

Research Article

Research on College English Teaching Evaluation System Based on Mobile Terminal

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The 21st century is the era of information technology, and the rapid development of information technology has had a huge impact on educational technology. With the popularity of mobile terminals in recent years, the development of mobile learning will promote changes in the way teaching, learning, and assessment are conducted. Traditional teaching evaluation methods focus on summative evaluation, although process evaluation is also involved, although it is limited by time and assessment recording means and does not achieve the purpose of evaluation well. In this study, we conduct a research on the evaluation system of secondary school chemistry classroom teaching based on mobile terminals and construct an evaluation index system of English teaching in colleges and universities based on mobile terminals, hoping to have some practical significance to the reform of teaching evaluation nowadays. The system uses the WeChat applet framework, the WeChat Web developer tool to output and display the front-end interface, and the Model-View-Controller framework development model to complete the invocation of the backend data. The results show that both students and teachers can access the assessment system through the WeChat applet and complete the teaching assessment and view the assessment results.

1. Introduction

The new generation of information and communication technologies such as big data, mobile Internet [1], and cloud computing [2] has profoundly affected our teaching methods. With the emergence of various online teaching platforms, these various informatization methods have given our classroom teaching wings to take off [3], which promote the transformation of teaching methods, learning methods, evaluation methods, and teaching and research methods with the support of information technology, integrate information technology into the cultivation of students' independent learning ability, discovery and problem-solving ability, thinking ability, and innovation ability, and effectively improve education information service quality education and promote students' comprehensive and individual development.

The level of higher education is crucial to the development of a country [4]. As one of the means to improve the

level of higher education, informatization is favored by education management departments at all levels. Teaching evaluation is an important means to reflect the effects of teaching, the quality of teaching, and the interactivity of teaching. The assessment of teaching quality through information technology is an important part of higher education. At the same time, education and teaching are a systematic process in which teachers, students, or administrators need to receive timely feedback and make targeted adjustments or improvements to form a positive cycle and continuously improve the quality of training students. Now that smartphones are widely used by students in higher education, it has become practical for students to use mobile devices to evaluate the teaching of their courses (assessment).

By deconstructing the informational teaching classroom, this study clarifies the principles and evaluation objectives of informational classroom evaluation [5], theoretically determines the framework of the teaching evaluation system

based on mobile terminals, and constructs an evaluation index system, which not only enriches the research content of English classroom teaching evaluation in colleges and universities, but also provides a new perspective for the development of informational teaching and is of great theoretical precedence.

With the development of campus information technology, online assessment systems have emerged, making the way of assessing education more diversified. Based on the browser/server model [6], the university student assessment system processes the university teaching evaluation on the Internet and realizes the functions of filling in and answering the English assessment questionnaire, the statistics of the assessment questionnaire, the enquiry of the assessment questionnaire, and the update of the assessment questionnaire. However, the implementation cycle of this kind of teaching evaluation system is long and the operation speed is slow. An online assessment system based on the WeChat platform, which uses the WeChat public platform for online assessment, provides an interface for interacting with users with messages, and using this interface, it is possible to realize interaction between teachers and students. However, not only does the implementation of the system need to rely on a third-party server, but also the data upload is prone to failure.

This paper proposes to design a mobile-based WeChat applet system for English assessment in higher education [7], including user information display, online assessment, feedback, and assessment result query. The system is developed using the Model-View-Controller (MVC) framework with the help of the WeChat Web developer tool. The online assessment system has been improved to ensure that the assessment results can be viewed while teachers and students are completing their assessments.

2. Architecture Design of the Assessment System

The construction framework of the data management system is designed according to the existing management system of the school. There is no need to modify the indexes and related contents of the original attendance record form. The construction of the data management system of lectures and teaching evaluation fundamentally changes the current data management mode of lectures and teaching evaluation. Teachers can directly fill in relevant lectures and grades in the system, and teachers can consult relevant teaching evaluation information and suggestions anytime and anywhere. Compared with the current class evaluation data management method, the teacher evaluation data management system is paperless, which greatly reduces the collection and statistics of class records printed by academic staff, improves work efficiency, and improves the accuracy of class evaluation and data. It can make classroom evaluation data digitized and informatized and further promote the construction of teaching management informatization.

