Design of Public Course Teaching Evaluation System in Colleges and Universities Under Mobile Education Platform

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Abstract. In the construction of the public curriculum system in colleges and universities, it is necessary to evaluate the teaching of public curriculum in colleges and universities in order to improve the control of the key links of the curriculum system. Therefore, the design of a mobile education platform under the university public course teaching evaluation system. The module design of the system is as follows: the client module uses C/S architecture, the client is mainly responsible for data processing, the processed data is sent to the server, and the server stores it. The main task of server module is data preparation and data storage. The hardware configuration module configures the hardware of client and server respectively. Teaching evaluation module is mainly used for teaching evaluation of public courses in colleges and universities. The main function of the evaluation information query module is to query the evaluation information that has been made. The main function of the evaluation result management module is to view the evaluation result information. Evaluation summary module is the continuation of teaching evaluation module. The database module is responsible for storing the evaluation data. Through the combination of hardware and software, the teaching evaluation of public courses in colleges and universities can be realized. And the system is tested. The test results show that the function and performance of the system are good. It has great promotion value.

Keywords: Mobile education platform · University public curriculum · Teaching evaluation system · C/S architecture

1 Introduction

Public courses in Colleges and universities refer to the courses that students of any department or major in colleges and universities need to study, as well as the compulsory courses of basic theory, basic knowledge and basic skills for students of a certain discipline or major. Courses are offered in the form of compulsory or elective courses. The purpose of this kind of curriculum is to form the basic literacy of students and the basic knowledge and ability needed by a major, that is to form the public, general ability and common professional ability of students [1]. Public courses in colleges and universities should dare to make bold attempts, actively explore the goal, direction and

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way of reform, make overall planning for the current basic courses, and further optimize the curriculum model.

According to the characteristics and actual needs of college students' future career, the content of professional courses is constantly increased, break the single course public curriculum system in colleges and universities, and highlight the basic, comprehensive and professional functions of new public courses. For example, reference [2] studies the evaluation of structured teaching effect of hand hygiene knowledge for medical staff, and reference [3] proposed a study on users' attitude towards image archiving and communication system in Kum teaching hospital of Iran based on technology acceptance model. In short, the reform of the public curriculum system must be clear about the curriculum objectives, that is, to build a comprehensive public curriculum system from the three directions of curriculum quality, efficiency and development, to carry out the basic curriculum reform according to the special professional curriculum content, and to emphasize the "necessity" of future development, such as real-time reduction of curriculum, not only to reform a single basic curriculum, but also to improve the quality of curriculum, pay more attention to the overall optimization and construction of multiple courses.

The construction of the public curriculum system in colleges and universities should highlight the principle of people-oriented and ability-oriented, comprehensively and seriously select the curriculum content and knowledge, pay attention to the development direction of professional development, improve the application effect of theoretical knowledge in the future real life, and realize the teaching efficiency with the smallest curriculum structure as far as possible. Therefore, this paper designs a mobile education platform under the teaching evaluation system of public courses in colleges and universities. In order to evaluate the teaching of the public courses in colleges and universities in the construction of public course system in order to strengthen the control of the key links of the course system.

2 Design of University Public Course Teaching Evaluation System Based on Mobile Education Platform

2.1 Design Client Module

The client module is designed based on mobile education platform. The mobile client of the system adopts C/S architecture, and the client is mainly responsible for processing the data, sending the processed data to the server and storing it by the server [4, 5]. The advantage of C/S architecture is that it can separate data processing from data storage. The client is developed based on the mobile education platform. Finally, the client is installed on the user's Android mobile phone or other mobile devices. On the premise of accessing the network, the client logs in to the system and sends the teaching evaluation request to the web page. After receiving the user's request, the web page accesses the database to obtain the information of the user's evaluation, and finally returns the request result to the user in the end. The functions developed by the client include: user login, teacher information modification, user password modification and teaching evaluation. The main users are teachers and students. Mobile education platform

client provides a good interface for teachers and students to operate the corresponding functions conveniently [6].

The development tools used to develop the client module include:

① Java development kit - Java SE Development Kit JDK, the version used is JDK 8 UPDATE 101. After downloading, complete the installation according to the prompts.

② Eclipse, the IDE tool of Java, uses Eclipse 4.2.1 and installs ADT, a general plug-in supporting Android projects and tools. Eclipse is installation free. After downloading it, unzip it to the directory F:\Android\Eclipse.

