



Design of Ideological and Political Intelligence Teaching System for Sino-German Dual System Course Based on MVC Architecture

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Abstract. In order to improve the accuracy and efficiency of Ideological and political intelligent teaching of dual system courses in China and Germany, and ensure the teaching effect, this paper designs an ideological and political intelligent teaching system of dual system courses in China and Germany based on MVC architecture. The WebKit engine is used as the core module of the browser client, and the information transmission results are passed to the client, and the Sino-German dual course is controlled through the operation buttons of the optical fiber Ethernet controller. Use multiple pins to complete a large number of signal transmissions, design virtual classroom modules to meet students' visual and auditory needs, design MVC function modules, and display the saved user list in the interface. The division of MVC can divide the ideological and political intelligence teaching system of Sino-German dual system courses and determine the teaching goals. The experimental results show that the teaching efficiency of the system is as high as 96%, and the teaching accuracy is as high as 93.2%.

Keywords: MVC architecture · Sino-German dual system · Ideological and political teaching · Virtual classroom

1 Introduction

As a subject with strong ideas and advanced scientific ideas, ideological and political course not only transfers important knowledge to students, but also promotes the reform of dual system education in China and Germany, deepens the integration of production and education, and plays an important role in the growth of students [1]. In the conventional teaching, the information source is very limited, influenced by the traditional teaching ideas, many teachers' teaching methods are often a blackboard, a piece of chalk, a book, which is difficult to stimulate students' learning enthusiasm [2]. The traditional teaching model with teachers as the center and students as the object, although it maintains the authority of teachers to a certain extent, cannot reflect the status of students' cognitive subjects. To a certain extent, the teaching effect is too dependent on the teacher's personal knowledge reserve and skill level, ignoring the interaction between

the two parties in the teaching activities, which has a certain negative impact on the teaching efficiency [3].

In order to better serve the adjustment of regional industrial structure layout, meet the actual employment needs of German funded enterprises, and carry out the reform of dual system vocational education, it is necessary to work closely with German funded enterprises in curriculum construction, teacher team construction and other aspects, and promote the rapid development of teaching system by deepening dual system teaching [4]. In the past, the ideological and political intelligent teaching system based on artificial intelligence network design was used to fully mine the space resources existing in the network by using the whole network node calculation. Although the resource utilization rate of this method is high, the information retrieval function is poor, which leads to the unsatisfactory teaching effect. To solve this problem, this paper proposes a design of Ideological and political intelligent teaching system based on MVC architecture. Compared with the traditional teaching methods, the ideological and political course teaching under the MVC framework has the characteristics of vivid, vivid, rich and interactive, which can better provide ideological and political course teaching practice service for both Chinese and German students.

2 System Overall Framework Design

MVC is a software design method, which is usually used for websites or web systems. In the dual system teaching of China and Germany, professional teachers can use multimedia technology, combined with scientific and technological elements, and use words, pictures, videos and other methods to explain the strict ideological and political knowledge and logical thinking of Chinese and German students vividly [5]. Give full play to the functional effects of hearing and vision, and change the interactive learning mode between subjects [6]. The teaching method based on MVC technology provides a convenient and efficient information exchange channel for the dual system teaching in China and Germany. For example, through cloud service, teaching resources can be shared everywhere, and teachers can participate in the whole process of students' learning, so as to improve students' thinking ability and think in class. The framework of teaching system based on MVC architecture is as Fig. 1.

