Design and Practice of Online and Offline Mixed Education System

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Abstract. With the widespread application of information technology in Colleges and universities, modern information technology provides effective support for the optimization of traditional teaching mode. In this study, computer network as the main technical support, on-line and offline hybrid intelligent assistant teaching system research. The system effectively integrates the two modes of network teaching and traditional teaching, and completes the design of the overall architecture of the system from the perspective of taking students as the main body and improving the effect of communication between teachers and students. Then, the functions of the key modules of the system are described, and the specific functions of the education system are realized by combining with the database. On this basis, this study also verified the effectiveness of the system through practical teaching application.

Keywords: Online and offline mixed education · Education system · Practice analysis · Communication effect between teachers and students

1 Introduction

With the popularity of computers and mobile devices, the form of learning is no longer confined to the traditional classroom teaching mode, but gradually to the media, network development. In this context, online education has become the general trend. As a kind of network course, excellent resource sharing course serves college teachers and students as well as social learners. Its purpose is to promote the co construction and sharing of high-quality course teaching resources. Its curriculum resource system is more suitable for network communication and can promote the improvement of professional course teaching quality. Therefore, it is of great practical value to study the online and offline hybrid curriculum construction based on the network platform. The network assisted teaching system has changed the traditional teaching mode and plays an important role in improving the teaching quality.

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2 Analysis of Educational Concept of Mixed Teaching Mode

Teachers play a leading role in teaching knowledge in traditional classroom teaching and network teaching, and guide students to learn through a variety of teaching methods (including cramming, heuristic, guiding and so on). Teachers will be limited by limited class hours and other factors in the classroom. Online classroom is an effective extension and supplement of classroom. It has the advantages of rich teaching resources and unlimited time and space. Students can realize the process of autonomous learning through the use of online classroom teaching resources [1].

The blended learning process integrates a variety of teaching methods. In addition to the integration of face-to-face teaching and network teaching, it also includes the integration of a variety of modern educational technologies (including multimedia, computer, network and communication technologies), giving consideration to the leading role of teachers and the dominant position of students. At the same time, relying on the online auxiliary teaching system, the initiative and enthusiasm of students can be effectively improved, so as to form a teaching system that organically combines theory and practice teaching [2, 3].

3 Design of Hybrid Assistant Teaching System

3.1 System Architecture Design

At present, we can use a variety of languages and technologies (such as net, ASP, PHP, Java, C#) to complete the development of the website. The design pattern should take rationality as the basic principle to complete the compilation, classification and summary of the system. The system should include code, design module, upgrade system functions, etc. the code compilation should meet the system functions and complete the establishment of the effective structure of the software project. In order to solve the problem of easy to be attacked when revising or upgrading the system, the business relationship in this paper is based on J2EE and three-tier B/S system. The three levels need to complete data analysis according to the logical relationship in the program, which improves the intelligence of the system and effectively improves the stability and security of the teaching aid system on the basis of reducing the maintenance or upgrading cost. The overall architecture of the system is shown in Fig. 1.

(1) Presentation layer. After the user interaction instructions are executed in the presentation layer, the system service requirements can be completed by inputting the relevant requirements information in the client. After the web server displays the page, the browser is used for the same transmission. J2EE platform can meet the needs of diversified clients, and can realize the functions of most software (such as HTMLClient.Java The examination system is mainly realized by applying JSP, JS,