The system uses a WeChat applet to present the system interface. The server is implemented in Java and uses the WebSocket standard protocol, which supports Secure Socket Layer (SSL) protocol encryption. The PHP scripts deployed

on the server are accessed via the `wx.request()` hypertext transfer protocol. PHP can connect to almost all major databases and is used in conjunction with MySQL for online interaction between teachers and students, online assessment, and viewing of student information, as well as allowing students to ask questions and leave comments. The architecture of the assessment system consists of five layers: application presentation, web, functional, technical, and database (see Figure 1).

2.1. Application Presentation Layer and Network Layer.

The application presentation layer is divided into two parts: the WeChat applet side and the global wide web (Web) server side. The framework for the applet side utilizes its own Multipurpose Infrastructure for Network Applications (MINA) framework [8]. The applet side is displayed on the WeChat platform and is linked to the network layer by the socket WebSocket protocol [9]. The server side is displayed on the applet page and is linked to the network layer via the HTTP network protocol. The network layer is where the client accesses the system's server via the network, and the applet uses the WebSocket standard protocol, which requires a secure socket protocol certificate. The web side accesses the system server through a browser, mainly using the router connected to the PC for network transmission and access.

2.2. *Functional Layer.* The functional layer is modularized according to the functions of the system and consists mainly of a user information module, an evaluation module, and an evaluation feedback module. The web server side can be divided into user information management, assessment management, and system maintenance management modules. The user is divided into two different parts: the student and the teacher, and the following is an example of the process of designing the WeChat applet.

- (1) Student terminal design. The main function of the student terminal is to display student information and to evaluate and leave comments on teachers. Teachers are evaluated by absolute ranking and scoring. Ranking of teachers means that students rank all teachers in the term in descending order of satisfaction. Scoring refers to the rating of individual teachers by star rating and comments. Student information and absolute ranking of teachers are integrated on a single page, with students dragging the course up and down to complete the ranking. Star ratings and comments are integrated on a separate page, where students can score up to 5 stars by clicking on the star icons, which are implemented in a separate collapsed box under each course name, normally hidden. The system automatically uploads and saves the assessment information to the database after the student has completed the assessment and exits.

