International Journal of Smart Home
Vol. 9, No. 7 (2015), pp. 85-90
http://dx.doi.org/10.14257/ijsh.2015.9.7.09

Design of Open Language Laboratory Information System in Network Environment

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Abstract

College language lab is "the second classroom" of foreign language teaching. It is a place of effectively cultivating students' ability of self-learning and practicing. This paper analyzes the significance and role of the language laboratory for cultivating students' self-learning and innovation ability, designs out the model of function structue for the openning of the language laboratory, proposes the form of database design, and discusses the system architecture.

Keywords: *Network environment, Laboratory management, System design*

1. The Analysis of Open Experimental Teaching System

With the continuous development of the national economy and the increase of international interchanges, the requirements for students' foreign language proficiency are constantly increasing in the society. The language laboratory has irreplaceable position in foreign language education in college, and it has become the main front of promoting quality-oriented education and cultivating students' innovative spirit, practical ability and scientific attitude. In particular, with the continuous development of computer and network technology, and wide application of information technology, a large number of new teaching equipment and methods are emerging, and digital language learning network system has gradually replaced traditional ones. The widespread use of the language laboratory has brought about a completely new concept of foreign language teaching in college and broadens the thinking of classroom teaching, which has an incomparable advantage in the sharing of education resources [1].

Digital teaching is the trend of language teaching reform. With the more comprehensive function of multi-media language learning system, it breaks through the normal language teaching mode, and provides ideas and platforms for the reform of languages teaching [2]. One of the most important tasks of college laboratory management and a very important subject that the language laboratory faces today is how to better strengthen the construction of the language laboratory and to establish a unified and secure network of laboratory information management system which is easy to manage and suitable for college, for the purpose of realizing concentrated information management, dispersed operation and shared information resources, developing the traditional laboratory management into the digital and integrated direction[3-5], and constantly improving laboratory management level and resource utilization to train quality talents.

ISSN: 1975-4094 IJSH

2. Design of Open Experimental Teaching System

Experiment teaching is an important part of modern higher education. To construct language laboratory mainly based on information technology and modern educational technology is the need of modern languge teaching. It is the direction of developing modern experimental teaching in higher education. According to the analysis, the open language laboratory is mainly composed of system management module, laboratory management module, teacher operating module, intramural student operating modula and extramural student operating Modula, shown in Figure 1.

3. System Management Module

It includes user management, user permission setting, and routine maintenance, *etc*. Users can be divided into five categories: system administrator, laboratory manager, teacher (teaching resource provider), intramural students and extramural students. Students should complete experiment content according to the curriculum requirements, which is usually the specially-designed experimental teaching contents of professional education, while extramural students have no constraints and are free to choose the content they are interested in [6-8]. Because both system administrators and teachers have access to system resources or learning resources, while students are only provided with applicable teaching resources, system administrators and teachers should enter the system after identification, and only those modules that are given authority to them can be operated.

The module also includes the opinions of using collection system. Through interaction of this module, users can post problems they have while using it, and to make appropriate recommendations, so that the system can be improved to make the system more humane.

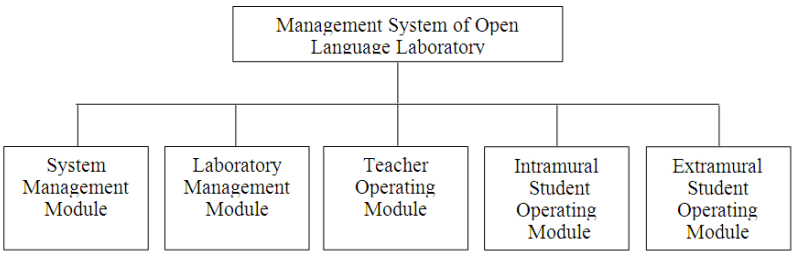

Figure 1. Function Strucher Of Language Laboratory Management System

4. Laboratory Management Module

The module mainly maintains management information inside the laboratory, including the experimental teaching arrangement (experimental teaching scheduling), laboratory apparatus management (includes list of equipment, equipment repairing and maintenance information), teacher information management, project information management, and analysis of experimental results, *etc* [7-12].

