Feedback Analysis of Information Teaching System Based on Web Database

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Abstract. In order to further dynamically update and maintain teaching resources and establish a teaching platform with various interactive modes, which is suitable for students, teachers, management and other levels to operate comprehensively, this paper constructs a Web-based experiment information teaching system by using the ideas and technologies of B/S mode. The system integrates the latest technology of the current network, integrates all kinds of teaching needs, rich teaching auxiliary functions and teaching management functions, and has strong pertinence and practicability. Based on the improved three-tier architecture, the system has good expansibility and maintainability, and can be easily transplanted to other teaching fields. The database design based on configurable view ensures the efficiency and security of the system. At present, the system has been widely used in many universities in China.

Keywords: Web database; Information teaching; Information teaching system; Three-tier architecture; view.

1 Introduction

Computer, Internet and other information technologies originated in western developed countries. The information construction in developed countries started earlier, and the technical system was relatively perfect. It has been applied in many fields, among which the education and training system based on the Internet has developed more maturely abroad[1].The main body of training tends to be diversified, and the institutions providing education and training services include universities, scientific research institutions, government departments, trade associations and profit-making education and training institutions.According to statistics, in the United States, the number of people who study and train through the online teaching system is increasing at a rate of 300% every year, and more than 60% of enterprises and government units train their employees through the network.World-class universities, such as Harvard University, Stanford University, Massachusetts Institute of Technology, Princeton University, etc., all actively participate in the research of online training [2-3].Cisco, the world's largest network equipment provider, launched the world's first network college program in 1997, creating a perfect network teaching system. At present, Cisco has established Cisco network colleges in hundreds of countries and regions around the world, which not only trains its employees, but also provides cisco certified training and examinations to the society.After years of application and continuous improvement, many well-known education and training systems have emerged

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abroad, including WebCT, Oracle's i-learning. Virtual-U and IBM's Learning Space, all of which have their own characteristics and advantages[4-5].

At the end of the 20th century, the rapid development of information technology with digitalization as the core has triggered the rapid development of educational informatization, resulting in unprecedented innovation in teaching mode and teaching method in domestic and foreign university education. The "College Simulation Experiment System" which came out in the 1990s, and the remote teaching system A and the experimental teaching resource database system established on this basis are all representative innovative media of information-based teaching, which have promoted the reform of teaching methods and teaching modes and played an important role in realizing personalized education and cultivating innovative talents. With the increasing richness of teaching resources and the growth of the number of students in colleges and universities, how to further dynamically update and maintain teaching resources and establish a teaching platform with various interactive modes, which is suitable for students, teachers, management and other levels of comprehensive operation, has become an urgent problem in this field [6].

2 Methods

2.1 Construction of the system

(1) Functional design of system requirements

The functional framework of the information teaching system is shown in Table 1.

Table 1. Information technology teaching system

Experimental center website	Introduction of Experiment Center
	Introduction of Experiment Course
	Excellent course application materials
	Term course schedule announced
	Press release of teaching and scientific research
Teaching resource pool	syllabus
	Teaching plan
	Experimental list
	laboratory apparatus
	Experimental exercises
	Teaching lecture
	Teaching video
	Student thesis
	reference material
Simulation experiment distance teaching (Web)	Basic experiment
	Comprehensive experiment
	Design and conduct experiments
Course selection and course implementation system	Course schedule formation
	Class formation
	Upload and download teaching plans
	Upload and download student experiment report.
Teaching management system	Fixed Asset Management

	Teacher's teaching workload management system
	Student credit score management system
	Designable teaching evaluation system
systems management	Permission Settings for Content Entry of Resource Library
	Website content entry
	Statistical print permission settings

The functional framework of the information teaching system is shown in Figure 1.

