Design of Economics Course Teaching System Based on Online and Offline Mixed Mode

Tong Sun(✉)

Department of Economics, Shenyang Institute of Science and Technology, Shenyang 110167, China

Abstract. In recent years, many colleges and universities have adopted economics course teaching systems to assist classroom teaching, but there is a shortage of teaching resources in traditional teaching systems, which leads to poor teaching effects. Therefore, the design of an economic course teaching system based on the online and offline hybrid mode. In terms of hardware, memory chips and FPGA chips will be selected and applied to the original system hardware framework. Expand and optimize the design of economic course resource integration module, economic teaching resource query module and economic course teaching module to realize the basic functions of the system. So far, the design of the economics course teaching system based on the online and offline hybrid mode is completed. Construction of the system test link, through comparison, we can see that the use of this system is better.

Keywords: Teaching system · Memory · Curriculum resource integration · Course inquiry

1 Introduction

With the popularization of computers and mobile devices, learning forms are no longer confined to the traditional classroom teaching mode, and gradually develop towards media and network, and online education has become the general trend. As a kind of online course, the excellent resource sharing course serves university teachers and students as well as social learners. The purpose is to promote the co-construction and sharing of high-quality course teaching resources. The curriculum resource system created by it is more suitable for network communication and promotes the improvement of professional curriculum teaching quality. It is of great significance to research on the construction of online and offline hybrid courses based on the network platform. The improvement of quality plays an important role [1, 2].

Teachers play a leading role in teaching knowledge in traditional classroom teaching and online teaching, and guide students to learn through a variety of teaching methods. Teachers in the classroom will be restricted by factors such as class hours. Online classrooms have achieved effective extension and supplementation of teachers' classrooms, and have the advantage of rich teaching resources and not limited by time and space. Students can realize the autonomous learning process through online classroom. Blended

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learning integrates a variety of different teaching methods. In addition to the integration of face-to-face teaching and online teaching, it also includes the integration of multiple learning methods and the integration of multiple modern education technologies [3, 4], giving full play to the leading role of teachers at the same time Ensure the main status of students. Through multi-angle integration, relying on the network-assisted teaching system, the initiative and enthusiasm of students can be effectively improved, and a teaching system that integrates theory and practice can be formed.

In the system designed this time, the system users are divided into different user roles according to the different needs of the users, and on this basis, the user permissions are limited [5]. System administrators are responsible for designing the basic information of the system; teachers can manage materials, homework, question bank, work sharing, forums, etc., set test parameters and realize online examinations; students can use the system for online learning, Submit homework, share works, exams and mutual assistance exchanges, etc. The system flexibly links the main functional modules of online teaching, test question training and academic feedback through the knowledge map built in the background, providing teachers with more intelligent guidance Features. The test question training environment not only provides students with functions such as automatic test paper exercises and special exercises, but also provides teachers with convenient question bank management tools, which reduces the teacher's question bank management burden [6]. The economics course teaching system based on the online and offline mixed mode provides a new direction for the classroom teaching process of economics.

2 Hardware Design of Economics Course Teaching System

Aiming at the problem of excessive shortage of teaching resources in the original economics course teaching system, in this study, the online and offline hybrid mode will be used to increase the knowledge reserve in the system. In order to improve the adaptability of the hardware, the hardware framework is optimized, as shown in Fig. 1.

According to the optimization results, complete the hardware design process of the design system. At present, multiple languages and technologies can be used to complete the development of the website. The design mode needs to be based on rationality as the basic principle to complete the compilation, classification and summary of the system. The system needs to include code, design modules, upgrade system functions, etc. [7], code compilation It should meet the system functions, complete the establishment of the effective structure of the software project, and solve the problem of being vulnerable to attacks when revising or upgrading the system.