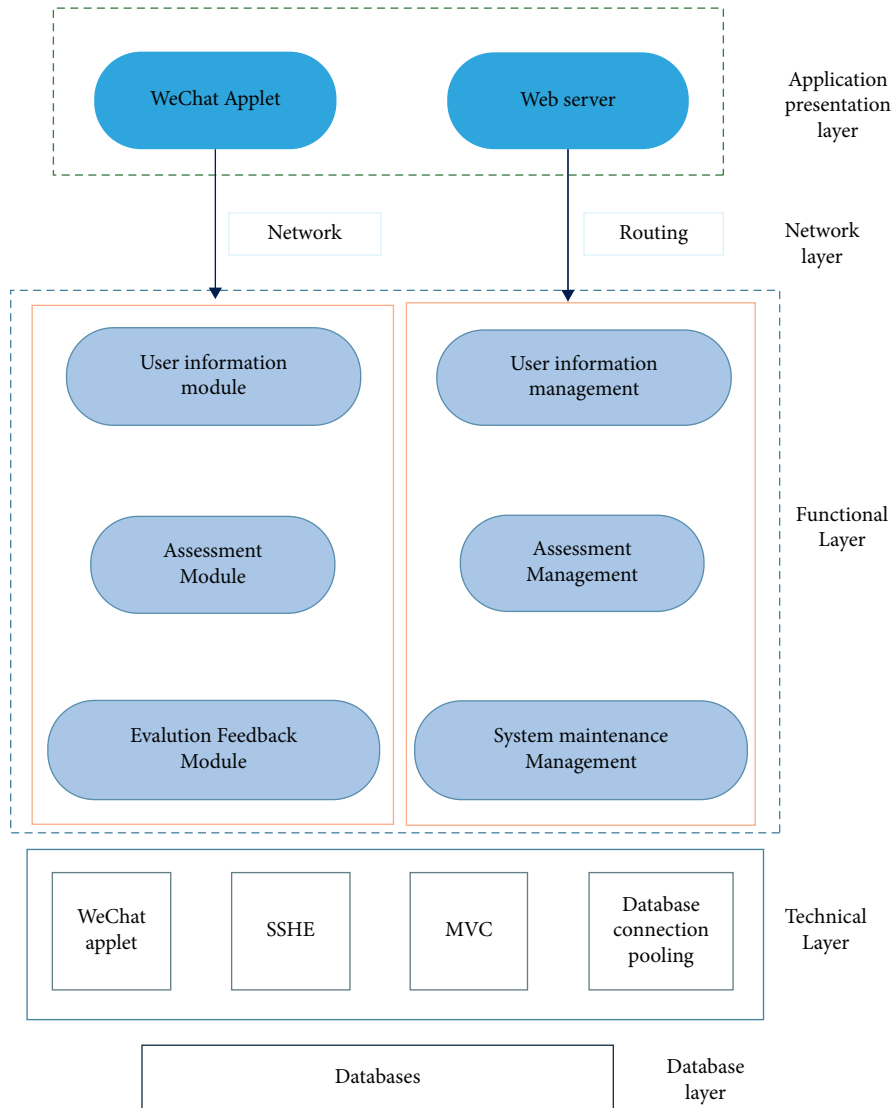


FIGURE 1: Architecture of the English assessment system in higher education.

(2) Teacher side design. The main function of the teacher side is to display the teacher’s user information, course information, and student assessment information. All this information is integrated on one page. The user enters the Mini Program through WeChat, and the Mini Program can directly manipulate the database by calling the JavaScript language script. First, it sends a “Request” to the server, and the server calls the public interface class “HttpServletRequest” object to receive the request information and stores it in the database after the request is responded. The data is reflected in the applet.

The data in the applet is stored in the JS file in the “data.” The data includes data for interaction with WXML, data for page presentation. The data is set up and initialized via a network request or some logical processing. A new page is opened using “wx.navigateTo.” To pass the data to the new page, it is necessary to append the Uniform Resource

Locator with the form “? key = value,” with multiple parameters separated by “&”. The new page will be restricted to load, so write an “options” parameter to the onload method and use “options.name” to get the data to be passed to the new page.

Another way to transfer data to the new page is to use wx.setStorageSync (“people,” this.data.people) to save the data and then use wx.GetStorageSync (“people”) to take out the data as it is. Keeping the data as it is to be transmitted should be achieved through the “type” value in “data.” Different “type” values will display different characters. Use the js file for corresponding preprocessing to convert the “type” value to the corresponding character display.

2.3. *Technical Layer Design.* The technical layer consists of the WeChat applet, the backend (struts spring hibernate easy, SSHE) framework, MVC pattern, and database connection pool [10]. The applet side is mainly developed using the WeChat Web developer platform. The server

environment is implemented in Node.js and developed in Java. The development is done in Java. The backend is developed using the SSHE framework, implemented in Java, and the interaction with the database is designed and implemented using PHP scripting.

2.3.1. WeChat Applet. To develop an assessment system using WeChat applets, you need to use the WeChat Web developer tool and firstly, you need to apply for and register an applet account. The AppID is the identity of the applet on the WeChat platform, which is determined by the WeChat client, and uses the high-level interface provided by WeChat. After registration, log in to the developer tool and select the default Generate Folder framework to access the applet development page. WeChat applets are developed using the MINA framework, which is divided into three parts: the view layer, the logic layer, the application software and the system layer. The view layer contains two types of files, WXML and WXSS, whose function is to build the structure and presentation of the page view and to provide a description language for the view layer. The application interfaces, the operating environment of each platform, borrow API interfaces [11] to be able to use the client side; the applet has only one AppService, which is permanently occupied in the life cycle memory. When the data changes, the AppService sends the change information to the view, which triggers the page update of the view layer, and the view notifies the triggered event to the AppService for business processing [12].

