A teaching assistant system for big data analysis

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Abstract. With the rapid development of big data analysis, cloud computing and mobile computing, the demand of teaching auxiliary processing and students' online learning in colleges and universities depends more and more on information system. According to the latest view of pedagogy, teaching evaluation is gradually turning to the "accompanying" education which is data-based and tracking the whole teaching process. In order to improve the current situation that the function of single teaching assistant system is limited, the information island caused by the expansion of multiple teaching auxiliary systems, and the situation that process data is not paid attention to, this research develops a complete educational administration and teaching auxiliary system, so as to promote the collection, processing and analysis of more, more detailed and higher frequency teaching real-time data.

1. Introduction

At present, many researches have analysed the teaching strategies, teaching models, teaching design, teaching content, teaching reform, teaching innovation, teaching optimization, teaching evaluation, interactive classroom construction, teachers' innovation ability, specific application of big data technology and Reflection on the method of using big data mode from the perspective of teaching practice application The quality and effectiveness of substitute course teaching. In specific application cases, it is concluded that we should change from experience teaching to evidence teaching, or from experience first to data priority. By using online classroom, MOOC and micro class platforms, the teaching functions of online communication, on-site voting questionnaire, in class test, teaching resource push and process incentive are realized [1]. Meanwhile, students' feedback data and information (including questions, dialogues, expressions and other information) are obtained and delivered to the teaching layer by layer [2]. When it comes to teaching strategies and data analysis, we should integrate the strength of teachers and technical teams to screen and optimize the use of massive data, and advocate cooperation [3]. The data feedback of mobile cloud teaching platform is used for data visualization, and the full sample of big data is used as the basis for formative evaluation of the course, and the overall design of the course content is carried out [4]. The traditional post evaluation should be changed, and the process evaluation model should be adopted by using data.

The widespread use of modern information technology in the classroom has becomes a trend. Teachers should make full use of big data to effectively implement the diagnosis and analysis of learning situation, intelligent resource push, cloud learning activities and support services, record learning process and multi intelligence evaluation [5]. However, how to use big data to improve teaching accuracy? Information fusion is a feasible method based on big data.

Information fusion, also known as data fusion technology, is a new technology for comprehensive processing of multi-source information. It can intelligently synthesize multi-source information from a certain target, and produce more accurate and complete estimation and judgment than single information source [6]. Generally, information fusion system and information fusion algorithm are common research contents. Information fusion research pays more attention to teaching evaluation in the field of teaching, and proposes a teaching reform evaluation model based on big data analysis and one-way information teaching integration [7]. It can integrate a variety of factors, such as student scoring, examination results, students' historical performance, to comprehensively evaluate the current teaching and give a more objective and fair teaching evaluation [8].

Some special software development companies in China have developed a relatively stable educational administration management system according to the basic educational management needs of colleges and universities. The system can realize the functions of managing course information, course selection registration, opening courses, student information, teacher performance management, student performance management and information statistics. The functions of the system are more comprehensive than those described above. However, there are still some problems such as teachers and students cannot interact in time, and there is still room for further optimization.

In addition, there is a more feasible way for the industry, that is, to purchase software systems with different functions from different software developers, each system has its own login module, and then develop a unified authentication login module to enable users to jump to each subsystem after logging in once. This method is easy to cause the problem of data island, the data of each functional subsystem is difficult to fuse, and it is difficult to implement big data analysis.

Taking the generation, flow and transformation of dynamic learning data in smart classroom as an opportunity, the research [9] introduces the concept of adjoint evaluation, and constructs the design framework of accompanying evaluation from five aspects of evaluation time, purpose, content, subject and tool, combining with the three nodes of situation diagnosis lesson preparation, interactive participation teaching and achievement test transfer in smart classroom.

Research [10] Based on the practice of Tsinghua University Affiliated High School for many years, through the record system, evaluation system and data application system, an electronic platform is constructed to provide students with comprehensive behaviour recording and evaluation, so as to promote the comprehensive development of students, promote the deepening of school education and teaching reform, and provide useful reference for the scientific decision-making of education departments at all levels.