2.1 Memory Chip Design

In order to better solve the problem of processing a large number of teaching resources in the economics course teaching system, CAM memory is added as its dedicated storage device in the system hardware design. CAM memory chip [8, 9] can search a large amount of data in parallel, and compare the data in the CAM chip with the search

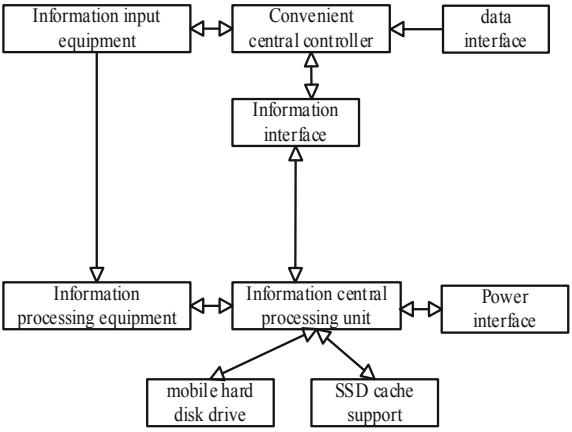

Fig. 1. The hardware optimization structure of the economics course teaching system

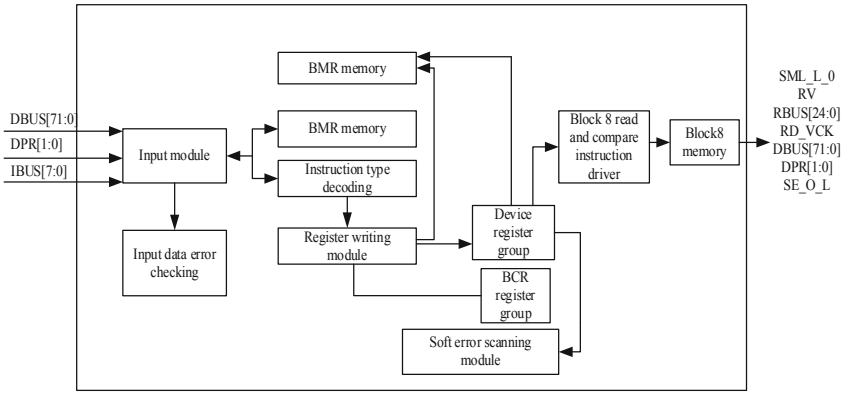

Fig. 2. Internal structure of dedicated memory chip for CAM module

keywords, and grab the physical address of the search matching item in the system. The internal structure of the chip is shown in Fig. 2.

The data read by the CAM chip is compared with all items in the table, and a decision is made quickly in the logical database where one or more classified data packets and their corresponding IP addresses are located. No matter whether the data item is found or not, when the comparison is over, the obtained data pin is a valid conclusion. If the searched data item is found, the pin is valid, and the data related to the match can be output at the same time; if it is not found, the bus continues to maintain a high impedance state, further expanding the storage depth for the CAM chip. The design of adding a CAM chip to the teaching system improves the speed of data writing while reducing the time spent on teaching resource integration and retrieval operations.

2.2 FPGA Chip Design

On the basis of adding a CAM chip to the system design above to improve the retrieval speed of a large amount of data in the economics course teaching system, further adding an FPGA chip to the system hardware design. The FPGA chip can be reconfigured according to different resource integration scenarios to provide the system with sufficient data integration flexibility and accuracy. The internal structure of the FPGA chip can be seen in Fig. 3. Due to the continuous improvement of the integration of FPGA chips, the operation speed of the chips also increases, and the communication between the FPGA chip and the system processor becomes simpler and more accurate.