(1) System security. As a distributed firewall uses IP security protocol, all communications between hosts have been well protected, so a distributed firewall has the ability to prevent various types of passive and active attacks. Especially when we use the password credentials of the IP security protocol to sign internal host, a strategy based on these signs to be undoubtedly more credible the host. The boundaries of traditional firewalls are equal to all internal hosts in a sense, that is, if one of them has been penetrated, the attacker can easily launch attacks other internal hosts; but for distributed firewall, such attacks are not established. On the other hand, most of the traditional boundaries firewall lacks the understanding of intentions to host, usually to filter only according to the external characteristics of

the data packets. Although the proxy-based firewall can solve the problem, but it needs an agreement for each individually, write code, its limitations are obvious. In the absence of context, the firewall is very difficult to distinguish attack packets from legitimate packets, and therefore filters will not be able to achieve. In fact, the attacker is not difficult to be able to attack masquerading as the legitimate packet. Distributed Firewall implement the policy control by the host, there is no doubt that the host have enough knowledge of their own intentions, and so distributed firewall depending on host makes the appropriate decisions ,and the can make a solution to this problem[13].

(2) System performance guarantee. Since the traditional boundary firewall has a single access control point, it is a negative impact to the network performance and reliability of the network. Although there are this kind of research, and put forward some corresponding solutions, such as the adaptive firewall technology, but for network performance, adaptive firewall is only a balance program between a network performance and network security; for a network reliability, using multiple redundant firewalls is also a feasible solution, but they not only introduces a lot of complexity and does not fundamentally solve the problem. Distributed Firewall get rid of a single access point from basic addition, leaving this problem solved. More importantly, the distributed firewall technologies eliminate the structural bottlenecks problems in the network and improve system performance.

(3) The system scalability. In fact, the most important advantage of a distributed firewall is that it can protect these hosts which don't not belong to the internal network in the physical topology, but in the logic of "internal"network, this demand will become more and more with the development of VPN. The traditional approach to this problem is: the long-range "internal" host and external host communication is still through the firewall isolated to control access, while use tunnel technology between the long-range "internal" host and firewall to ensure security. This approach could have direct communication to go around through the firewall, it is not only inefficient, but also increases the difficulty of setting the firewall filtering rules. In contrast, a distributed firewall is based on the concept of logical network, therefore, there is no difference between long-range "internal" host and the internal hosts physically, it prevents this from happening.

4.1. Teacher Operating Module

Teachers enter the system after identification, and then the system shows their experimental courses or research projects related to them, they can add, modify or delete specific experimental projects depending on the need for teaching or scientific research. Besides background experimental project management, the system has the function for the teacher to answer, ask or communice with students to guide student's practical experiments for courses or subjects online.

4.2. Intramural Student Operating Module

After entering the system with identification, the system shows the students experimental content that must be done. Except for completing experimental projects of courses or subjects, students can also preview, book and operate the experiment. In the "Course Setting" module, students can select experimental projects with their interest. They can login the system to have a preview of the experiment and then take a test. If they pass the test, they will be able to make an appointment. And the booking situation will be uploaded to the database so schools can offer experimental courses.

4.3. Extramural Student Operating Module

The system allows other students in the society to register and enter the system after identification. They get to know about resources that can be shared, from which they can select the experimental projects with interest, ask questions or make an appointment online. The booking situation will be uploaded to the database of experimental center to provide the appropriate experimental projects or teaching resources.

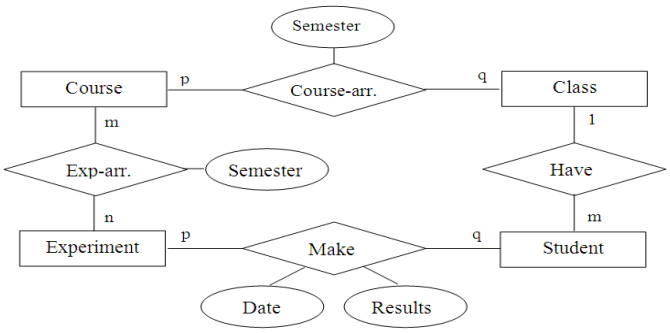

Figure 2. E-R Diagram of Experiment Teaching Arrangement

5. Database Design

The database of management information system for open language laboratory is of three main types, (1) daily laboratory management database, (2) experiment teaching arrangement database (related to school educational administration system), (3) the teaching resource management database. Here we only give the detailed design proposal of experiment teaching arrangement database. We have the entity of class, student, experiment, course, *etc*. Their entity relationship diagram is shown as Figure 2.

