Design and Implementation of Practical Teaching Management System Based on Web in Higher Vocational Colleges

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Abstract. In this paper, taking the practical teaching management in higher vocational colleges as the background, they have caused some problems, so, in higher vocational colleges, we construct the new management system based on Asp.net MVC in order to optimize the information level of the management and the construction of practical training room, and to improve the information-based teaching management, as well as to promote the efficiency of practical teaching management and the quality of personnel training.

Keywords: Higher vocational practice, Teaching management, Software systems.

1. Introduction
Practical teaching is regarded as one of the basic contents and important features in higher vocational college education, it is the basic platform to improve students' practical ability and to reflect the characteristics of higher vocational colleges, and is the most important way to realize the training of talent engineering, as well as is the frontier position of the innovation of talent training mode in higher vocational colleges[1]. In order to meet the needs of practical training management in vocational colleges, it is urgent to develop a management system to meet the supervision and management about the course of practical training between teachers and students, so as to improve the quality of teaching, and reduce the cost of human management and waste of resources.

2. System requirements analysis

2.1. System requirements analysis
With the increasing number of students in recent years, the disadvantages of the management of traditional practical training are becoming more and more prominent in higher vocational colleges, and the traditional management methods have gradually become an important factor affecting the quality
of teaching [2]. Although each college has its own management software, but the design of the software does not take into account the future problems. Most software is only a small part of the management, and most are stand-alone, teachers and students need to query must go to the designated location, but also cumbersome application process, making the original simple things complicated. For example, how to make school-running resources such as limited teachers, practical training rooms and equipment be reasonable, standardized and efficient service for practical teaching, and how to make better use of the platform of cooperation between schools and enterprises, deepening the reform of practical training teaching is a major problem in the colleges [3]. The practical teaching management system of higher vocational colleges is a solution to the management problems existing in the course of practical training of higher vocational and technical colleges, and the practical teaching management system of higher vocational colleges is a management software based on a series of specific business applications, which can meet the different needs of various user levels, highly integrated management, distribution and statistics as one.

2.2. Structural analysis of the system

Here we use a common Structured Analysis (SA). This method uses simple and easy-to-read symbols, according to the relationship between data transmission and transformation within the software, decomposes from top to bottom layer by layer, and depicts the software model that meets the functional requirements[4].

After the research on the current situation of the management of the training room of higher vocational colleges, it is summarized that the teaching management system of practical training in higher vocational colleges needs to have the following functions:

1) Accept teachers and students online application for practical classrooms: teachers and students submit online applications to the system for the use of a practical classroom, first of all, the system first analyze and query whether the state of the classroom is open, this process records the application form to the bottom of the database; If it is not open, the system automatically fills out the application results form; If it is open, the system sends the pending audit record to the administrator of the requested classroom and records it to the bottom of the database table.

2) Practical classroom administrator audit: for the audit is mainly to see whether the classroom on the day of the planned teaching, training classroom equipment is complete, the length of the application time is in the normal time.

3) Feedback teaching quality: through the information submitted by teachers and students to understand the use of practical classrooms, as well as practical classrooms in the future improvement plan, students for teachers to give feedback on classes.

4) Timely understanding of equipment wear and tear situation: each after-class teacher will check the use of equipment, and fill in the corresponding information to the system, the system records this information and produce the corresponding replacement form to the database, prompt the classroom administrator to carry out the corresponding processing, the entire process will also be recorded. Let the Random Variable X,

\[ X = \begin{cases} 1, & \text{the computer is good,} \\ 0, & \text{the computer is bad.} \end{cases} \]

Let \( P \{X = 1\} = 0.95, P \{X = 0\} = 0.05. \) then \( EX = 0.95 \times 1 + 0.05 \times 0 = 0.95 \), and

\[ DX=E(X-EX)^2 = EX^2 - (EX)^2 = 0.95 - 0.95^2 = 0.95. \]

Where \( EX^2 = 0.95 \times 1^2 + 0.05 \times 0^2 = 0.95. \) From \( EX = 0.95 \), we can get the average lifetime of computer is very good, and from \( DX = 0 \) that the deviation of computer to the average lifetime is 0.