Therefore, it is very meaningful to study a comprehensive educational administration system which is suitable for all kinds of subjects and has various functions and is easy to expand. In view of the current educational administration system is relatively scattered, it is necessary to make an integrated unified system.

2. System design

Many educational administration and teaching auxiliary systems used by the education sector have decentralized functions. Some are achievement registration systems, some are graduation thesis management systems, and some are online examination systems developed by colleges and universities. The decentralized educational administration system increases the intensity and difficulty of educational administration work, and also reduces the working efficiency of teachers and the learning efficiency of students. Although some colleges and universities have introduced the method of single sign on to enable users to log in to multiple systems at one time, it is obviously not the best option for different development styles of subsystems

The foreground of this system adopts the technology of HTML5 + CSS 3 + JavaScript, and the background uses the native Java EE, rather than the SSM or SSH framework which is used more frequently at present. Although the use of SSM framework can improve the development efficiency, but due to the vulnerability of these frameworks from time to time leading to serious system security

problems, this system does not use these frameworks, but adopts the native framework with high security.

In the process of informatization, different types of data will be generated, such as student attendance data from different subsystems, daily homework scores, usual test scores, mid-term examination results and user operation data. These data partly reflect the learning state of students to a certain extent. These data from different functional modules and different types have different dimensions, that is to say, there is a semantic gap between the data. In the evaluation of students and classroom state, we can't simply add the data of different parts to carry out teaching state evaluation. It is necessary to design a method that can integrate multi-dimensional information to comprehensively evaluate the teaching status and teaching effect. The data fusion analysis method needs to design a specific fusion algorithm as a teaching aid tool to provide data from multiple sources for integration and as a teaching aid tool for students' learning state discovery.

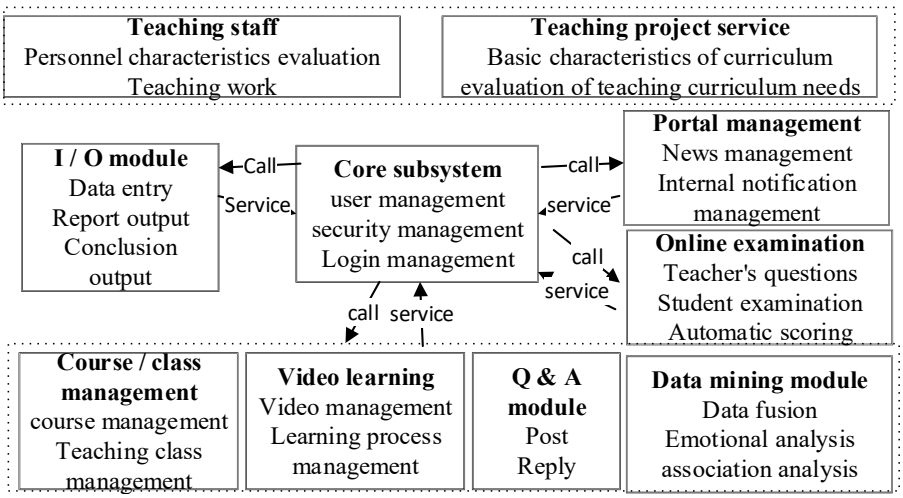

Figure 1. Main module diagram

3. System implementation

The massive structured data and unstructured data in the big data environment have become an important data source for the further enrichment and development of professional course teaching. Therefore, when designing the system data table, we should not only consider the functional requirements of each module, but also consider various process requirements in the process of data fusion when mining large data in the future.