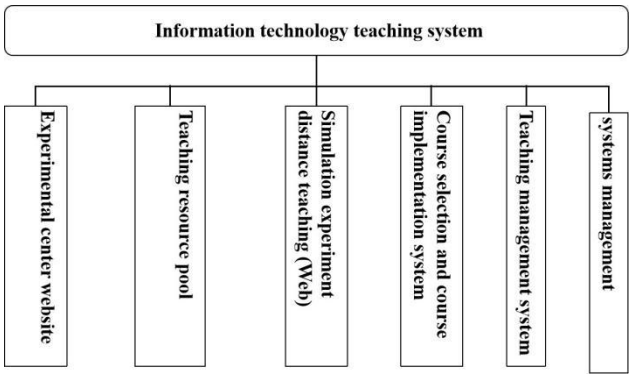

Figure 1. System framework diagram

Web-based remote simulation experiment teaching system: the simulation experiment based on C/S mode is released to the Web through ActiveX technology, and the author's intellectual property rights are protected. Using this system, the distance experimental course teaching can be realized and the experimental course can be expanded in time and space [7].

Teaching resource database system: It solves the problem that the management of teaching resources can be updated dynamically, and provides technical support for the further enrichment and expansion of online resources. The two ways of organizing resources in the system facilitate users to find and copy resources. With the continuous accumulation of teaching, the content of the resource library has been continuously expanded and enriched.

Course selection and course implementation system: in advance, the experimental teaching center should formulate and publish courses, determine teachers and enter required courses, and then students can choose other credit courses independently in the course selection system. After the above process is confirmed, the system will automatically form a teaching module for teachers, who undertake multiple courses. With each course module as a unit, teachers and students will establish a one-to-many relationship. In this module, many functions such as printing lists, compiling course contents and experimental reports, grading and grading, and completing course guidance and teaching interaction can be realized. After students choose courses, the system will automatically form a course module for students. Students form a one-to-one relationship with different teachers according to different courses, and a one-to-many relationship with students in the same course. In the course management module, many functions can be realized, such as printing the course schedule, viewing the teaching contents

and requirements, uploading homework and experimental reports, and interacting with teachers and classmates, such as asking questions, discussing the course and receiving teachers' guidance, viewing the corrected experimental reports and scores, and grading the teaching effect of teachers.

Teaching management system: it has the functions of online course selection and automatic course organization, credit and grade management, teacher's teaching workload management, designable teaching evaluation, fixed resource management, etc., and realizes the informationization of teaching management. As an open part of the system, the website of the Experiment Center includes the introduction, news release and curriculum setting of the experiment center, which provides various information resources for teachers and students and a publicity window for the external communication of the experiment center. Through the use of Web technology and Database management system, build a teaching system to support teachers and students to carry out teaching activities, and collect students' feedback information through the system to analyze and evaluate the teaching effect. In this teaching system, teachers can create and manage teaching courses, including course content, learning resources, and assignments. Students can access and learn course content through the system, submit assignments, and participate in discussions. The system will automatically record students' learning behavior and feedback information, such as learning time, visit frequency, homework grades, online test results, etc.

2.2 Architecture design

The traditional three-tier architecture is divided into three parts: presentation layer, business logic layer and data persistence layer. In order to increase the expansibility and maintainability of the system, FormBean:WebInfo and EntityBean: DBInfo are added to the three-tier architecture to encapsulate the screen data and logical table data respectively. In FormBean and Entity Bean, there are only methods for setting and reading attributes, but no methods for realizing transaction logic. Form Bean describes the data structure of the user's form and stores the latest data entered by the user in the form, so as to regenerate the same web page. Entity Bean describes the data structure of the database table, which is used by the data persistence layer to access the information of the data table. The two-tier Bean further reduces the coupling of the traditional three-tier architecture, and the interfaces between each tier only interact through FormBean or Entity Bean. The part shown by the dotted line is the system extension part.

Presentation layer: The user interface part of the system is built by using the dynamic web page technology of NET. According to the information requested and submitted by users, corresponding html images are dynamically generated, and the page display (result) and submitted data are encapsulated, and the encapsulated data is transmitted to the business logic layer [8].

