Computer Experiment Management in Virtual Environment

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Abstract. With the development of the era of big data and the continuous updating of computer technology, the traditional teaching is not satisfied with the current diversified educational development concept, especially for the computer operation class, computer operation has become the mainstream of the current computer experiment class. With the increasing number of computer experiments and the extensive use of computers in open laboratories, how to manage computer experiments reasonably has become an urgent problem. The function of the computer is powerful, and students have different habits of using the computer, and the entertainment function of the computer is also loved by many students. Therefore, in the process of experiment, students often play games and watch movies, which is not easy to manage. In order to solve these problems, this paper studies the computer experiment management system under the virtual environment to help teachers manage the experiment process. This paper studies the function modules of the computer experiment management system, explains the key elements of the analysis of the implementation of the experiment management system, and explains the construction scheme of the virtual experiment teaching environment, and expounds the ant colony algorithm used in the design and management of the course scheduling system. This paper also analyzes the operation and load of computer experiment management through simulation experiment research, and tests and analyzes to prove the rationality of the management system. The experimental research shows that in the daily computer experiment management system, the most commonly used is the experimental teaching, and the conventional office, accounting for 27.35 and 26.33 respectively. The highest utilization rate of the computer experiment system is the daily teaching, accounting for 53.6%.

Key words: Computer Experiment; Management System; Virtual Environment; System Design

1. Introduction

For today's colleges and universities, computer experiment management is an indispensable part of education and teaching management. Computer experiment management is related to the planning process of school teachers' daily computer courses. It provides students with classroom information and teachers with the right to manage students [1-2]. Computer laboratory plays an irreplaceable role in cultivating students' practical operation ability, comprehensive ability and scientific and technological innovation ability. Computer laboratory is the main position of students' classroom...
practice and extracurricular practice, and has become students' favorite [3-4]. However, the manual management mode of computer laboratory has not been able to meet the requirements of modern school running [5-6]. There are many shortcomings in the manual management mode, such as weak confidentiality, poor class efficiency, unable to achieve classroom interaction between teachers and students, and unchanged computer management [7-8]. With the implementation of enrollment expansion, school integration and university city construction, the traditional management mode can no longer meet the needs of modern computer teaching. Only by using modern means of communication control, can we improve the management mode, improve work efficiency, and provide more computer practice opportunities for students in limited time [9-10].

In the research of computer experiment management in virtual environment, many scholars at home and abroad have done research on it, and have made some achievements. Li C and others pointed out that the management of the experimental process is almost only controlled and maintained by the experimental instructor. At present, there is no system that directly uses the computer to manage the experimental process [11]. Yubao Q and others pointed out that with the continuous expansion of the scale of computer laboratory, the task of computer practice is becoming more and more heavy, the installation and maintenance of hardware and software is becoming more and more complex, and the management difficulty and workload of computer laboratory have doubled [12].

This paper mainly studies the computer experiment management in virtual environment. This paper studies the function analysis of computer experiment management system, and explains which modules are needed to build the management system. This paper analyzes the key elements of the implementation of the experiment management system, pays attention to its security, reasonably designs the database and reasonably uses the new technology. This paper also explains the construction scheme of the virtual experimental teaching environment, and expounds the ant colony algorithm used in the design and management of course scheduling system. This paper also analyzes the operation and load of computer experiment management through simulation experiment research, and tests and analyzes to prove the rationality of the management system.

2. Computer Experiment Management

2.1. Function Analysis of Computer Experiment Management System

The design requirement of university computer management system platform is very important to the design concept of the system. In order to design a good laboratory management system, we must fully understand and grasp the current situation of university computer department laboratory management. Only in this way can we fundamentally solve the problem, and improve the laboratory management system information more reasonably and comprehensively, More scientific and effective management of laboratory system. The functional requirements of the system is the key to the total requirements of the management system. In the aspect of functional requirements, we should first consider the technical and functional requirements and compatibility requirements, which requires the system to have strong expansibility, consider the operation and applicability of the system as well as the convenience of design management and other functional requirements, and conduct a comprehensive investigation on the functions of the system. This demand requires the system to achieve simple report extraction and printing services, and provide users with flexible data query and statistical analysis services.