③ Mobile education platform Android development kit, the version used is Android SDK_ r17-windows. After downloading, unzip it to the hard disk. Run the SDK manager, and the program will automatically detect whether it is updated. After selecting Updates/New and Installed, the file will be automatically downloaded to the F:\Android\SDK directory. Then add the tools path in the SDK to the system variable tools. The steps are as follows: right click "computer" on the desktop, select "properties" option, select "advanced system settings" on the properties page, and then click "advanced", "environment variables" and "system variables". Add "F:\Android\SDK\tools" to the system variable Path and click "OK" to save Save.

④ Android simulator can be created by using the Android SDK. The program can be tested directly through the virtual device AVD. After starting eclipse, select "Android virtual device manager" under the "window" menu to open the Android Virtual Device Manager window. Select new to create a new Android simulator. After the creation is successful, click the start button to start the virtual device. The virtual device interface consists of two parts, the left part is the display part of the simulated mobile phone, and the right part is the input part of the simulated mobile phone [7, 8].

2.2 Design the Server Module

The main task of server module is data preparation and data storage. The system server is written in Java and realizes the Web page through MyEclipse. The database mainly contains the information data of user, class, department, course and so on. On the server side, the system administrator has the highest level of authority, responsible for maintaining and managing the data, and can query, add or delete the data. The functions developed by the server include: user login, password modification, teaching evaluation and evaluation result query. The function diagram is shown in Fig. 1 [9].

2.3 Design Hardware Configuration Module

Under the mobile education platform, the main users of university public course teaching evaluation system are concentrated in the campus network, with a large number of people, large amount of business data and high requirements for system processing speed, which requires that the hardware environment of the system deployment must have advanced performance and strong processing ability. The hardware configuration of the server is determined by the system design, the amount of data, the number of users and the amount of concurrent access. Hardware configuration requirements are mainly considered from storage capacity, stability, running speed and other aspects. For this system, according

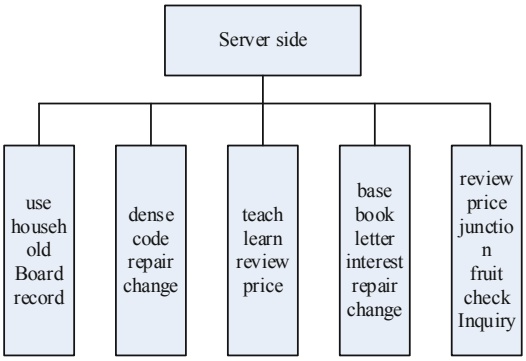

Fig. 1. Function diagram of server module

to the demand and the equipment that the school can provide, the IBM × 3850 server is used as the system server and Gigabit network card.

The hardware configuration of the client is CPU dual core 2.6 GHz and above, memory 2 G and above, hard disk 160 g and above, using more than 100 m network card.

2.4 Design Teaching Evaluation Module

Teaching evaluation module is mainly used for teaching evaluation of public courses in Colleges and universities. The student user can select the evaluation student to log in on the login interface, and input the student's account and password. If it is consistent with the database, the user can enter the student function information page, where the user can select the evaluation subsystem and query subsystem for corresponding operation. If the account password does not match, enter the prompt page. After successful login, students can modify and edit personal data in the query subsystem, such as personal basic information, account password modification and other operations.

In addition, students can view the courses that need to be evaluated, as well as the detailed introduction of these courses, such as the corresponding books and class hours, so as to have an intuitive understanding of the courses that need to be evaluated. In the teaching evaluation part, the system will judge the type of users, distinguish the users and students, teachers, school management, expert group members, and then issue different types of questionnaires for different types of users. Student users can fill in the questionnaire according to their own basic situation in class and submit it [10].

In the teaching evaluation module, using fuzzy mathematics theory to establish the teaching evaluation fuzzy evaluation model is the basis of the design. Taking teacher evaluation as an example, based on the theory of fuzzy mathematics, the evaluation factor set and comment set of teaching evaluation in the module are given in detail.

Evaluation factor set: for teacher evaluation, evaluation users are divided into four categories: students, teachers at the same level, expert group and leaders in charge. According to the different attention characteristics of four types of users, four different evaluation factor sets are designed to meet the personalized needs, as shown in Table 1, 2, 3 and 4.