5) Out-of-stock statistics: according to each teacher's equipment inspection records, to count out-of-stock notice, leave a bottom and notify the corresponding procurement department; Remind the
purchase to purchase, i.e. modify the inventory and remove the out-of-stock order from the out-of-stock record for delivery processing.

(6) Practical training information base: to provide teachers and students with inquiries, including question-and-answer forms and term interpretation.

According to the above needs to make a practical classroom management top-level diagram:

![Diagram of practical classroom management](image)

Figure 1. The top figure of training classroom management

The main function of the system is the application of the practical classroom, mainly involved in the group of administrators, teachers and students of the classroom. Students and teachers through the online application to submit a request to the higher vocational colleges practical training teaching management system, the system will apply for analysis and transfer to the practical classroom administrator for approval, the practical classroom administrator will indicate the results to the higher vocational colleges practical training teaching management system, the system will be left to the bottom of the results back to the applicant.

3. Overall system design

The teaching management system of higher vocational training based on a series of specific business applications is a solution to the management problems existing in the course of practical training of higher vocational and technical schools, and can meet the different needs of various user levels, and be able to highly integrated management, as well as distribute and count the whole management software.

3.1. Design goals and technical indicators

The teaching management system of higher vocational training itself is located in the internal network of the campus, on the basis of meeting the needs of the school must meet the design needs of convenient use, flexible operation and so on. The system should be designed with the following objectives in place:

- Allow students and teachers to check the classroom online;
- Allow students and teachers to apply online for the appropriate classroom;
- Be able to provide students and teachers with online relevant training materials inquiries;
- The practical classroom administrator can maintain the management and maintenance of the classroom and classroom-related equipment;
- The practical classroom administrator can review a student's or teacher's application for classroom use;
- The trainee administrator can review the terms of the repository submitted by the student or teacher;
- The practical classroom administrator can scrap the aging equipment and apply for new equipment to the system administrator;
The system administrator can manage the storage and purchase of devices accordingly; The classroom administrator can notify students and teachers about the classrooms they manage; For the user input data, the system to carry out strict data testing, as far as possible to eliminate human error; The interface design is beautiful and friendly, and the operation is simple.

3.2. The structure of the system
According to the results of demand analysis, the teaching management system of higher vocational training mainly includes four large modules: system management, basic information management, practical classroom management and information bank management.

The system management module mainly provides the management work of the basic operation time of the system, the operator is mainly the administrator at the system level.

The basic information management mainly includes some necessary data for the user during the operation of the system.

The practical classroom management module provides the status of the training room, the list of equipment in the training classroom, the status of the equipment, the number of people that can be accommodated, etc. The methods provided are also different for different objects of use.

Information base management is mainly the relevant practical knowledge entries entered at the beginning of the system operation, and there are different use methods for different roles. In the process of use, anyone can submit the words in the training to the system, after the training room administrator can query.

3.3. Build a development environment
(1) NET Framework 4.5 serves as the primary framework for development. .NET provides a stand-alone platform for developing software, brings its own highly secure network systems, and relies heavily on software components and component-oriented programs [5].

(2) Web Application Server: The IIS8.0 server is not the latest version, but it is superior in windows server 2019.

(3) Database: Microsoft SQL Server 2019, this database software is very powerful, often selected by large enterprise-level development, is a superior performance of the database. The database is powerful and fast to retrieve [6]. SQL Server database has achieved a great improvement in data processing speed, and the operation of the entire system is more stable, the database is currently allowed to use.Net Framework framework to build, is conducive to the relevant personnel to the system research and development and upgrade[7].

(4) The development IDE uses Microsoft's VS2019, compared to other development software, VS has a large number of integrated intelligent systems, so that you can discover errors in time for development, improve development efficiency.