Through the analysis, we can get database tables (only main fields are given here), the underline fields represent the main key:

Class (ClassID,ClassNM)

Student (StudentID,StudentNM,ClassID)

Experiment(ExpID,ExpNM, Resources)

Course(CourseID,CourseNM, Credit)

Course-arrangement (CourseID,ClassID, Semester)

Experiment-arrangement (ExpID, CourseID, Semester)

Make-Experiment (StudentID,ExpID, Date, Results)

On this basis, we can also set up the view of class-experiment and student-experiment, *etc*.:

Creat View class-experiment (ClassID, ExpID, ExpNM, Semester) AS

Select X.ClassID, Z.ExpID, Z.ExpNM, X.Semester

From Course-arrangement X, Experiment-arrangement Y, Experiment Z

Where X.CourseID=Y.CourseID

And Y.ExpID=Z.ExpID

Creat View student-experiment (StudentID, StudentNM, ExpID, ExpNM, Semester) AS

```
Select  W.StudentID, W.StudentNM, Z.ExpID, ZexpNM, X.Semester
From Course-arrangement X, Experiment-arrangement Y, Experiment Z,Student W
                Where X.CourseID=Y.CourseID
                  And Y.ExpID=Z.ExpID
                  And X.ClassID= W.ClassID
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6. System Architecture

Taking into account that there are various types of lab management information and maintenance, large amounts of basic data maintenance are done in the laboratory, while extramural student may be scattered in various locations. Most of the work in the laboratory office is the interactions with maintenance, and it is easy to connect through a LAN, so it is more suitable to use C/S structure. The extramural students who are scattered and unpredictable and most of them require the access to system information, not interactive maintenance information, with their dispersed places and unpredictable client location, so it is more appropriate to use B/S structure. Therefore, characteristics of laboratory management determines the combination of the best aspects of B/S and C/S structure, to construct a software system based on B/S and C/S mixed structure, which can meet the requirements of different environments separately on the system, as is shown in Figure 3.

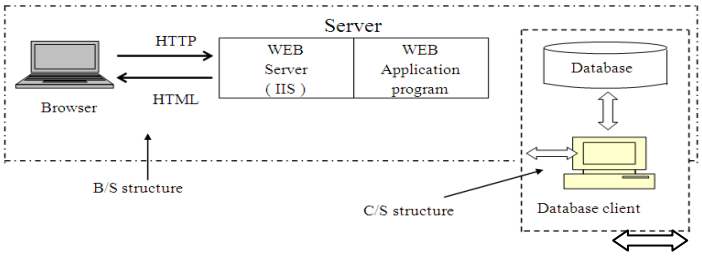

Figure 3. B/S and C/S Mixed Structure

7. Conclusions

With the development of information technology and the popularity of computers, lab management informationization is the inevitable choice. It is the need of modern foreign language teaching in college to make full use of modern information technologies. The construction of information platform in lab management and of open language laboratory should be accelerated to promote the share and efficient operation of laboratory resources and to improve management and service level of the laboratory. In the course of information construction of the laboratory, laboratory information must be integrated into the overall informatization of college to make the most of information advantages, such as laboratory equipment management, integrated management system of assets information, teaching management in the laboratory and educational administration system to share the information between laboratory management and school management.

Acknowledgment

This work is supported by Project of Ministry of Education English characteristic professional (TS12154).

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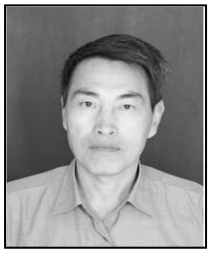

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