(1) The requirement analysis of login function

The laboratory management system has a wide range of users, which are divided into: teachers, students, administrators, and each role has different permissions. Among them, teachers have the right to view student information and view the arrangement of experimental teaching. Students have the right to log in, modify the password, and view all the information of the experimental class. The administrator has the management rights to the user table, the basic parameters management of the system and other permissions.
(2) Course scheduling function
It needs a lot of manpower to arrange courses in the laboratory, so it is necessary to set up a large-scale course arrangement system. Sometimes the distribution of laboratories is very chaotic. We must have a systematic course scheduling mode to achieve a convenient, stable and easy-to-use system.

(3) Laboratory information maintenance function
The information of the whole system is very large and needs to be sorted out and managed. At this time, we need the administrator's function. The administrator can manage and integrate the information, so as to achieve the function of adjusting the whole information.

(4) Experiment scoring function
Considering that the students' consideration of each course is different, teachers' teaching level is different. So design a scoring standard to score the experimental class. It is convenient for students to choose better experimental courses, and it can also encourage teachers to teach better. Teacher ratings also play a role. Students can also make suggestions for each experiment to make each experiment more effective.

(5) Team building management function
The workload of teachers is very large and different. Therefore, it is necessary to systematically sum up and manage. And job responsibilities should also be well summed up, if any teachers want to leave, can be adjusted in time. We can discover and modify the curriculum in time. For the future to reduce unnecessary trouble. Don't look for a teacher who doesn't come to class. We will make it more convenient for administrators.

2.2. Key Elements of Experiment Management System

(1) Security
To realize the establishment of computer experiment management system in virtual environment, we must first consider its security performance. The security of test management operation can not only ensure the login security, but also protect the data security against malicious intrusion and system errors caused by improper operation. In the system design, the student login interface should be distinguished from the background management interface to prevent the background system from collapse due to improper operation. Next, we should prevent students from connecting to the Internet outside the laboratory through dynamic IP or unplugging the network cable to disconnect the Internet. Without the connection of local area Internet, managers can't monitor students' machines through the platform. At the same time, to prevent malicious attacks from the outside world, if the computer experiment management system is invaded, the results will cause the loss of data, resulting in serious teaching accidents. The university laboratory system is connected through the Internet. If the network system is modified or tampered with, it will affect the operation of the whole system. The modeling program function is messy, and even the system will be paralyzed. In general, the database of university laboratory records all the charging information and computer records of students, These information are the guarantee of the effective operation of the management system, and the security of the information must be guaranteed.

(2) Reasonable design of database
According to the analysis of data management mode, the development of management system mainly involves two problems, namely network and database. Among them, the network is the platform to realize resource sharing and the basis of server connection, while the database is the place to store all information, and the database is the core of system software to ensure the quality of system resources. When designing a database, we need to choose a reasonable database type. The efficiency of different database types varies greatly. Choosing an appropriate database has a great impact on the use of the
management system. When choosing the database, it is necessary to carry out reasonable redundancy. In the case of low data redundancy, the integrity of the database is relatively easy to be guaranteed, so the combined data redundancy is very necessary. At the same time, in the process of system design, it is necessary to maintain the consistency of work coding, standardize data storage, integrate database resources, and facilitate future maintenance and updating of the database.

(3) Rational use of new technology
In the development of laboratory management system software, the rational use of new technology should follow the principle of innovation and foresight. The software will be advanced and not be eliminated quickly. It should not only be functional, but also be able to move forward, considering economic and practical applications. In today's society, there are many new technologies. If we want to not be eliminated by the society, we must develop software. The development of software can bring good prospects, and we must follow the principle of reasonable use of software. Always follow the big step, our goal is to effectively use software to help us achieve more requirements.

2.3. Construction Scheme of Virtual Experimental Teaching Environment
This paper studies the construction of computer experiment management system in the virtual environment. The construction scheme is based on the total service control platform of the laboratory. The main server platform is used as the computer experiment management platform in the operation and management virtual environment, and other computers are controlled systems controlled by the main system. The whole computer experiment management system is supported by the computer client, the general control platform and the Regional Internet. During the experiment teaching, the Internet server is turned on, and the teachers are manipulated to make the virtual experiment teaching environment used in class into a system image. The image is uploaded to the cloud through the experiment teaching cloud platform, and the teaching plan is made and the teaching tasks are arranged in the cloud. Set the hardware configuration of virtual machine for class. According to the number of students in class and the configuration requirements of virtual machine, the platform will dynamically schedule the hardware resources carried by the nodes, and the students will use the computer client to access the cloud platform to enter the virtual experimental teaching environment. The construction of the whole virtual experimental teaching platform adopts B / S architecture. The students can access the experimental teaching cloud platform through the browser, and the platform supports the simultaneous access of Intranet and extranet.