The WXML and WXSS documents, the JavaScript-based logic layer framework and the data transfer and event system between the view and logic layers, bring convenience to developers who just need to do the data and logic and then fill in the blanks. Based on the viewer kernel, WeChat has completely refactored and optimized a built-in parser to act as a runtime environment for applets, which can execute more efficiently than traditional HTML. The applet interacts with the system through the WeChat APP, gaining system privileges such as network communication status, data caching, etc., and generating a native APP-like user experience.

2.3.2. The MVC Model. MVC pattern stands for Model-View-Controller pattern. This pattern is used for layered development of applications. A model represents an object or JAVA POJO that accesses data, and it can also have logic to update the controller as the data changes. View represents the visualization of the data contained in the model. Controllers act on models and views. It controls the flow of data to model objects and updates the view as the data changes. It separates the view from the model.

The MVC model is divided into three layers, namely, the visualization layer, the control layer, and the data access layer. The specific MVC pattern is shown in Figure 2.

In Figure 2, the controller is used to call up the database model, manipulate the data through the model, and display it on the front-end view page. The layered design is highly

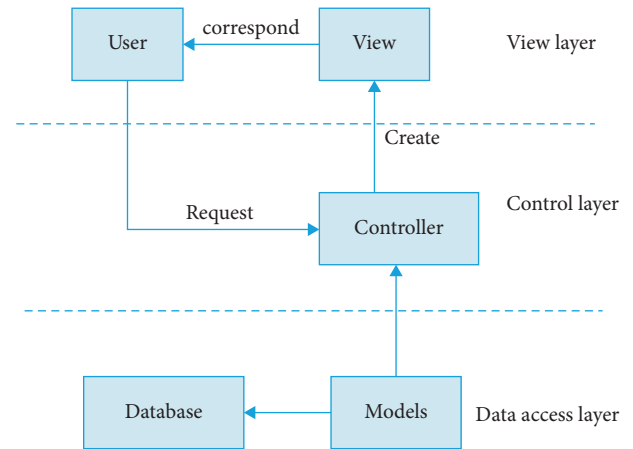


FIGURE 2: MVC model.

cohesive and low-coupled, making it very easy to maintain the system at a later stage, and new functions can be added simply by adding the appropriate code between the layers. Each WeChat applet contains three files: app.js for logic implementation, app.json for public settings, and app.wxss for public forms. The system is developed using the MVC model; the interface is written in WXML and WXSS, and the framework is wrapped in bootstrap; the logic layer uses the jQuery library [13] for the document object model; the database uses MySQL. MVC structure based on PHP, data, and page separation, using SQL statements to extract data from the database and generate JSON format data, returned to the foreground program foreground program using JSON data to generate visual graphics for data display.

2.3.3. Servers. The framework of WeChat applets includes two parts: client and server. The server technology of applets is quite different from the technology of website construction. As far as the framework SSHE technology adopted by the teaching evaluation system is concerned, the MVC framework is well implemented. The front-end program can write the front-end interface, supported by the PHP programming language. The PHP backend file of the server is agreed and generates the corresponding JSON data set. The development of the assessment system requires a database to be called upon. There are dynamic websites in the applet that require data interaction with the backend server, and the common languages that support dynamic websites are Java, PHP, and ASP. As WeChat is a mobile-based APP application, PHP's unique syntax is more efficient and powerful compared to other programming languages, it executes dynamic web pages and dynamic pages faster, it executes compiled code very well, it allows for optimization and encryption of code, and the security of the system is high. PHP can also connect to almost all major databases and is often used in conjunction with MySQL.