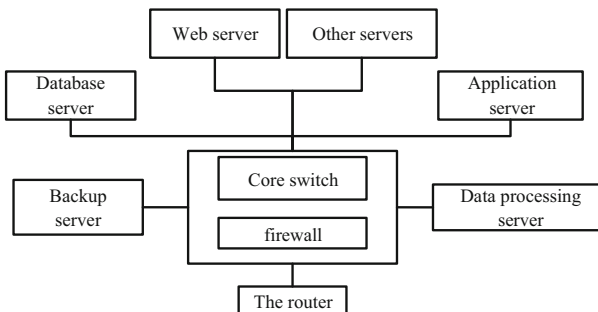


Fig. 1. Architecture of automatic assistance platform for ideological and political classrooms based on multimedia technology

As can be seen from Fig. 1, the framework can be independent of the network teaching resources, effectively integrate the scattered resources, and provide convenience for the acquisition and full utilization of teaching resources. Under the MVC framework, cloud storage has strong security storage capacity, teachers and students can save a lot of cloud storage resources, and provide stable and secure services for Chinese and German students [7]. Using the network teaching environment provided by MVC technology, teachers can access public teaching tools and use existing teaching resources. Teachers can carry out the ideological and political intelligent teaching of dual system courses online, which is convenient for both Chinese and German students to learn.

3 System Hardware Structure Design

The main idea of MVC is to separate business logic from data display, so that the three core modules of model, view, and control can operate concurrently [8]. The hardware structure diagram of MVC is as Fig. 2.

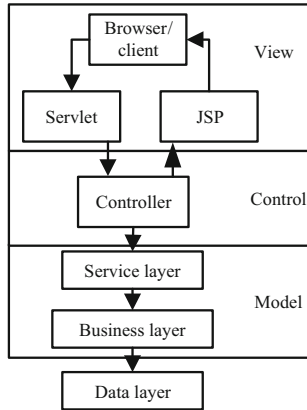


Fig. 2. MVC hardware structure

It can be seen from Fig. 2 that the model is used to store all the data objects of the application. For example, there may be a user model to store the user list, attributes and all logic related to the model. The model does not need to clearly understand the relevant details of the view and the controller. For other layers, it is a black box operation, that is, the model only receives data requests and returns the final processing results [9]. Views represent user interaction interfaces. For web applications, most of them consist of HTML, CSS, and JavaScript templates. As the link between the model and the view, control is obtained from the view to receive requests from users, process them, and update the view accordingly [10]. When the page is loaded, the controller will add some monitors to the view. When the user makes a request, the model can be effectively matched with the view immediately to complete the user’s request.

The system is mainly based on MVC structure. By using the web distributed application, different users can access the remote learning teaching assistant system in different places by different access methods, which is convenient and flexible. At the same time, it can effectively protect the database platform and manage the access rights.

3.1 Browser

Because the browser client does not have high standards for the application platform, most of the processing and display work is achieved through the server. All data is transmitted to the client through the information transmission module, and the client's secure browser display module displays the transmission result. The WebKit engine is designed as follows:

- (1) UI module
This module is responsible for managing and calling the browser core module, connecting to the network through the plug-in interface, and realizing data management and transmission under the UI control operation module.
- (2) Browse module
This module is responsible for storing the data transmitted by the UI module, and through the main computer rendering function, the data transmission result is displayed on the interface.
- (3) Control module
This module is responsible for managing the interface data of the browsing module. The plug-in interface is set in this module to provide channels for other extended functions.
- (4) Configuration module
This module is responsible for configuring functional parameters for the UI module, the browsing module and the control module.
- (5) Network module
The module directly communicates with the server. The communication can be divided into Http and Socket. According to the transmission protocol, it completes the integration with the background management agreed data, and uses the network module to update the database at any time.
- (6) Management module
This module is responsible for managing the local data in the network module, which includes business data, historical data and cache data.

3.2 Controller

The optical fiber Ethernet controller is composed of an integrated media access physical interface and a media controller. When the network is controlled, it must follow the IEEE802.3 rules, and support the 100BASE-TX standard, and the media access control layer (MAC) and the physical layer (PHY) respectively correspond to the third and second layers in the ISO protocol model. The basic interface of the coordination controller is a simple bus interface at the media access control layer (MAC), which provides a way for network information transmission and reception, and provides a data transmission

interface to the physical layer (PHY) through an internal media independent interface [11]. The layer (PHY) is mainly responsible for data transmission with optical fiber Ethernet, and its basic structure is as Fig. 3.