The account management module is mainly used in user management, and its function is mainly to add, delete and modify users. The specific functions are as follows. (1) The first administrator account is brought by the system, and other administrator accounts can be added to the account. Administrator users can directly add student and teacher accounts. Students can register their own account number and fill in their basic personal information, such as student number, name, account password, gender, study, college, major, administrative class, grade, mobile phone number, email, remarks and so on. after being approved by the administrator, the student account can be successfully registered. Teachers can also register their own accounts and fill in their personal information, including the college to which the teacher belongs, the teacher's job number, password, name, gender, telephone number, e-mail, remarks. after being approved by the administrator, the teacher's account number can be successfully registered. (2) The administrator can directly modify the basic information and account password of students and teachers, and each user can also reset the password by setting the security question. (3) The administrator can query the list of students and teachers, the list of courses, the list of teaching classes and delete the information of students in batch.

Figure 2. User log module

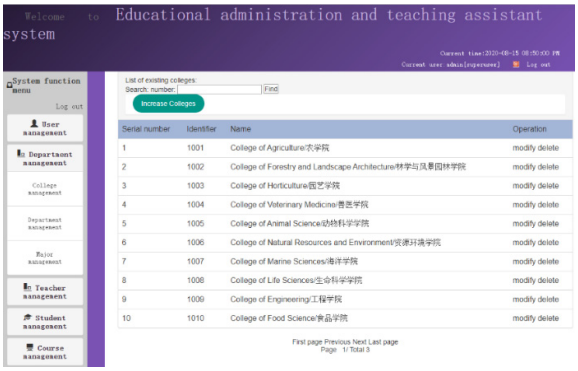

Figure 3. Department management module

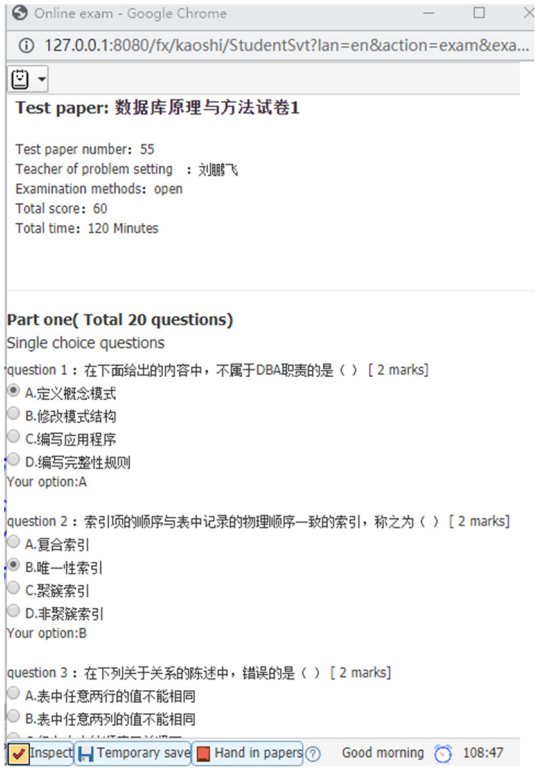

Figure 4. Department management module

Figure 5. Teaching forum module

The main functions of the specialty management module are: the administrator can add, delete and query the information of college, department and specialty. The main functions of the administrative class management module are: administrators add, delete, modify and check the administrative class. The information entered by the administrative class includes: head teacher, year of enrolment of students used for subsequent students' class division operation, Department specialty, name of administrative class, capacity for students' independent course selection, and teaching class number. The management module of teaching class division is mainly used for students' class division. After the administrator sets the teaching class according to the course in advance, the students can choose the teaching class by themselves or divide the class manually by the administrator. After the completion of the first round of class division, the administrator can detect whether the students of a certain grade have repeated and missed the division. It should be noted that in order to ensure the integrity of the data, if a teaching class has been assigned students or students have selected courses,

the teaching class cannot be deleted directly. All students of the teaching class must be deleted before deleting the teaching class.