2.4. Database Design. According to the requirements of the system function, the database function is mainly reflected in the preservation, update, and query of all kinds of information. The system mainly includes student information,

teacher information, curriculum information, teaching evaluation information, and administrator information. A database named xspjDB is designed, which contains the data tables corresponding to the above main information, plus some auxiliary data tables such as semester information and course information. The database layer mainly maintains the persistence of data and performs data interaction with the applet. The design of the database involves the information table and the result table, including the processing information table, the result table, and their relationship with each other [14, 15]. The teaching evaluation system includes three information tables for students, teachers, and courses, as well as two result tables for teaching evaluation order and evaluation information feedback. The following 5 tables are linked through the course information to transform the many-to-many relationship between students and teachers into a one-to-many or one-to-one relationship. The user accesses the PHP script deployed on the HTTP server via `wx.request()`. When the order of the data on the evaluation page needs to be adjusted, the `set data` method is called in the JS file to modify the original data and PHP operates on the database according to the parameters passed by the resulting applet. For the assessment system, students are assessed anonymously. Therefore, it is essential to have a secure and reliable database for the data, and it is safe to use the PHP script to manage the data. The database management system provides a constant state of protection for real-time data in the database against malicious attacks and intrusions from outside.

Data preprocessing: The administrator account is used to export the evaluation data from the educational administration system, and the exported data is stored in Excel. A student's rating of an evaluation of a course is one. The record includes academic year, semester, teaching evaluation stage, class, course name, teacher name, evaluation content, grade, and teaching evaluation time. This data only uses the relevant fields of teaching evaluation and does not contain the basic information of classes and courses, so it is impossible to conduct a more comprehensive correlation analysis. In order to expand the analysis scope and improve the analysis model, the list of courses undertaken by each discipline is obtained from the Teaching Office, which contains the information of course name, major, class hours, credits, theoretical class hours, experimental class hours, total number of classes, course categories, examination methods, teachers, and so on.

Navicat for MySQL database management and development tool is used to import data into the database. The tool can visually import data from Excel into the MySQL database, which is convenient and efficient.

The details of each of the five data tables, including student information, teacher information, course information, assessment information and feedback, are shown in Tables 1–5.

3. Implementation of the Teaching Evaluation System

3.1. System Login. When entering online evaluation, users do not need to register and password settings, nor do they

need to authorize WeChat users to log in to obtain user public information (avatars, nicknames, etc.) but use the user's account and password to log in, directly enter the account password, and verify the user's identity information. The user enters the account number and password and clicks the login button. The specific login process is shown in Figure 3.

3.2. User Information. The realization of the user information module includes two parts, one is to display the information in the database to the front-end page, and the other is to realize the hiding function of part of the information to highlight the teaching evaluation module [16]. When displaying, the applet uses `wx.Request` to request the corresponding data, and the backend server starts to accept the data after receiving the request. At this time, the console will print successful submission and submit complete information, and PHP writes the backend server response code to display user information. The hidden function mainly uses the bubble event (`bindtap`) to define the folding information and then uses the ternary operator to expand the hidden box [17].

The personal page contains user information and a dynamically adjustable evaluation form. Each line of the form contains a serial number, course, and instructor. The display process is realized through the native API of the WeChat server, and the API interface is `wx`. At the beginning, take the `Callback` function as a parameter to monitor the occurrence of an event. When the event is triggered, call the `Callback` function to obtain user information or perform local storage. Before displaying the personal page, the applet first accesses the database, obtains the data to be displayed, and stores it in the data of the JS file, which interacts with the personal page by the JS file. When the user exits the page, the data in the JS file will be stored in the database. If some data processing methods are involved, these methods must be written into the JS file in case they are needed.

3.3. Teaching Evaluation Process. The system module consists of three parts, namely, the module of record management, the module of result management, and the module of system management, which can initially realize the collection and management of data of lecture evaluation and teaching. The system module is shown in Figure 4.