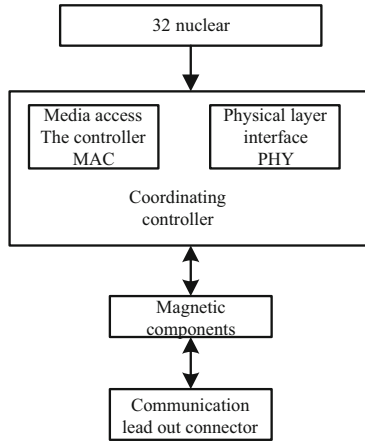


Fig. 3. Optical fiber Ethernet coordination controller structure

It can be seen from Fig. 3: When the coordination controller is designed, no matter whether the physical interface is serial or parallel, the work can be completed correctly. The physical interface uses IEEE1596.3 low-voltage signals and uses 8/16-bit links as protocol endpoints. The specification specifies in detail that when 8/16-bit link data is used for clock and frame signal transmission, it cannot deviate from the transmission path and cannot be repeatedly transmitted. When using low-voltage differential technology to transmit signals, short-distance, low-swing, constant-current differential signals can be used and implemented on complementary metal oxide semiconductors.

3.3 Virtual Classroom Module

Applying the Sino-German dual system based on the MVC framework to ideological and political education can make ideological and political education more quickly and better integrated into students' thinking [12]. Use the MVC framework to change the traditional blackboard writing teaching mode, so that the blackboard teaching content is single and the teaching process is not vivid. Video playback, screen switching, and sound matching are used to meet the needs of students for vision and hearing. Using three-dimensional space technology, the content of ideological and political education can be expressed more vividly and concretely. The virtual classroom module is as Fig. 4.

As can be seen from Fig. 4, colleges and universities, as the main place for cultivating high-quality talents, have become the primary goal of running schools and daily teaching to provide the society with excellent innovative talents of various specialties [13]. With the development of network technology, students' thinking activities are increasingly active. It is of great practical significance for higher education to correctly guide and

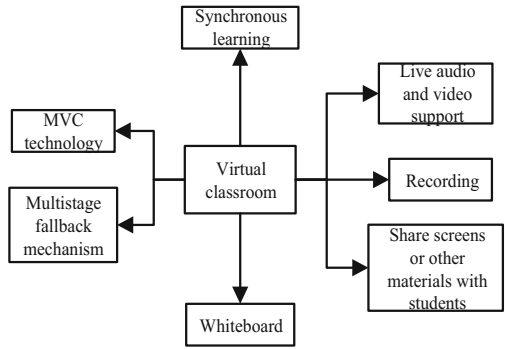


Fig. 4. Virtual classroom module

shape students' world outlook, outlook on life and values, and cultivate college students' patriotism and social responsibility.

4 System Software Part Design

The system adopts MVC structure and three-layer system function modules. Under the function module of the three-layer system of the MVC structure, design the order of adding users. After confirming that it is correct, submit the saved result, and display the saved user list in the interface. The three-layer system function module of MVC structure is as Fig. 5.

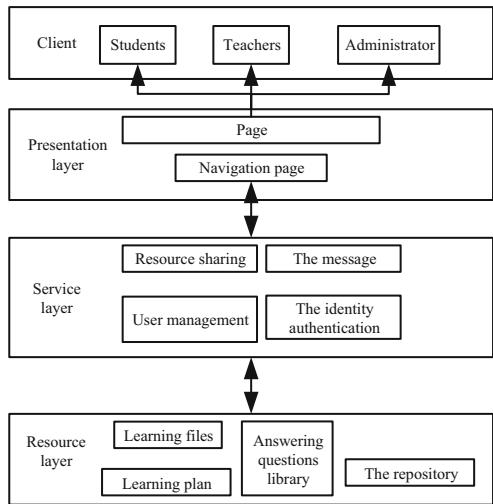


Fig. 5. Three-layer system function module of MVC structure

It can be seen from Fig. 5 that the detailed content of the three-layer system function module of the MVC structure is as follows:

Presentation layer: Provide a personalized interactive interface. After the user enters the system navigation page, after identity authentication, he can enter other functional modules through the home page navigation. Each user's navigation page has certain differences.