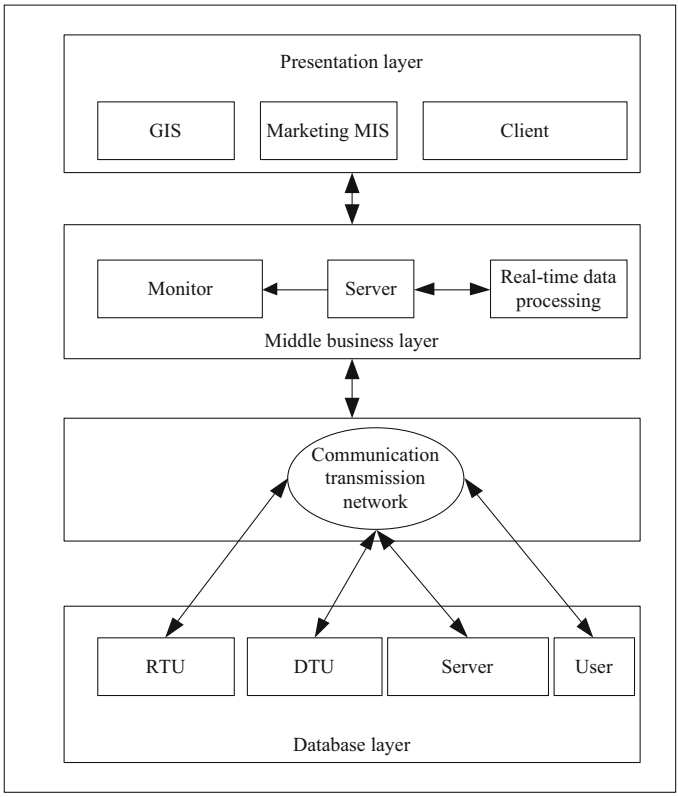

Fig. 1. Overall architecture of the system

HTML and other technologies, which helps the system to realize the examination management, intelligent test paper generation and analyze the common problems in the answering process. The structure of presentation layer is shown in Fig. 2.

(2) Intermediate business layer, including Web and J2EE server types. By connecting the two servers in parallel, the processing results can be transmitted from Web to J2EE, thus ensuring that multiple requests (such as adding and deleting database information, forwarding server information, etc.) can be processed simultaneously. In addition, the design pattern of the intermediate business layer of the system in this paper adopts Spring MVC pattern, which can further improve the flexibility of the system. Through the use of logical DAO layer and database connection (application server management), the interactive interface of data layer can not only meet the functional requirements, but also take into account the irrelevance and system scalability [4, 5]. The intermediate business layer structure is shown in Fig. 3.

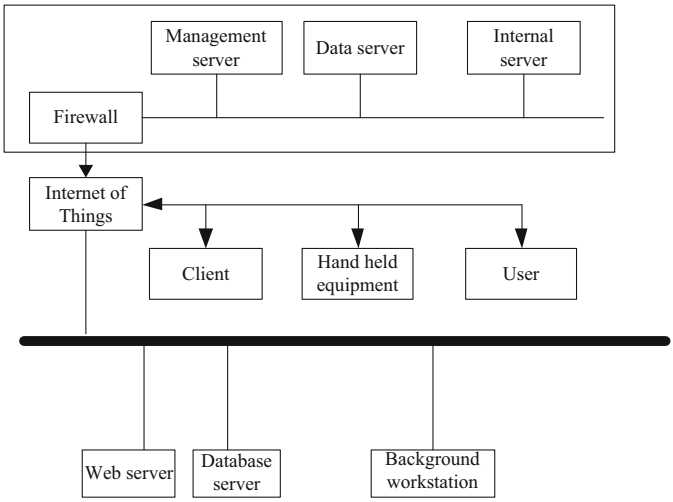

Fig. 2. Shows the layer structure

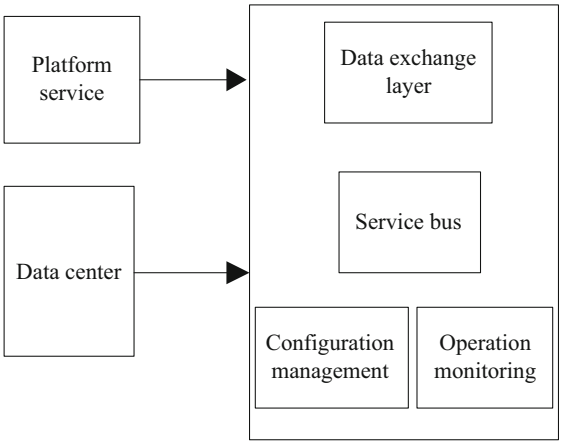

Fig. 3. Structure of middle business layer

(3) In order to improve the security of the system, this paper makes the database server independent, and provides great convenience for system maintenance and security management. The database layer is shown in Fig. 4.

