user is the teacher and the student, no other personnel.

From the teachers' and students' point of view, how to better complete the teaching and learning tasks, can provide a support for teaching, easy equipment management and course scheduling of the auxiliary teaching system, so as to maximize the use of the laboratory, and the use of the auxiliary teaching system of the various modules of the function, and ultimately, so that the computer experiments to assist the teaching of the link of the auxiliary function of the maximum use.

(2) The computer network as a platform for teaching and

learning system can be completed regardless of the time and place of the limitations of the actual experiential teaching, meanwhile, based on the virtual technology of remote teaching, only needs to simulate the experimental objects on the computer, or use hardware to simulate experiments. This virtual experimental course is completed by students with the same network environment at the same time.

The system has the characteristics of sharing, collaboration and simulation, so it saves experimental resources. At the same time, students' experimental objects in remote operation are mostly animated pictures realized by 3D technology rather than specific experimental equipment. The final experimental report is also calculated according to the formula. Students' computer experiments rely on a remote network virtual teaching auxiliary system to enable students to solve their computer operation and observation problems in different places as they operate actual experimental equipment, and the final experimental report data is more accurate.

(3) This paper studies how to effectively support the students' learning of computer experiment courses with the experimental assistant teaching system. At present, web-based courses such as WEB learning support system [4] and adult learning support system in China are all self completed through experimental learning system. According to the survey of various experimental learning systems in China, the experimental auxiliary teaching system should focus on students' learning and take the difficulties encountered in supporting students' learning as the core content.

As far as the current situation is concerned, the experimental auxiliary teaching system does not have a unified conclusion, but it can at least enable students to complete courses that cannot be completed alone, At the same time, try to reduce their mistakes in completing the experimental courses, improve students' self-learning ability, improve their understanding of experimental tasks, and enhance their interest in learning.

4. The Current Need for Computerized Laboratory Aids in Teaching in Higher Education

At present, the security and usability of the use of computer experiments in colleges and universities to assist teaching is poor, cannot meet the needs of normal teaching, mainly in.

First, it is impossible to manage on-line assignments. The process and results of computerized on-line assignments cannot be submitted in physical form, but in the form of electronic documents. Multimedia network classrooms used in computer lab centers have the functions of sending and receiving files, but their security and availability are poor [5].

First of all, the teaching function is poor, the multimedia file sending and receiving is not related to the class schedule, so it can not reflect the relationship between the teacher sending homework to the students and the students submitting homework to the teacher in detail.

Secondly, the security is poor, using multimedia to send and receive assignments, the received assignments can only be stored in the machine used by the teacher, but the machines used by the teacher and the students are common, so if the teacher does not copy the saved assignments away after the class, it is very likely to be vandalized.

Secondly, the teacher cannot control the program that students can run. The use of computers to complete the experimental teaching can not ensure that each student does not do not have anything to do with the classroom, the teacher can not control the students can run the program can not guarantee that the completion of the experimental teaching tasks, and finally seriously affect the results of experimental teaching. Although multimedia network has

It has the ability to control students' machines, but the control it provides is only the control of the whole machine, and it can't control a runnable program. Therefore, during the experimental teaching, teachers can't prevent students from doing some operations unrelated to the classroom.

Third, the instant communication function is weak [6] . Multimedia network classroom provides communication function, but its function is relatively simple, which can not meet the needs of counseling, answering questions and discussion in the process of experimental teaching.

Fourth, there is no function of course examination. Teachers can distribute test questions to each student through the multimedia network classroom, and then collect students' test questions, but this multimedia distribution and collection is not reliable and safe, so it can not be used in real exams.

Fifth, you can't check in on the computer. The computer experiment center uses access control to record the names and time of computer users, but it is mainly used for billing, which can not completely record the teaching information of computer users' classes and substitute teachers, which is not conducive to teaching management.

Sixth, experimental data cannot be automatically counted. According to some data of the experimental center, such as the opening rate and man-machine hours, the computer-aided experimental teaching system lacks the corresponding statistical system. Therefore, the staff of the experimental center need to do it manually, which is not only easy to make mistakes, but also extremely inefficient.

Seventh, the computer experiment assistant system did not consider the characteristics of cross platform operation, which directly led to the assistant system can only be used in the Windows environment, so that many experimental courses could not be completed.

Eighth, the universality of computer experiment assistant system is not well planned. At present, most of the assistant systems used are oriented to a specific course, but other experimental courses cannot be completed. This leads to the phenomenon that one computer in the laboratory installs multiple sets of assistant systems, which is not only inconvenient to use and teach, but also a waste.

5. Solutions to Computer Experiment-aided Teaching in Colleges and Universities

In view of the current situation of computer experiment-aided teaching in colleges and universities and the problems that need to be solved, this paper puts forward an improved scheme, starting from the system principles, and finally determines the structural design of the system according to the computer experiment-aided teaching system environment.

5.1. Design Philosophy

The design of computer experiment aided teaching system should be based on the principles of systematicness, teachability and expansibility.

Systematization: The system design should be considered from the overall situation, and the system operation receiving and dispatching, computer attendance and program

monitoring are all interrelated. Therefore, we should not only pay attention to one aspect in the design, but should combine the operation receiving and dispatching, computer attendance and program monitoring to grasp the computer experiment aided teaching as a whole.

Teaching: The computer experiment aided teaching system is designed and implemented according to teachers' teaching needs, students' learning needs and administrators' management needs, in order to better assist experimental teaching and improve teaching quality.

Scalability: computerized experimental teaching system can solve the urgent problems in teaching, its applicability is strong, but in the system design architecture or to consider its scalability, to facilitate future system upgrades or functional expansion, so that it can better assist the teaching [7] .

5.2. The Experimental Environment

(1) Hardware environment in accordance with the different experimental teaching, the laboratory is divided into a number of functionally different functional rooms, each laboratory is equipped with the same hardware service

The computer will be used as a server and will include a special computer for teachers.

(2) The software environment installs Active Directory, Windows Server 2003 Enterprise+SP1, IIS, MSSQL Server 2000, NTFS file system [8], etc. on the server of the experimental center, and all user computers install Office 2003 and Windows Professional XP+SP2 software, but the professional software installed in laboratories with different functions should be different, such as Auto CAD 3ds Max software.

5.3. Structural Design

System Architecture: Based on the idea of students, teachers and administrators, the computerized experimental teaching system is divided into student machines, teacher machines, application servers and administrators, and adopts a server/client and three-layer hybrid architecture, with the student machines and teacher machines belonging to the client program, which is mainly oriented to students and teachers.

The student and teacher machines are client programs, mainly for students and teachers, while the management and administrators are for administrators. Logically, the application server is a proxy server, which provides a channel for teachers' and students' machines to access the database, realizes the functions of monitoring, communication and sharing, and avoids the clients' direct access to the data path, which effectively improves the system security and operation efficiency.

Database design: In order to ensure that the pedagogical relationship between students and teachers is expressed in the process of laboratory-assisted teaching, the database should have the function of reflecting the complete content of the class schedule.

6. Summary

With the increase of the proportion of China's educational information technology in higher education, computer experimental teaching has become the current situation of educational development, one after another, most of the domestic colleges and universities in the computer experimental teaching system applied to experimental teaching activities for students to provide a good network of resources for experimental learning.

At the same time, the computer experiment course is no longer limited to the experimental class, greatly expanding the space and time for students to learn the experimental operation, and at the same time, the computer theory is transplanted to the experimental teaching system to facilitate the use of the resources of the system platform to promote the students' experimental operation ability at the same time, help to enhance the learning ability of the information technology platform.

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