Table 1. Student evaluation factor set

First level indicators	Secondary indicators	Score
Lesson preparation	Teaching preparation, content and attitude (10)	10
Lecture	Key and difficult points (10), language (10), inspiration (10), teaching aids (10), blackboard writing (10)	50
Task	Attitude (10), timeliness (10)	20
Educating people	Work attitude (10), requirements (5), care (5)	20

Table 2. Set of evaluation factors for teachers at the same level

First level indicators	Secondary indicators	Score
Teaching objectives and content	Teaching objectives (10), teaching contents (10), ideological education (10)	30
Teaching process and methods	Teaching methods (5), teaching media (5), the role of teachers and students (5), feedback control (5)	20
Instructional design	Organization ability (5), language expression (5), education mechanism (5), demonstration blackboard writing (5)	20
Instant effect	Student feedback (10), goals achievement (10), time standard (10)	30

Table 3. Evaluation factor set of expert group

First level indicators	Secondary indicators	Score
Teaching objectives	Thinking training (10), teamwork (10), value cultivation (10)	30
Instructional design	Objective design (5), student foundation (5), resource utilization (5), teaching students in accordance with their aptitude (5)	20
Teaching organization	Teaching ability (5), situation creation (5), teaching effect (5), classroom organization (5)	20
Teaching art	Classroom atmosphere (10), comprehensive measurement (10), teaching mechanism (10)	30

Table 4. Evaluation factor set of leaders in charge

First level indicators	Secondary indicators	Score
Routine assessment	Professional ethics (10), subject knowledge (10), teaching ability (10), cultural literacy (10)	40
Teamwork	Sense of participation (10), good at working together (10), unity and cooperation (10)	30
Continuing Education	Lifelong learning (10), changing ideas (10), research and innovation (10)	30

The evaluation factor set is stored in tables according to the first level factor set and the second level factor set.

The weight of comment set and evaluation factors is as follows:

There are four grades in the comment set: excellent, good, medium and poor. The corresponding scores of each two-level evaluation factor are: excellent: 9–10 points, good: 7–9 points, medium: 5–7 points, poor: less than 5 points; if it is a five point system, the corresponding scores are: excellent: 4–5 points, good: 4–3 points, medium: 3–4 points, poor: less than 2 points.

According to the analysis of the evaluation factors and considering the opinions of all parties, the weight values of the first level evaluation factors and the second level evaluation factors are set (see the table above respectively), and the weight values of the first level and the second level evaluation factors are given according to the percentage system in the table. According to the above weight value and the actual scoring situation, and calculate the total score of different teachers to be evaluated. In addition, the weights of students, teachers at the same level, experts and leaders in charge are set as 0.2, 0.3, 0.3 and 0.2 respectively, so that the scores of different evaluation users can be comprehensively considered and the final results can be given [11].

The fuzzy operators of evaluation factors are as follows:

According to the primary and secondary evaluation factors in the evaluation factor set and the collected student evaluation data, its membership can be determined. The fuzzy operator is weighted average operator. This method can take into account the weight of all evaluation factors, so that the evaluation results reflect the effect of all evaluation factors.

Finally, the fuzzy evaluation model is established: according to the set of evaluation factors, the set of comments, the weight value, and the user evaluation recorded after the system running, the collected evaluation records can be calculated according to the fuzzy evaluation method to get the final evaluation results. The main function of the module is to record the evaluation contents of different users in the database. In the client page design, the evaluation factors are presented in the web page design. After user evaluation, the data submitted to the background are processed according to different users, and the evaluation scores corresponding to the evaluation factors are obtained and stored in the database.

2.5 Design Evaluation Information Query Module

The main function of the evaluation information query module is to query the evaluation information that has been made, so as to facilitate students, teachers and management personnel to understand the evaluation information.

In the evaluation information query module, the personnel who need to query the evaluation information enter their own account name and password to log in to the module. For student users, you need to input the information to query, such as the course name, to query their own evaluation information of the course; students can view the basic information of the course and their own evaluation content, and can modify their own evaluation; as student users, they have no authority to view the evaluation information of other students. Teacher users and expert users also have the right to view their own evaluation contents of a course and the summary information of their own teaching courses, understand the students' evaluation of their own teaching, and understand and correct the students' feedback information; teacher users can only query their own teaching evaluation. School management users have the right to view their own evaluation information of some courses, and can query the course evaluation information of all teachers and the summary of evaluation results.