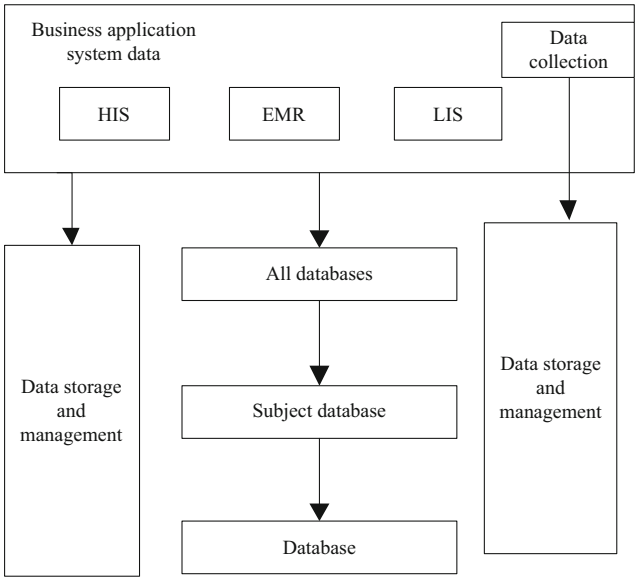

Fig. 4. Database layer structure

3.2 System Function Design

Functional Structure

According to the different needs of users, the system users are divided into different user roles, and on this basis, the user rights are limited. The system administrator is responsible for setting the basic information of the system; The authority of teachers lies in the management of information, homework, question bank, work sharing, forum, etc., the setting of examination parameters and the realization of online examination view; the core functions of the system can be used by students, including online learning, submitting homework, sharing work, examination and mutual exchange, etc., and the system can realize online teaching, test training and online examination through the knowledge map constructed in the background The main function modules of learning feedback are flexibly linked together to provide teachers with more intelligent guidance function. The test question training environment not only provides students with the functions of automatic test paper generation exercises and special exercises, but also provides teachers with convenient test question bank management tools, reducing the burden of test question bank management [6]. The functional structure of the system is shown in Fig. 5.

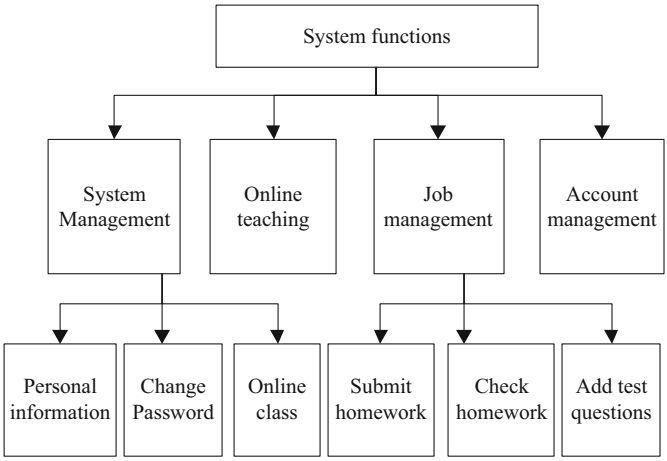

Fig. 5. System function structure

Key Function Modules of Online and Offline Teaching System
The workflow of online and offline teaching system is shown in Fig. 6.

(1) The new classroom (Data Management) is convenient for teachers to open many different classes. The contents mainly include: modifying or adding the name of the class according to the actual needs (changing the format for grade, major and course); setting the start and end time of the class; setting the user's permission to join and use (if allowed or not allowed); in order to facilitate students to understand the course, the new classroom can be added Set up the relevant introduction of the class, list the content to preview in advance, add new preview content, students preview in advance according to the preview list, and teachers view the preview results [7–9].
(2) In online teaching, the teaching materials are divided into knowledge point database (Chapter one knowledge point test questions) and homework question database (secondary structure: Chapter one homework) for management. Test questions can be directly converted into assignments under this chapter, which is convenient for teachers to answer students' difficult questions in time, and is helpful for students to interact with teachers in real time. The online teaching module mainly includes switching knowledge points, switching demonstration and practice, and manages the coding area of teachers and students, and online student list.
(3) Through the intelligent auxiliary teaching system, teachers can complete the layout and management of the corresponding classroom assignments; through clicking to publish the assignment questions and examination questions, mainly including the name and type of the examination questions, purpose, description of the examination questions, etc.; The default start time and end time are the current time and seven days later respectively. If the time limit is exceeded, the homework cannot be submitted and students are not allowed to view it. To correct the homework,

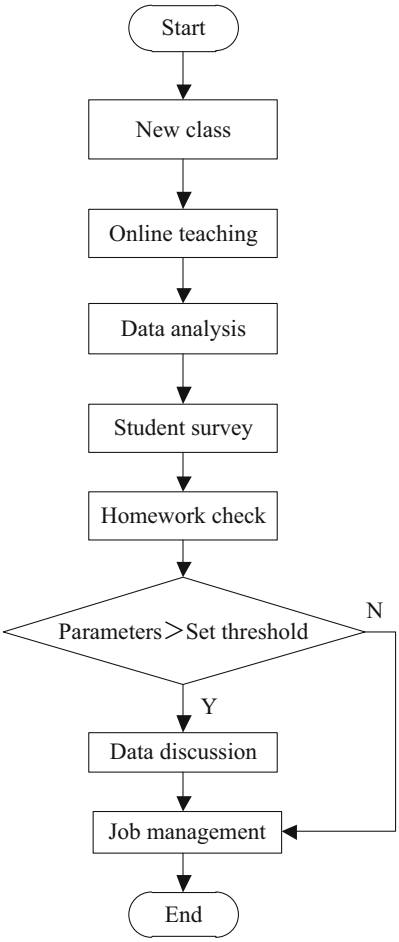

Fig. 6. Work flow of online and offline teaching system

complete the correction of the corresponding batch of homework on the homework list page (manual correction by default) [10].