Business logic layer (Biz): the key of this framework and the core part of enterprise application, which is responsible for responding to the requests of Web clients. It is responsible for the main application processing tasks and the realization of business logic, which is used to calculate all business-related parts and realize transaction processing. Get the correct input information from the page and pass it to the persistence layer, which runs on the Net server.

(IID data persistence layer (Entity): the data persistence layer is located at the bottom of the system framework, and is mainly responsible for storing and managing data, processing and realizing the request of business logic layer for data. The data persistence layer accesses the database with A DONET, which has nothing to do with the specific database. The persistence layer is divided into persistence layer about business and Entity about data table according to the different objects it faces. The business persistence layer mainly describes 0/R of business and calls FormBean to access business information. The persistence layer of the data table describes the O/R of the table, and calls Entity Bean to access the information of the table.

The coupling of the improved three-tier architecture system is minimized, and the functional modules are in different namespaces. Based on this architecture, the information-based teaching system can combine its functional modules at will, without affecting their respective functions, so as to achieve the configurability of functions. It only needs to specify the corresponding functional modules, which can be quickly combined to realize their functions. Users can select all or part of the modules according to the situation of our school and organize their own teaching system.

3 Results and analysis

When building and developing database-based applications, how to improve the access efficiency of applications to databases is a key issue. In most applications, query operation is the operation that consumes the most database server resources among all database operations. In many applications, when the data in the data table has accumulated to millions or tens of millions of records over a period of time, the response speed of the system will often become very slow when dealing with such orders of magnitude data. Therefore, it is very necessary to optimize the database to improve the system performance during system design or operation. Database is often at the lowest level in system development. In the general three-tier model, the data persistence layer is responsible for data storage and management. In traditional software development, the persistence layer generally stores the data table through ADO, which leads to the problem that when the underlying database is maintained or upgraded, the data persistence layer must make corresponding changes, and the data persistence layer and the underlying table are closely coupled. How to decouple the data persistence layer from the table is an element that must be considered in database design. The rows in the table of the database are stored on disk, usually in the form of records. To minimize the impact of changes to the data persistence layer, it is hoped that the rows of the data table will remain unchanged when the data table is changed. For this reason, in order to avoid the direct operation of the persistence layer on the data table, this system builds the operation on the view (as shown in Figure 2). A view is a virtual table, and its data is obtained from one or more actual tables. The data of these tables are stored in a database. Using views to build applications has the following advantages:

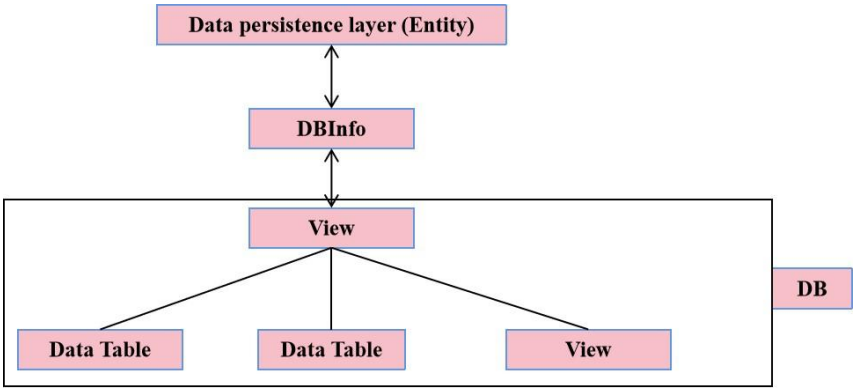

Figure 2. Structure diagram of system database

Simplify the user's operation on data, especially for most: in the application of logic complex system, the access to data is related to the correctness of the results, especially the access to multi-table data. In order to improve the development efficiency, the frequently used query is defined as a view, so that users do not have to specify all the conditions for future operations every time [8-9].