2.6 Design Evaluation Result Management Module

The main function of the evaluation result management module is to view the evaluation result information. This module contains permission control. Different users can only query the evaluation result information within their own permissions. The evaluation result management module can collect all the evaluation information in a certain way and analyze the data. The evaluation result management module is the most important module in the system, which classifies and summarizes the specific index results of student evaluation, peer teacher evaluation, expert evaluation and leadership evaluation, so as to obtain the overall evaluation results of a teacher. The evaluation results represent the opinions and suggestions of students, teachers, experts and leaders on the teaching level of the teacher. Teacher users can view the evaluation results of their own courses, so as to adjust the way of teaching. The users of the leadership can view the evaluation results of all teachers, so that the school leadership can have a comprehensive grasp of the teaching ability of the whole teaching team, and reasonably formulate the corresponding incentive measures.

The evaluation results management module can also generate evaluation reports according to needs for users with permission to query and download. In addition, the specific method of classification and summary of the evaluation result management module can be changed. If the administrator gets a better evaluation and statistical method, the new algorithm can be implemented in the module.

2.7 Design Evaluation Summary Module

Evaluation summary module is the continuation of teaching evaluation module, the core content and goal of the system, which reflects the existence value of teaching evaluation system. The summary function of evaluation results reflects the level of a teacher's

teaching ability, is the feedback of the teacher's teaching level, and also provides the school leadership with the opportunity to fully understand the teaching level of teachers. The evaluation summary module needs to summarize all the evaluation contents in the database, which involves the operation of a large number of data. Therefore, the evaluation summary function can only be implemented after all users or the vast majority of users have completed the evaluation. The system manager will submit the evaluation summary request, and the system will start the evaluation summary and get the evaluation summary results, and save the evaluation summary results to avoid errors. The summary without evaluation is carried out many times, resulting in unnecessary waste of resources.

The evaluation summary module is started by the system administrator, which will call Java background class to access the database, classify and summarize according to the first level evaluation factors of different users, and store the summary results in the database table. After the summary results of the four types of users are completed, the total evaluation results are obtained, which are also saved in the database.

2.8 Design Database Module

In order to achieve the functional requirements of the teaching evaluation system, it is necessary to store the evaluation data. There are a large number of users in the teaching evaluation system, and the main users are teachers and students. The personal information storage of a large number of users can not simply use the file mode, but should use the efficient data storage scheme database. Database was born to solve the problem of large amounts of data storage. Database table is the core infrastructure of the whole teaching evaluation system. The design of database table is generally directly related to the efficiency of data extraction and preservation, especially for big data.

Database conceptual structure design is the core part of database design. Its purpose is to find out the relationship between different entities in the real world, and get the entity relationship diagram (ER diagram). ER diagram reflects the relationship between objects and their attributes in the database [12, 13]. The system database file is to be deployed and managed on the specific database management system, so the database management system used in the system is selected, and the corresponding restrictions should be followed when designing the conceptual structure of the database. E-R relational model is the most commonly used tool for database conceptual structure design. E-R relational model is an abstract concept in reality, which is not restricted by the specific implementation environment of the system. E-R diagram consists of entity, attribute and relation. Entity: entity is the real existence in the objective world, which can distinguish each other. Entity can represent a kind of concrete things, can also represent a kind of abstract things. For example: customers, orders, contracts, etc. are entities. Attribute: the characteristics of things in the objective world are called attributes. The order number, signing date, goods, quantity, etc. are attributes of the order entity. Any entity must have one or a group of primary attributes. The primary attribute can distinguish the entity from other entities. The primary attribute of an order is the order number. Connection: the relationship between entities is called connection. Connections include "many to many", "one to one" and "one to many". For example, a demand plan can only belong to one department of the company, while the relationship between demand plan and department of the company is many to one. There is no definite boundary between entity

and attribute. At present, the commonly used method of dividing entity and attribute is to follow two principles: one is that the attribute does not need to be described any more, and it is already the smallest data item, such as the order number, which is a string of symbols without any other characteristics; the other is that the attribute cannot be associated with the entity. The E-R diagram is designed according to the main function modules, the main user information and the information to be stored of the teaching evaluation system obtained in the demand analysis stage.

The logical structure design of database is to transform the conceptual structure model of database into the relational model supported by database management system. The design of the logical structure of the database is restricted by the selected database management system. The implementation of the database of the university public course teaching evaluation system under the mobile education platform is realized on the MySQL database management system.