In order to make the teaching evaluation system of more operability, for users of the teaching evaluation system, the content displayed by the evaluation information management module is different for the users of the evaluation system. To make the evaluation of teaching more maneuverable, the original traditional scoring mode was changed to a sorting mode, and the students would sort the teaching effect according to their ideas to teachers from high to low. After the saving is successful, the system will upload the results of the teaching evaluation to the backend database. The flow of the teaching evaluation system is shown in Figure 5.

TABLE 1: Student information data.

Serial number	Column name	Data type	Length/byte	Identification	Primary key	Null allowed
1	XSID	Int	4	Yes	Yes	No
2	XSTM	Varchar	50	—	—	No
3	DLZH	Varchar	50	—	—	No
4	DLMM	Varchar	50	—	—	No
5	XY	Varchar	50	—	—	No
6	BJ	Varchar	50	—	—	No
7	ZY	Varchar	50	—	—	No

TABLE 2: Teacher information data.

Serial number	Column name	Data type	Length/byte	Identification	Primary key	Null allowed
1	JSID	Int	4	Yes	Yes	No
2	JSTM	Varchar	50	—	—	No
3	DLZH	Varchar	50	—	—	No
4	DLMM	Varchar	50	—	—	No
5	XY	Varchar	50	—	—	No
6	ZY	Varchar	50	—	—	No
7	ZC	Varchar	50	—	—	No

TABLE 3: Course information data.

Serial number	Column name	Data type	Length/byte	Identification	Primary key	Null allowed
1	KCM	Varchar	50	Yes	Yes	No
2	KXJS	Varchar	50	—	—	No
3	KCID	Int	4	—	—	No
4	KHMC	Varchar	50	—	—	No
5	BHID	Int	4	—	—	No

TABLE 4: Teaching evaluation result data.

Serial number	Column name	Data type	Length/byte	Identification	Primary key	Null allowed
1	KCID	Int	4	Yes	Yes	No
2	XSRS	Int	4	—	—	No
3	KCMC	Varchar	50	—	—	No
4	PJJG	Varchar	50	—	—	No
5	PJFS	Float	20	—	—	No
6	PJLY	Varchar	500	—	—	No

TABLE 5: Feedback data of teaching evaluation.

Serial number	Column name	Data type	Length/byte	Identification	Primary key	Null allowed
1	KCID	Int	4	Yes	Yes	No
2	XSRS	Int	4	—	—	No
3	KCMC	Varchar	50	—	—	No
4	PJJG	Varchar	50	—	—	No
5	PJLY	Varchar	500	—	—	No