Application service layer: The teaching function module provided by the application service layer is the core module of the system. Students use the learning module to carry out learning activities, use the module to share learning resources, order interactive courseware, complete interactive homework, and implement self-test evaluation. In the teaching system based on the MVC multi-layer structure, the Chinese and German students use the communication module to achieve communication, complete collaborative learning and group study discussions, news releases, and online question answering.

Public service layer: it mainly provides public services which have no direct relationship with teaching. The function modules include user management, resource management, log management and so on. The public service layer provides information filtering function, which can provide users with personalized resources according to their learning status. The system uses the intelligent function to provide personalized guidance to users to help learners successfully complete the learning task and play the intelligent function of the system; the resource management function can realize the management of teaching resources such as teaching video, courseware and test questions; the user management function can realize the user's identity authentication; the log management module can realize the daily learning management of students.

Resource layer: The resource layer realizes data storage. It mainly stores user information, log information, teaching resource library information, learning process information, and learning results.

The intelligent teaching system based on the MVC multi-layer structure clearly plans the functions of each structure through a three-layer structure, which is conducive to the expansion of the system function and business. If you need to add new business functions, you only need to add functional modules in the application service layer, which greatly facilitates business expansion. By introducing the public service layer, a common structure is built for other business systems. The public service layer is responsible for managing logs and permissions. To add new business systems requires the development of corresponding functional modules at the application layer, which greatly improves the repeatability of the software.

4.1 Chinese-German Dual System Curriculum Ideological and Political MVC Division Design

The teaching knowledge base in the teaching system based on the MVC architecture is set to D ; the content of the learned ideological and political knowledge is set to S , the content of the ideological and political knowledge that has not been learned is set to SN ; the knowledge of the practical ideological and political teaching for students is G , and no The knowledge of practicing ideological and political teaching is GN . Then there are the following two formulas:

$$\begin{aligned} \{SN\} &= \{D\} - \{S\} \\ \{GN\} &= \{S\} - \{G\} \end{aligned} \quad (1)$$

If $\{SN\} = \{D\} - \{S\} \in (0, 0)$
 $\{GN\} = \{S\} - \{G\} \in (0, 0)$, it means that the student has learned all the knowledge of ideological and political intelligence teaching in the Sino-German dual system course;

If $\{SN\} = \{D\} - \{S\} \in (0, 0)$
 $\{GN\} = \{S\} - \{G\} \notin (0, 0)$, it means that the student cannot enter the next stage of Sino-German dual system curriculum ideological and political intelligence teaching. Students can only review the ideological and political knowledge that they have not learned in Unit GN , and practice continuously until all the ideological and political teaching knowledge that they have not mastered is $\{GN\} = \{S\} - \{G\} \in (0, 0)$, before they can enter the next stage of teaching.

4.2 Teaching Function Design

Knowledge Point Modeling

The arrangement of curriculum knowledge points plays a leading role in the course. Integrating intelligent teaching system, combing teaching resources and guiding students to carry out personalized learning can help teachers push resources and complete students' personalized correction. By setting the course knowledge points, teachers can use the knowledge point system modeling tool to match and push the course resources and the related knowledge points in the question database resources according to the specific learning progress of the Chinese and German students before class, forming a set of resources closely connected with the knowledge points, and realizing the filtering and reconstruction of knowledge points.

Permission Control Service

In the Sino German dual system ideological and political intelligent teaching system, the user rights control mode based on the roles of students and teachers in China and Germany is as Fig. 6.