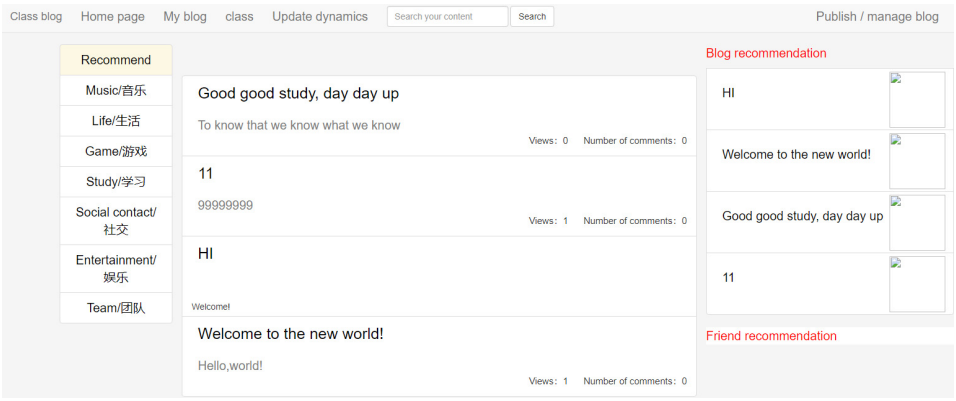

Figure 6. Blog module

The main function of the course management module is: the administrator to add, delete, modify and check the course. Course information includes: Chinese and English name, serial number, credits, class hours, semester, nature of study, assessment method, School of commencement, major of students' department and introduction of Chinese and English. Students' professional training plan is generated by adding courses.

Based on the curriculum management module, students' curriculum is completed, and the function of teaching class management module is realized. Its main functions are: (1) the administrator can add and query the teaching class information, including the teaching class number, course name, school year, semester, class name, and teacher. It can also define the students' course selection time, set the teaching class score, input password, teaching class examination time and place. (2) Students can view their selected course information through the course list, and view the corresponding teaching class of each course through the teaching class list. (3) After the division is successful, the teacher can check the list of teaching classes. (4) Each teaching class can open a forum, and users can log in and edit and publish posts for users to exchange and share.

Grade management module is mainly used to manage students' grade points and credits. The main functions of the module are as follows: (1)the administrator can automatically calculate and update the grade points and credits of all students, and can output the student's personal score and a grade's score summary table, correct a student's score, return the score submitted by a certain teaching class or a teacher, and input it into a certain teaching Class make-up exam results. (2) Teachers can register and submit their scores. (3) Students can view their course scores and automatically download excel output transcripts through the browser.

The main functions of the homework management module are: teachers can publish online homework and delete the homework that has not been submitted by students, view the homework information, including the list of students who submitted the homework and the homework answers, correcting and deleting the submitted students' homework.

The main functions of answering management module are: teachers can open or close the answering module of teaching class. After opening, teachers and students can publish, browse, reply to posts, and have some likes, administrators can delete posts and post automatic classification audit functions.

The functions of the online examination module are as follows: (1) the administrator or teacher can search the selected course first through the question bank management, and then can put on the flyer topic selection, multiple-choice question, judgment question and fill in the blank question, including the corresponding question answer and the score of each question, and can also generate the test paper by randomly setting questions and manually setting questions. (2) Each user can view the test paper

through the test paper list function. (3) If the student does not complete the answer within the specified time, the system will automatically hand in the paper.

The system has been used stably for three semesters. About 300 students from three different classes participated in the test. There are more than 2000 questions of different types (single choice, multiple choice, blank filling and judgment) in three courses. The students' evaluation of the system prototype is good.

4. Conclusion

This paper uses JavaScript plus HTML for front-end development, and uses Java EE developed the educational administration and teaching auxiliary system with rich functions.

The value of this study: the concept of information fusion and big data are applied in the development and design of educational administration and teaching auxiliary system, the concept or top-level architecture is preliminarily discussed, the system prototype is developed, and the construction of supporting platform is elaborated. The next step of this research is to make the concept of teaching information fusion concrete, technical and operable, and develop a fusion algorithm of college curriculum teaching which collects multi-dimensional data.

Acknowledgments

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