2.4. Ant Colony Algorithm Design
Ant colony algorithm is mainly used to find the optimal configuration path in image by ant searching for discovery path. The main ant issues a temporary curriculum to each ant before they go out. After they leave, they record the travel, write each place of the temporary curriculum into matching, and after the end of the first cycle, compare the placement position of each ant's temporary curriculum, and find out the best course arrangement path through analysis. During the course of the tour, the ants will communicate information, and the same information will be available at the beginning. However, with the optimization of ants, the amount of path information will gradually increase. In the course of arranging classes, ant colony algorithm is used to find the best matching arrangement. The specific formula is as follows:

\[
T_{ij}(t+n)=(1-p)*T_{ij}(t)+\Delta T_{ij}(t)
\]

\[
\Delta T_{ij}(t)=\sum_{k=1}^{m} \Delta T_{ik}(t)
\]

All ants go from one node in LCT to another node in GPR in bipartite model. When all ants return to LCT, they will go on a new round of logical tour activities, and so on, until all the courses in LCT are configured.
3. Experimental Study

3.1. Subjects
This paper mainly studies the computer experiment management in virtual environment. This paper analyzes the function module of computer experiment management, understands the key elements of computer experiment management system, and constructs the construction scheme of virtual experiment teaching environment to study the construction of computer experiment management system.

3.2. Experimental Process Steps
The main content of this paper is the research of computer experiment management in virtual environment. In order to study the construction of computer experiment management system, this paper studies the function analysis of computer experiment management system, and explains which modules are needed to build the management system. This paper analyzes the key elements of the implementation of the experiment management system, pays attention to its security, reasonably designs the database and reasonably uses the new technology. This paper also explains the construction scheme of the virtual experimental teaching environment, and expounds the ant colony algorithm used in the design and management of course scheduling system. This paper also analyzes the operation and load of computer experiment management through simulation experiment research, and tests and analyzes to prove the rationality of the management system.

4. Computer Experiment Management Experiment Research and Analysis

4.1. The Operation of Computer Experiment Management
Computer experiment management ensures the normal operation of computer experiment, and its load performance is very important. In this paper, through the simulation experiment management system to simulate the computer operation, to explore the situation in the process of computer experiment operation management, through the simulation to collect the operation of computer experiment, the results are shown in Table 1.

| Type                      | Experimental teaching | Experiment management | System assessment | Team building | Regular office | system maintenance |
|---------------------------|-----------------------|-----------------------|-------------------|--------------|----------------|-------------------|
| proportion                | 27.35                 | 14.72                 | 10.26             | 15.84        | 26.33          | 5.5               |

Figure 1. Experimental management system module operation
As can be seen from Figure 1, in the daily computer experiment management system, the most
commonly used is the experimental teaching, the conventional office, accounting for 27.35 and 26.33 respectively, and then the experimental management accounts for 14.72, the system evaluation accounts for 10.26, the team building accounts for 15.84, and the system maintenance accounts for 5.5. It can be seen that the computer experiment management system module runs normally and reasonably.

4.2. Load Test Analysis of Computer Experiment Management
By simulating the operation of the computer experiment management system, we can study whether it is in line with the test experiment, and understand the operation and utilization of the computer. This paper simulates the operation of computer experiment management system to understand its related function utilization and load. The results are shown in Table 2.

Table 2. Load of experiment management system

| Activity       | Daily teaching | train | examination | open | other | free |
|----------------|----------------|-------|-------------|------|-------|------|
| number         | 53.6           | 11.8  | 7.2         | 18.3 | 3.9   | 5.2  |

Figure 2. Load of experiment management system
As can be seen from Figure 2, the highest utilization rate of computer experimental system is daily teaching, accounting for 53.6, followed by open use, accounting for 18.3, training utilization rate is 11.8, examination utilization rate is 7.2, other use accounts for 3.9, idle use accounts for 5.2.

5. Conclusions
This paper studies the computer experiment management system in the virtual environment, mainly in order to change the traditional education mode with defects, in order to optimize the computer experiment teaching management of college students, to integrate virtual technology and control system into the computer experiment management. This paper studies the function analysis of computer experiment management system, explains the key elements of the realization of the experimental management system, and explains the construction plan of constructing virtual experiment teaching environment, which is to optimize the teaching effect and provide new method mode for teaching.

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