3.4. The system directory structure
Because MVC is selected in the development of the system, the organizational structure of the directory is different accordingly. MVC is the abbreviation for Model-View-Controller. It is an application development development model, in J AVA is relatively long-term, in recent years Microsoft has also incorporated it into its own development framework, with the maturity of the development level, MVC this development model has a very good framework structure, it is worth mentioning that MVC makes maintenance very easy [8]. Other App_Data are files used to store the application database, Images folders to hold related picture files in the application, and Script to hold JavaScript files that need to be called.

3.5. Database design
The design of the database determines the dynamic operation efficiency and data integrity of the
hierarchical module. Based on the characteristic requirements of the design, the system software of Sql-server2008 based on the design model of E-R is used to realize the co-linking of entity properties with database data. Different entities can perform different entity functions based on the contents of the database they are designed to.

3.5.1 Database design principles
(1) Meet the third paradigm: the first paradigm is that the fields in the database table are single attributes and cannot be divided[9].
(2) Maintain data consistency: use transactional associated data to maintain database integrity.
(3) Increase efficiency: establish the corresponding database view, add indexes, etc.

3.5.2 Project entities
The practical training management system of higher vocational colleges includes users, roles, permissions, colleges, departments, practical classrooms, practical training projects, professional, equipment, equipment groups, classroom application forms, classroom application results forms, training results lists, information terms, inventory status lists, equipment orders, equipment entry orders, inventory lists, inventory and order lists and other entities.

3.5.3 System-related database tables
Each entity in the database corresponds to a table, so the system's database has a total of 17 tables, respectively: system role table, college table, department table, user table, permission table, practical classroom table, practical training project table, professional form, equipment table, equipment group table, classroom application form, classroom application results form, training end list, information terms table.

4. The modules in the system operate in cooperation
Depending on the different roles in the system design (primarily the four roles of system administrator, classroom administrator, teacher and student), the use rights after login are not the same, so there must be a user login module to distinguish between post-login interfaces and actions by logging in.

4.1. User login process
Login module using role-based authentication technology, according to the different user roles, we provide a different logon option and assign different usage rights[10]. The user through the browser to enter the system login page, enter the user's account and password, after clicking the submit button, the client javascript script will check whether the user's input is legal, if legal will submit the form, the server side to obtain the parameters in the form and then verify the legitimacy of the data again. The role is then entered into the appropriate main interface, and the user can leave the system by logging off when the operation is complete.[11]

4.2. Practical classroom management module process
The classroom management module contains four important processes: classroom application process, classroom application review process, classroom use end feedback process and practical feedback reading process.

Click the request classroom button to start the application process of the system, according to the corresponding prompts of the form to enter relevant information, trigger the client javascript script verification, if the input is not illegal, prompt to change the corresponding illegal data, if the legitimate submission form system will extract the user's requested classroom number.

For the feedback reading process, the administrator logs in and the system will query the classroom administrator's classroom under the authority of the classroom according to the number of the feedback form, if there is, list the unread feedback form, prompt reading.
4.3. Information bank module process
In the information base module process, there are two main roles involved, one is the system administrator, the system administrator needs to add a lot of basic information, and the other role is the classroom administrator, the main task in addition to the basic management of the classroom to review the submitted terms. The entire repository module contains the two main processes of submission and approval.

4.4. Basic information management module device management
In the basic information management module, equipment management includes the management process of equipment ordering and storage, in this part of the main operating role is system administrator, unified maintenance of hospital, department, professional, teacher registration information, student information entry, equipment registration and equipment inventory management. In the process of equipment management, the classroom administrator can scrap the device, when the classroom administrator found that the device can no longer be used can be scrapped online, and from the inventory to find the appropriate equipment as a replacement, the replacement process is a process of changing the device usage status information.

5. Conclusion
This paper mainly uses the current industry popular C# language, sql server 2008 and net 4.0 framework to develop a set of new practical teaching management system, which can meet the needs of professional colleges, and satisfy the teaching management norms of vocational colleges and modern exemplary practical training construction standards. They make a certain contribution to improve work efficiency, teaching quality and service capabilities, as well as to regulate the practice teaching management for vocational colleges.

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