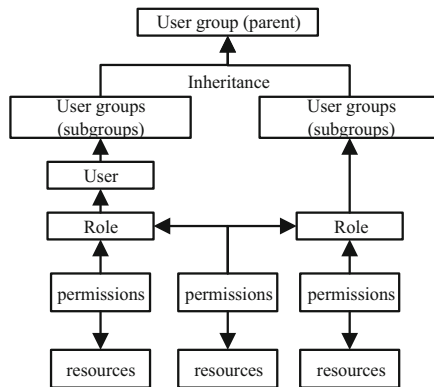


Fig. 6. Service flow of authority control

The main body of the teaching aid system authority system: teachers, Chinese and German students and system administrators. Since the school is divided into colleges as the teaching unit, the courses and teachers of each college are different. Therefore, the designed authority system includes student management, teacher management, course management, college management, maintenance management, role management, and authority management in both China and Germany. The logical structure of the permission system framework includes function points, users, and roles:

Function points: Function points are designed according to permissions, and each function point corresponds to a permission. When a user obtains a permission, the user obtains a certain system function.

Users: Students, teachers, administrators who use the system.

Role: A set of permissions for a role. The role is created by the system administrator. The role name and permissions are set when it is created. Each role can have multiple permissions, and the user can also have multiple roles.

Therefore, the specific process of designing the authority of teaching system is as follows:

- (1) Establishing teaching assistant user information
Establish student information database, including student number, name, gender, college and other basic information, as well as login password; establish teacher information database, including teacher's job number, name, gender, college and other basic information, as well as its login password; at the same time, design an administrator user.
- (2) Establishing teaching assistant college information and course information
Establish college information, including college code, college name, college basic information; establish course information, including course code, course name, etc.
- (3) Establish role information for teaching assistant system
Establish all roles of distance learning teaching assistant system, including administrator, student, teacher, etc.
- (4) Establish teaching auxiliary authority information
Establish system operation function points, including multiple usage rights and functions such as login, connection, query, modification, and deletion.
- (5) Establish the corresponding relationship between roles and permissions
Different roles are given different permissions to form functional entities, and multi-level relationships are constructed to form a composite framework. It is associated with a permission ID and a role ID.
- (6) Establish the correspondence between users and administrators of the teaching system
Establish the association relationship between user ID and administrator ID, so that each user has its own management organization, and establish different user rights for users.
- (7) Grant roles to users of the distance learning system
After the role is assigned to the user, the role possessing the authority is also assigned to the user. After the user logs in, the corresponding authority system operation can be performed.

Teacher Terminal Service

Teacher terminal services are applied to mobile terminals such as mainframes, tablets, and mobile phones to provide statistical analysis tools for classroom interaction. In the process of preparing videos, resources and materials for the micro-class, teachers can select existing resources from the system “course resources” and push the targets that can be selected. The editing and processing of teaching resources requires the help of knowledge point modeling tools to accurately push teaching resources. In the classroom, the student intelligent terminal system provides interactive tools to satisfy the interaction between teachers and students in the classroom.

Classroom Interactive Services Between Students and Teachers in China and Germany

In the process of classroom interaction service between students and teachers in China and Germany, we mainly focus on the deep interaction of data analysis, timely analyze the classroom data, and focus the interactive system functions on the most commonly used functions in classroom teaching, and discard fragmentary functions, so as to make the communication between teachers and students more convenient.

5 Experimental Analysis

5.1 Experimental Environment and Parameter Settings

The experiment is carried out on the MATLAB platform, using a desktop computer, and installing a dual port 10 Gigabit fiber Ethernet controller, supporting peripheral components interconnection standard bus. The hardware optimization features of virtualization support the unified network pattern, allowing LAN, storage network and other network sharing. In addition, it uses the adapter of integrated physical layer (PHY) and blade server mezzanine card. The parameter settings are as Table 1.

Table 1. Communication network parameter setting

Parametric variable	Set value
Network coverage area	1500 m × 1500 m
Number of nodes	200 pcs
Data transmission consumes energy	15/KJ
Shortest data transmission path	8 lines

5.2 Experimental Results and Analysis

System Functional Test

In order to have an objective evaluation of the system function, a comprehensive test is carried out. The test example is as Table 2.