Improve the independence of data. The view separates the application from the underlying data table. When the underlying database is reconstructed, the application can stay still by shielding the influence of the change of reconstruction through the view, which enhances the maintainability of the system.

Views can shield sensitive data from unauthorized users and automatically provide security protection for hidden data.

For the same application, different views can be configured according to the user's situation, and the views have the same column names, but the query implementation mechanism of the views is different, thus achieving the configurability of the application.

In the information-based teaching system, especially the course arrangement and course selection system, a lot of data storage and processing are involved, and how to process the data quickly and efficiently is the focus of research. Taking the course arrangement and course selection system as an example, this paper expounds the database design. In the course arrangement, there are four constraints: teacher, experimental level, course and time. After completing the course arrangement, students enter the course selection stage, and students choose courses according to the class hours. At present, there are many differences in the situation of colleges and universities, such as the number of courses and the number of students. The relationship between the elements of course selection information is many-to-many. Teachers can take multiple courses, one course can be taught by multiple teachers, students can choose multiple teachers' courses, and teachers can teach multiple students.

In the course arrangement and course selection system, there are the following typical views: all the course information offered this semester: :vi_term_ class; Teacher's class information: vi_ teacher_ class_ time; Teaching evaluation information: vi_ term_teacher_ evalution;

Student course selection information: vi_ student_classID; Student achievement information: vi_ _student_ score; Student class information: vi_ student _classID[10].

3.1 Improving teaching efficiency

A comparative study was conducted on 100 students from a certain school for a period of 4 months, and 50 students each participating in traditional teaching and 50 students each participating in the information technology teaching system were randomly selected for sample comparison. Firstly, the teaching efficiency was compared, and the learning time of the two groups of students was compared, as shown in Figure 3:

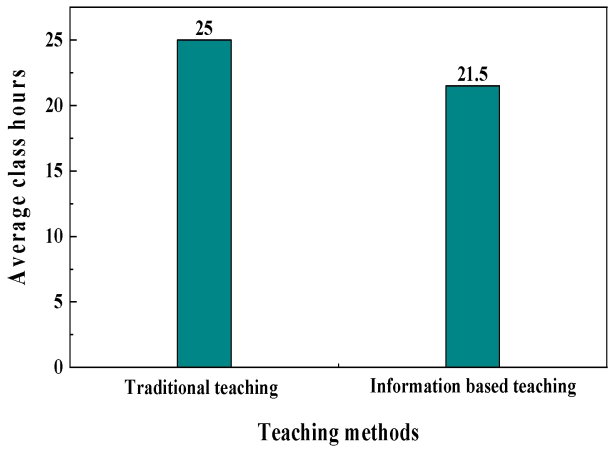

Figure 3. Learning time of two groups of students

From Figure 3, it can be seen that the learning efficiency of students using the information based teaching system has increased by an average of 15%, which can be said to be very obvious. With the continuous improvement and improvement of the teaching system itself, I believe this difference will become more apparent.

4 Conclusion

The Web-based information teaching system of experiment proposed in this paper is a huge comprehensive system, including Web-based remote simulation experiment teaching, teaching resource database, course selection and course implementation, designable teaching management, experiment center website and other functional modules. In order to make the system have good scalability, its coupling degree must be reduced. This system has improved the commonly used three-tier architecture. A three-tier architecture based on the expansion of B/S mode is adopted. According to the different ways and functions of organizing teaching by using teaching resource system in colleges and majors, a database design based on configurable view is adopted, which meets the teaching needs of various majors and levels and

improves the operating efficiency and safety of the system. This system provides an information-based comprehensive teaching platform for experiment teaching on the Internet. On this platform, students can complete simulation experiments under the real-time guidance of teachers, and use rich teaching resources to learn and broaden the teaching content. Teachers use the resources of teaching resource database to organize teaching plans to upload to the platform, and the teaching organization implementation system provides teachers with a convenient curriculum management model and auxiliary teaching environment.

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