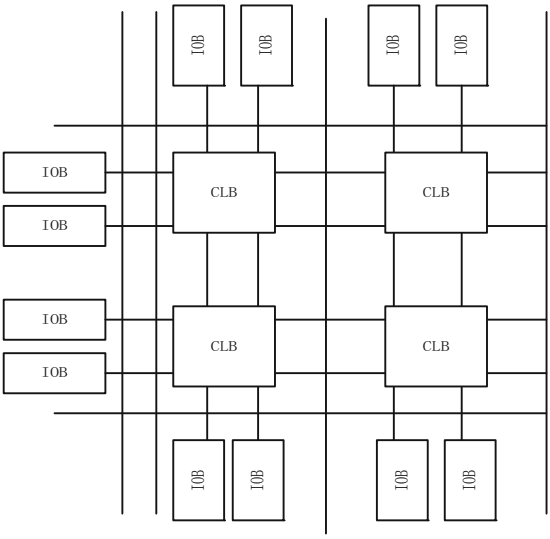

Fig. 3. FPGA chip internal structure

The FPGA chip is connected to external circuits through the I/O module, and uses its internal CLB module to support the programming of the system software part to realize combinational logic and sequential logic. The BRAM embedded in the FPGA chip further expands the application range of the chip, and improves the flexibility of chip use and the accuracy of data resource capture [10]. The FPGA chip is embedded with multiple soft core and hard core modules, which can improve the software and hardware coordination capabilities of the resource intelligent integration system to a certain extent, and provide technical support for the design and operation of system software. Because FPGA is a kind of semi-custom resistor circuit in the field of ASIC, it not only solves the local phenomenon of system hardware customized circuit grabbing fixed mode, but also overcomes the limitation of the limited number of resistor circuits of the original system programmable device; and FPGA chips are abundant The digital logic resources are further combined with the CAM memory chip to replace the discrete digital chip in the original system, reduce the BOM cost, solve the limitation of the hardware in

the original system that cannot be parallelized, increase the operating rate of network bandwidth, and meet the requirements of system real-time resource integration.

3 Software Design of Economics Course Teaching System

3.1 Module Design of Economic Curriculum Resource Integration

Aiming at the problem of poor integration of curriculum resources in the original system during use, this part of the performance will be optimized in this research. Based on the complexity and diversity of teaching resources, similarity processing is mainly used in this research to complete the integration process of teaching resources.The set teaching resource data can be expressed as a, b, where p represents the number of variables when the data a and b are both 1, q represents the number of variables when the data a is 1, b is 0, and t is the data The number of variables when the values of a and b are both 0, s represents the number of variables when the value of a is 0, and the value of b is 1, and the degree of dissimilarity between data a and b can be expressed as a simple matching coefficient:

$$d(a,b) = \frac{q+t}{p+q+t+s} \tag{1}$$

When calculating the dissimilarity of two binary variables, the value of p coefficient can be ignored, and the Jaccard coefficient [10, 11] is used to complete the dissimilarity calculation process between the data, then the Jaccard coefficient between the curriculum resource data a and b can be expressed as:

$$d(a,b) = \frac{q+s}{q+t+s} \tag{2}$$

In the same way, the degree of dissimilarity between resource data a and b of general categories can be obtained by simple matching calculation. Set e to represent the number of a and b with the same attribute value, f is the number of all attribute values, then the degree of dissimilarity between teaching resource data a and b can be expressed as:

$$d(a,b) = \frac{f-e}{f} \tag{3}$$

In addition, the integration of this method can analyze and process teaching resource data of different structures. The difference between data g and h of different dimensions can be expressed as:

$$d(g,h) = \sum_{i=1}^{i=n} \beta(g_1, h_1) \tag{4}$$

In formula (4), if $g_1 \neq h_1$, then $\beta(g_1, h_1) = 1$; otherwise, $\beta(g_1, h_1) = 0$. Using formula (4), the teaching resources are integrated, and the integrated teaching resources are classified and stored.

3.2 Setting of Teaching Modules of Economics Course

After the user logs on to the platform, teachers can manage the courseware of this course online, assign and modify homework, upload courseware-related materials, and publish relevant information. Students can browse corresponding course content, complete homework online, ask questions to teachers, etc.

The biggest feature of this function is to provide a suitable learning mechanism. Designing a course is like making a flowchart [12]. The learner starts to answer the question after reading the course content. When the answer is correct or another answer is selected, the system will enter the content of a different page to give more information. Further or more shallowly display the content, adjust the progress so that the learner can complete the learning goal, the main things that need to be set are:

(1) Course name;
(2) Range of points;
(3) The number of questions presented on each page;
(4) Course opening hours;
(5) Course content (edited with embedded HTML editor);
(6) Question description and the linked page after answering each question;

In addition to the above content, two parts of network teaching material design and course announcement are added to this module. Online teaching materials publish course content, edit and delete course content according to chapter needs. Teaching can add chapters, edit and delete chapters; you can add courses [13–15]. Course announcement: instant message about a course. Teachers can post, modify, and delete course announcements. After entering the online learning environment for the first time, students first check the label, that is, master the basic methods and skills of online course learning, and make their learning steps clearer.

3.3 Design of Query Module for Economic Teaching Resources

When using the economics course teaching system, students need to make corresponding course queries, but the performance of this part of the original system is poor, and the problem of abnormal query results often occurs. In response to this situation, a targeted design was launched in this research.