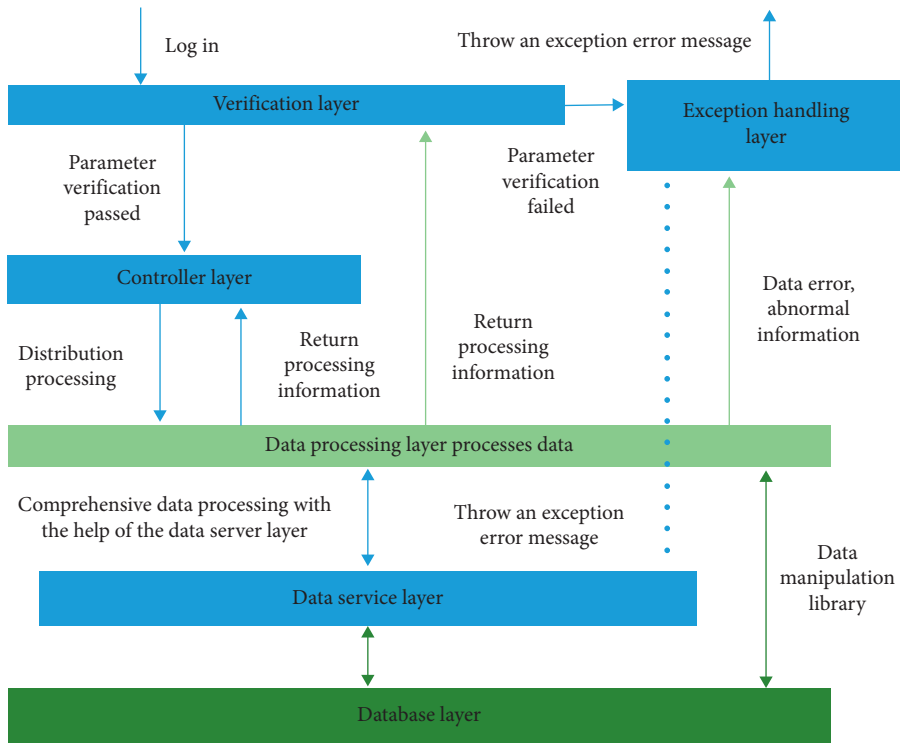


FIGURE 3: Login process.

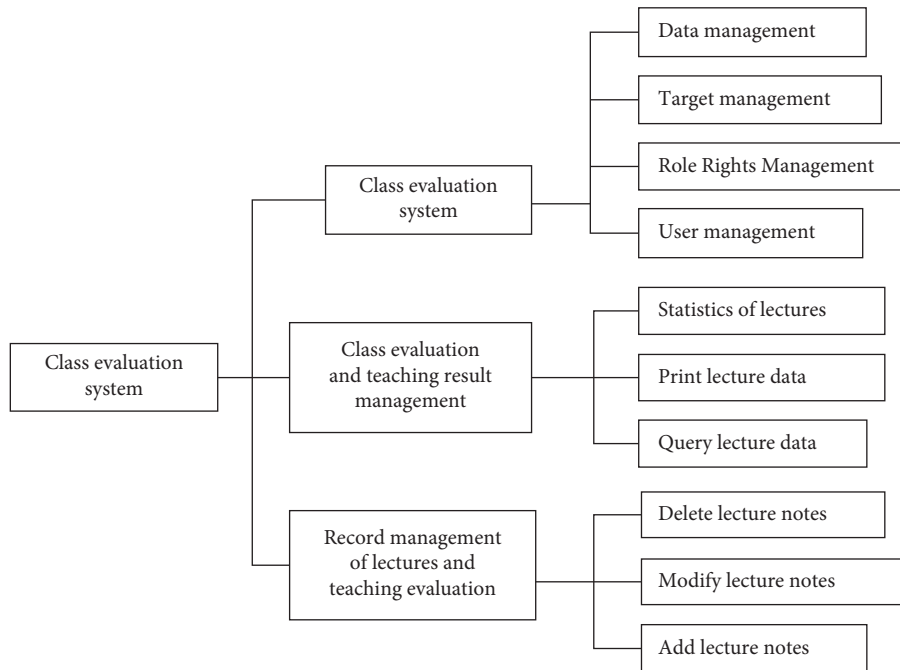


FIGURE 4: Lecture evaluation system module.