4 Implementation of Online and Offline Teaching System

The key to the realization of the system lies in the data input, storage, modification and management, which are based on the design of the database, and the database is the core part of the system. This paper mainly starts from the E-R conceptual model to complete the design of the logical structure of the data table and the database relational model, and then completes the design of the database.

4.1 Database E-R Diagram Design

The database entity is mainly composed of teachers, students, assignments, teaching materials, test questions and papers. In this paper, "n" is used to represent multi-layer relationship. Students can participate in the examination for many times. For example, teachers can add multiple test questions. The E-R relationship design of the system is shown in Fig. 7.

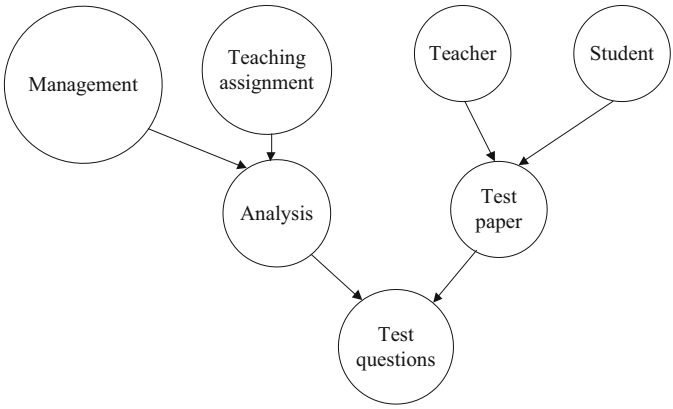

Fig. 7. System E-R relationship design

4.2 Table Structure Design

(1) The user information table mainly includes primary key, user account number, type and nickname, login password, mobile phone number and e-mail, as shown in Table 1.

Table 1. User information table

Name	Field type	Length	Meaning
ID	VAR CHAR	255	Primary key
User account	VAR CHAR	255	User account number
User name	VAR CHAR	255	User nickname
PWD	VAR CHAR	255	Login password
Mobile	VAR CHAR	255	Cell-phone number
Email	VAR CHAR	255	Mail box
User type	INT	19	Customer type

Table 2. Teaching materials

Name	Field type	Length	Meaning
ID	VAR CHAR	255	Primary key
Sys account id	VAR CHAR	255	User account number
User name	VAR CHAR	255	User nickname
Title	VAR CHAR	255	Subject
Upload data	VAR CHAR	255	Upload date
Remark	VAR CHAR	255	Detailed description
Status	INT	19	State

(2) The teaching data table is mainly composed of primary key (ID), user name, foreign key (user ID), title, update date, detailed description, etc., as shown in Table 2.
(3) The job list mainly includes ID, user ID, user name, job number, name, date and status, online preview path, name of the correcting person and correcting information and date. Detailed description is shown in Table 3.

Table 3. Operation table

Name	Field type	Length	Meaning
ID	VAR CHAR	255	Primary key
Sys account id	VAR CHAR	255	User account number
User name	VAR CHAR	255	User nickname
Work name	VAR CHAR	255	Assignment topic
Work data	VAR CHAR	255	Operation date
Remark	VAR CHAR	255	Detailed description
Status	INT	19	State

User data is the core of data design, and data tables representing system functions are directly or indirectly associated with user tables. General system functions (such as attachments, system settings, etc.) have no direct relationship with business function tables, and are set as independent tables. The specific data table association model is shown in Fig. 8.

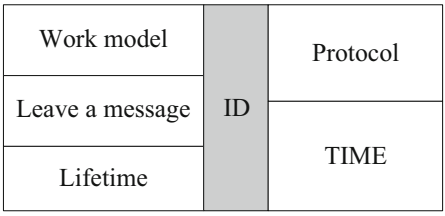

Fig. 8. Data table association model

5 Practice Analysis of Online and Offline Mixed Education System

The education system proposed in this paper can improve the training effect from many aspects. In-service training is different from ordinary diploma education. The trainees have a strong learning purpose, which may be due to the need of career development or the improvement of their own economic capacity. This requires that they should respect their right of choice when implementing distance education, that is, they should be able to learn selectively according to their own needs. After the introduction of online and offline interactive teaching, with the overlapping of online and offline learning in time and space dimensions, it can help students complete online learning according to their own needs, while offline can ask teachers or students for advice under the guidance of specific problems.