In this design, the data in the course resources is set to the form of data packets, and the waiting time of the queried data packets can be calculated in the form of formulas. The specific calculation process is shown in formula (5):

$$t_{wait} = |d - v| * t_i \tag{5}$$

In formula (5), d represents the sending interval between two query data packets, v represents the corresponding communication distance, and t_i represents the time granularity. According to literature research, the maximum value of t_{wait} can be understood as $t_i * v$, and the minimum value can be zero. Formula (5) can complete the time control management in the process of teaching resources query. At the same time, set the corresponding program in this module.

Through the above content, complete the inquiry process in the use of the system, and provide convenience for students' use. Incorporate the optimization results of the software modules set above into the original module construction and combine them with the system hardware. So far, the design of the economics course teaching system based on the online and offline hybrid mode is completed.

4 System Test Analysis

4.1 System Test Environment Design

In this study, in order to verify the effect of the design system in the article. In this link, two common systems on the market are selected for comparison with the design system in the article. When the three systems are undergoing comparison tests at the same time, a reasonable test environment needs to be set to ensure the stability of the test process. Therefore, the system test environment adopts a distributed architecture, which includes one server as the master node and three data processing servers as nodes to realize the efficiency and stability of data calculation (Table 1).

Table 1. System test platform architecture

Name	Hardware configuration	Operating system
Main controller	8-core CPU 6G memory	CentOS 7.0
	10G hard drive	
	2M bandwidth	
Node 1	8-core CPU 6G memory	CentOS 7.0
	10G hard drive	
	2M bandwidth	
Node 2	8-core CPU 6G memory	CentOS 7.0
	10G hard drive	
	2M bandwidth	
Node 3	8-core CPU 6G memory	CentOS 7.0
	10G hard drive	
	2M bandwidth	

In this system test, the test platform will be used to complete the test process and obtain the use effect of the design system in the article. In order to ensure the use of the teaching system test platform, the experimental network is set as shown in Fig. 4.

Install the test platform in the above-mentioned test network, and use it to complete the system test process, and obtain the corresponding test results for comprehensive analysis.

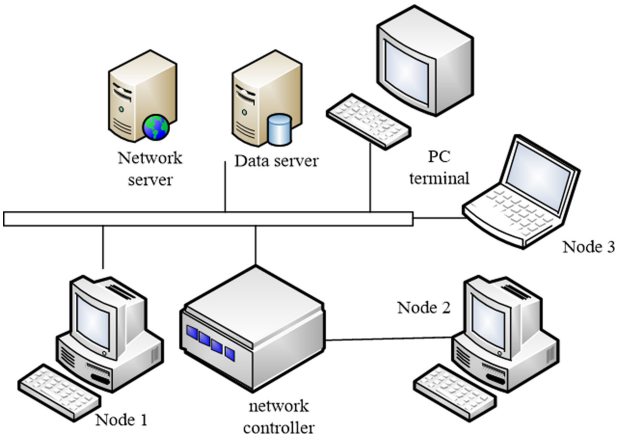

Fig. 4. System test network

4.2 System Test Plan

Two classes of the same course are opened in one semester, after completing the unit study. First of all, let all students accept the pre-test before online learning. For the convenience of operation, it was carried out in the form of roll-out. After the test results were summarized, the students with middle grades were regarded as the subjects of this experiment. They are divided into two classes. In order to ensure the objectivity of the experiment, the students are first merged together and redistributed into three groups on an average basis of the S type, which are respectively used as the experimental group and the control group.

In the process of this system test, the design system in the text and the three teaching systems currently in use are used to analyze the learning situation of students. In this system test, the results of student performance improvement, teaching resource query accuracy, and teaching resource processing time were used as comparative indicators in the test. In this system test, multiple tests will be used to improve the accuracy of comparison. Use the system test plan set above to complete the system test and obtain effective system test analysis results.

5 System Test Analysis

The accuracy and processing time of the three systems were tested, and the results are shown in Fig. 5 and Fig. 6.