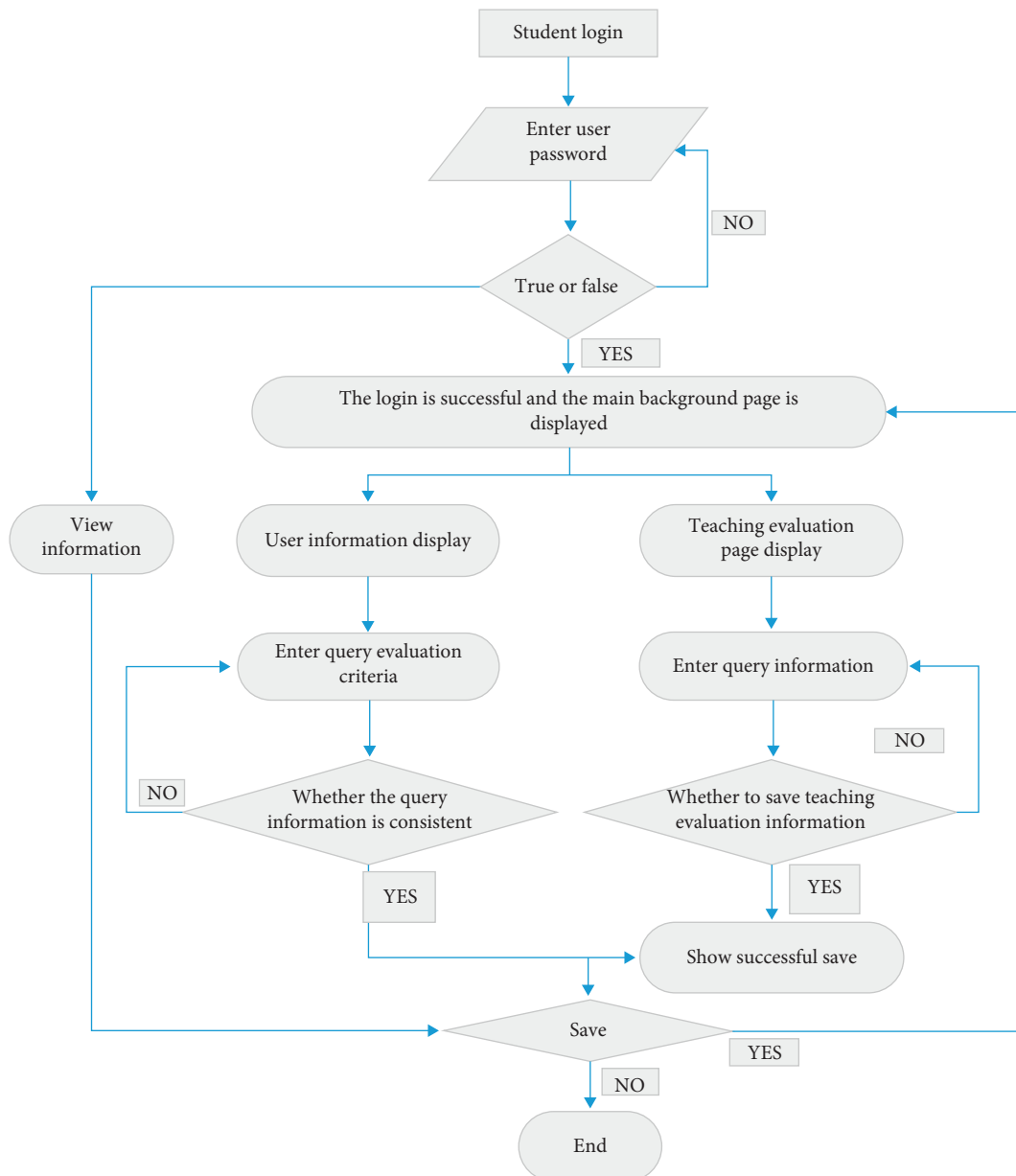


FIGURE 5: Teaching evaluation process.

4. Conclusion

This paper designs a mobile terminal-based WeChat applet college English teaching evaluation system, which is developed using the WeChat Web developer platform, and the server environment adopts Node.js implementation, the use of Java language to complete the development, through the use of MVC framework development mode, with the help of PHP language scripts and other technologies, compared with the use of browsers, WeChat platform, and other evaluation systems; the WeChat applet evaluation system has more comprehensive functions, so that students and teachers can enter the teaching evaluation system through

the WeChat applet to complete the teaching evaluation and view the results of the evaluation.

From a practical point of view, the research significance of this article is to give full play to the role of classroom teaching evaluation, which has an important impact on improving the quality of classroom teaching, helping students grow, and improving teachers' abilities. The mobile terminal-based college English teaching evaluation system constructed by this research can provide a reference for college informatization classroom teaching evaluation, help college English teachers update outdated teaching concepts, improve classroom teaching methods, and change the classroom evaluation model.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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