A good learning atmosphere can not only improve the learning efficiency of the students, but also promote the students to realize the learning sustainability. Establish online and offline interactive distance education mode, students mainly use online discussion group and offline class learning activities to obtain this learning atmosphere. It needs to be pointed out that in order to improve the effect of distance education, it is necessary to be clear about their learning preferences before providing education services. Therefore, it's very important to create a learning atmosphere for them.

The traditional distance education is influenced by the internal teaching technology and plan, which has rigid characteristics in teaching, which weakens the students' interest in learning. However, it is impractical to focus on optimizing the form of online education to solve the problem of rigidity of online education. First of all, online education has its own educational technology constraints, as well as the cost control requirements of educational service institutions in providing products. Therefore, while optimizing the online teaching form, we should also focus on finding strategies from the way of offline teaching as a supplement.

On the job training should be strictly in accordance with the syllabus and examination syllabus to organize teaching, although sometimes the teaching content is recorded in advance, the disadvantages of this kind of programmed teaching have been described above. In the mode positioning, it can not only be limited to the optimization of online teaching mode, but also can not be separated from the functionality of online teaching. Therefore, the mode can be positioned as follows:

(1) Optimize the interactive interface of online teaching, and pay attention to students' autonomous learning requirements;

(2) Expand the form and content of offline learning, and help students establish an informal organization for learning and mutual assistance. It is not difficult to see that from these two ways, we can effectively solve the problems brought about by programmed teaching.

No matter how to improve and transform the distance education, the education service content is still mainly from online teaching. This shows that offline teaching always plays an auxiliary function, so we should strengthen this auxiliary function at present.

(1) Strengthen the understanding of the importance of offline teaching. Educational service institutions need to recognize the important role of offline teaching in supporting online teaching when carrying out distance education projects. This effect comes from the social attributes of on-the-job staff, and also from the mutual motivation factors in teamwork learning.
(2) Pay attention to the role of offline teaching for on-the-job staff. Employees should participate in training programs with a strong sense of purpose. Therefore, educational service institutions should attach importance to the role of interpersonal interaction platform built by offline teaching.

In addition, to carry out online and offline interactive distance education activities, it is necessary to improve the organization and management of the offline teaching process. First of all, we should improve the teacher in charge system, through the selection of teacher in charge to promote the class management under the leadership of the class committee more reasonable, and can help to improve the learning efficiency. Moreover, it is still necessary to emphasize the regulatory role of class rules for students, so as to provide institutional guarantee for creating a good class learning atmosphere and cultivating their learning mentality.

6 Experiment and Analysis

In order to verify the practical application performance of the online and offline mixed education system designed above, the following experiments are designed.

In view of the two parts of the same degree of difficulty of teaching content, the paper system and the traditional system are respectively used to teach 10 students, students are required to fully master the content to be learned. Then the time for students to fully accept the teaching content after applying different systems was tested. The comparative results are shown in Table 4.

By analyzing the experimental data in Table 4, it can be seen that due to the different teaching methods adopted by the two teaching systems, the time for students to receive the teaching content is quite different. After using the traditional system, the time for students to accept the teaching content is more than 36 min. However, after the application of the system in this paper, the time for students to accept the teaching content is significantly shortened, and the minimum time is only 20.96 min. Therefore, the application effect of the system in this paper is better.

Table 4. Students receive the statistical results of teaching content time

No.	The time required for students to receive the content/min	
	System of this paper	Traditional system
01	22.32	36.21
02	23.14	36.40
03	21.01	36.37
08	22.53	36.75
04	21.70	36.27
05	22.14	35.14
06	22.85	35.86
07	20.96	37.02
08	22.53	38.58
09	21.47	38.56
10	22.52	38.75

7 Conclusion

With the popularization of information application in Colleges and universities, modern information technology provides support for the optimization of traditional teaching mode. Taking computer network as the main means, this paper studies the design of online and offline hybrid intelligent auxiliary teaching system, which takes students as the main body, enhances the communication between teachers and students, effectively integrates network teaching and traditional teaching mode, and completes the design of system architecture This paper describes the function of the key modules, combined with the design of the database to achieve the function of the auxiliary teaching system, and through the actual teaching application to verify the function of the system, the hybrid auxiliary teaching system through the integration of all aspects of teaching resources, can provide multi angle guidance for students' learning, can effectively meet the teaching needs, and has great practical application value.

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