As the E-R relational model of database is an abstract expression of the real world, it is not limited by the specific database system, but also can not be directly applied by the database system. When designing database conceptual model, it is necessary to transform per model into data relation logic supported by database system. The basic requirement of database logical structure design standardization is to meet the paradigm of 3NF. The logical model of teaching evaluation system is processed according to the standard of 3NF. After analyzing the concept model, the specific database table is designed.

3 Simulation Experiment Test

3.1 Experimental Design

From two aspects of function test and performance test, this paper tests the teaching evaluation system of public courses in Colleges and Universities under the mobile education platform.

System testing is to deploy the prepared software and hardware, network equipment and other equipment to form a whole system and run it, and then carry out various assembly tests and confirmation tests of the system by professional testers. System testing is to test the whole application system. The objective is to find out the difference between the realized system and the customer's requirements, find out the dissatisfaction with the customer, and then respond. In this test of teaching evaluation system, two different test methods are used: black box test and white box test. Black box testing refers to the ability to complete the given output according to the given input, which is generally completed by the program testing engineer. In this test process, the black box test is used to test whether the function modules of the software system are completed, and check whether the software has completed all the required functions of the requirements specification. White box testing means that developers can export the correct results through the analysis of program code and structure, which is generally completed by developers.

3.2 Test Results

Function Test Results

In the function test of the university public course teaching evaluation system under the mobile education platform, observe whether the input and output functions of the system can operate normally; whether the functions of student evaluation, user query, evaluation factor management are consistent with expectation.

Take user login, student evaluation function and evaluation factor modification function as examples, as shown in Table 5.

Table 5. Test examples of user login function, student evaluation function and evaluation factor modification function

Serial number	Test content	Test method	Test results	Remarks
1	User login function	Enter the correct student account and password, click the login button, you can enter the system, enter the wrong student account and password, and jump to the account and password error page	(1) The correct account can enter the system, and student users can not enter the unauthorized module (2) Wrong account and password cannot enter the system, jump to the error page	Nothing
2	Student evaluation function	Click the evaluation button to enter the evaluation page. After filling in the evaluation content, you can submit the evaluation normally	(1) Be able to enter the evaluation page (2) Be able to fill in the evaluation content (3) Be able to submit evaluation content normally	Nothing
3	Modification function of evaluation factors	Administrator users can log in with their own account, enter the maintenance subsystem, enter the evaluation factor modification page, change and save the evaluation factors, and view the changed evaluation factors on the evaluation page	(1) The administrator can modify the evaluation factors after entering the evaluation factors modification page (2) The administrator checks the evaluation page to confirm that the evaluation factor has changed	Nothing

Performance Test Results

In the performance test of the public course teaching evaluation system in colleges and universities under the mobile education platform, the running performance of the system is tested, such as the system response time, and further determine the timeliness and stability of the system response.

The performance test results show that the system has good timeliness. After a certain period of operation, the system shows high reliability.

After the function test and performance test, the teaching evaluation system solves the problems found in the test. At present, the system has been running, and the customers reflect that the system is running well.

4 Conclusion and Prospect

Under the mobile education platform, the use of university public course teaching evaluation system has changed several aspects of teaching

(1) The management mode of the teaching management department has been changed: the teaching management department is no longer limited to the traditional management mode. It can quickly and accurately grasp the evaluation data of students and teachers through the real-time statistics of the system, which makes the teaching method reform faster and more efficient.
(2) Promote interaction between teachers and students: students can truly and objectively evaluate a teacher's teaching level, so that teachers can quickly know the result. In fact, it is also interaction between teachers and students.
(3) Improve the teaching level and quality of teachers: through the system, teachers can quickly know the evaluation of students and teachers, and also enable teachers to quickly adjust teaching methods to adapt to students' learning and improve the quality of teaching.
(4) Greatly increase the enthusiasm and interest of students to participate in teaching activities: through real-time teaching evaluation, let students feel that they have a way to express the views of teachers' teaching level, greatly increasing the enthusiasm of students to participate in teaching activities.
(5) It evaluates the labor value of teachers more scientifically, systematically and efficiently.
(6) However, this study only tests a small number of teaching content and samples, so the next research will expand the teaching sample data to test and optimize the effectiveness of the design system.

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