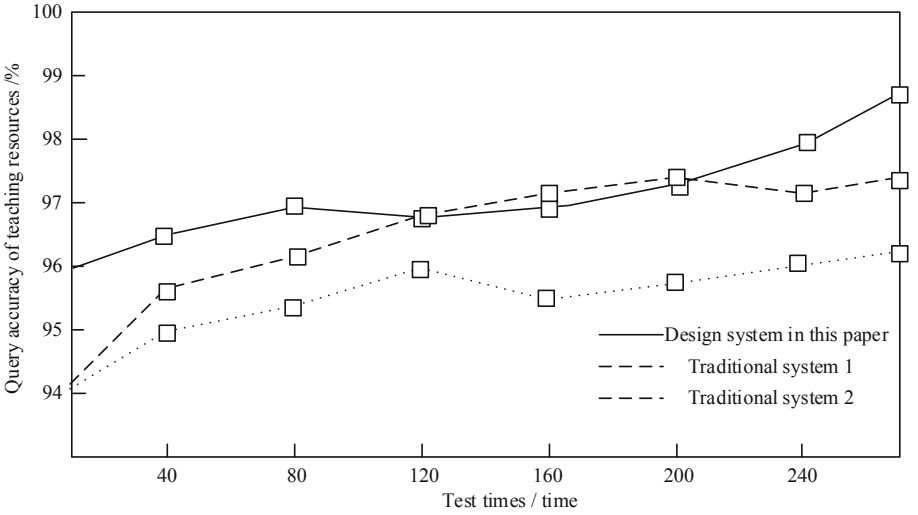

Fig. 5. Teaching resource query accuracy test results

According to the system test results, it can be seen that the teaching resource query accuracy of the design system in the article is high. Because of the high resource integration capability of this system, the high accuracy of the test results is guaranteed. It can be seen from the two systems currently in use that due to insufficient resource integration capabilities, the accuracy of querying teaching resources has been seriously affected, the query accuracy is low, and the system processing results are not highly reliable.

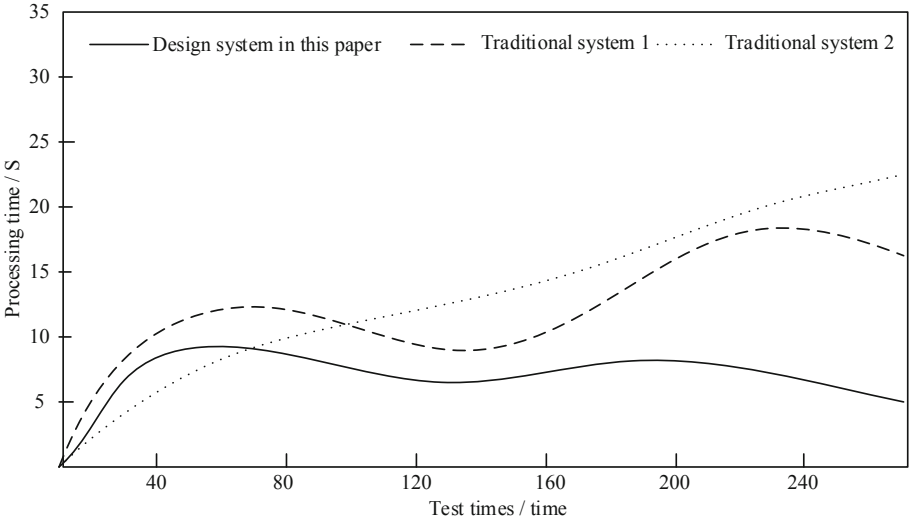

Fig. 6. Teaching resource query processing time test results

The test results show that the teaching resource query processing time of the design system in the article is shorter than that of the current system. Through the comprehensive research and analysis of the teaching system, it can be seen that the module with the longest running time of this system is the link of teaching resource integration. Because the design system in the article has a strong ability to integrate teaching resources, it can be seen from this round of testing that the system handles the design system in the article. The time is shorter and the teaching resource query efficiency is higher.

Based on the results of the double number three-part test, it can be seen that the use effect of the design system in the article is better than the current economics course teaching system in use.

6 Conclusion

The application of the teaching model designed in this research provides advanced methods for the teaching of economics courses, and the quality of economics teaching is guaranteed and improved. In order to achieve the purpose of adaptive teaching, courseware producers need to design diversified teaching content and design diversified teaching strategies to suit the different learning characteristics of each learner. Use various methods to express and present courseware content to meet the needs of each learner. Therefore, it is necessary to apply the educational theories such as "mastery teaching" and "constructivism" to the spirit of teaching strategies, reform teaching methods, and design diversified teaching strategies to achieve the purpose of adaptive teaching.

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