Table 2. System function test cases

Test instructions	System operation correctness
Login problem	Can students log in Q1 normally
	Can teachers log in Q2 normally
Class recommendation question	Click to view teacher recommendation, can you enter the recommendation view normally Q3
	Normally display the personalized recommendation results, can you directly enter the recommendation view Q4
	Click the recommended letter, can it display the main activity Q5
Class discussion questions	Click the discussion button, can you directly enter the topic discussion interface Q6
	Click to view the view, can you receive the reply topic Q7

The artificial intelligence-based network system and the MVC-based system were used to analyze the safe use of various test cases of the ideological and political classroom system. The comparison results are as Table 3.

Table 3. Comparative analysis of the security usage of test cases on the two technology platforms

System operation correctness	Based on artificial intelligence network system	Based on MVC system
Q1	Correct	Correct
Q2	Correct	Correct
Q3	Correct	Correct
Q4	Incorrect	Correct
Q5	Incorrect	Correct
Q6	Incorrect	Correct
Q7	Correct	Correct

It can be seen from Table 3 that the artificial intelligence based network system can not directly access the recommendation view, display the main activities by clicking, and can not directly enter the topic discussion interface, display the recommendation results, and click the recommendation letters and discussion buttons, resulting in incomplete system functions. The MVC based system can complete the system operation normally and has complete system functionality.

Teaching Effect Test

In order to improve the persuasion of the experimental results, students of different levels were selected to participate in the experiment, and 10 experiments were added,

and the average value of 10 experiments was taken. The teaching effect based on artificial intelligence network system and MVC system is compared and analyzed. Based on the full score of 100 for each student, the teaching results of the two systems are compared as Table 4.

Table 4. Comparative analysis of scores obtained in two systems of ideological and political teaching

Number of students/person	Based on artificial intelligence network system/points	Based on MVC system/points
100	800	1000
200	1800	1998
300	2500	3000
400	3200	3995
500	4500	5000

It can be seen from Table 4 that when the number of students is 200, the maximum score obtained using the artificial intelligence network system is 1800 points, which is 200 points away from the full score. When the number of students is 500, the score obtained using the artificial intelligence network system is 4,500 points, which is 500 points away from the full mark; When the number of students is 200, the score obtained using the MVC-based system is 1998 points, which is 2 points away from the full mark. When the number of students is 400, the score obtained using the MVC-based system is 3995 points, which is 5 points away from the full score. From the above content, we can see that using the MVC-based system can more stimulate students' interest in learning, the teaching effect is good.

Teaching Efficiency Test

Based on the above contents, the two systems are used to compare and analyze the teaching efficiency, and the results are as Fig. 7.

It can be seen from Fig. 7 that when the number of students is 50, the teaching efficiency of the artificial intelligence network system is 68%, and the teaching efficiency of the MVC-based system is 96%; When the number of students is 200, the teaching efficiency of the artificial intelligence network system is 60%, the teaching efficiency of the MVC-based system is 94%; When the number of students is 400, the teaching efficiency of the artificial intelligence network system is 50%, and the teaching efficiency of the MVC-based system is 91%.

Teaching Accuracy Test

The teaching accuracy based on artificial intelligence network system and MVC system is compared and analyzed, and the teaching accuracy of the two systems is compared, as shown in Table 5.

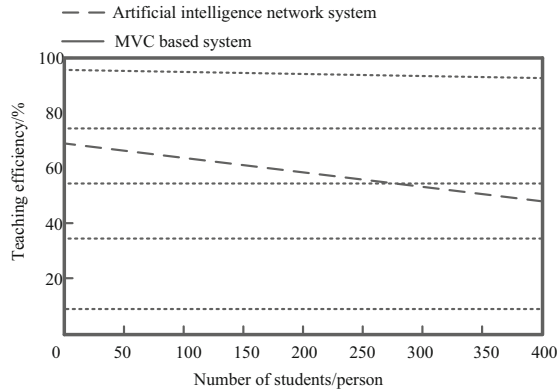


Fig. 7. Comparative analysis of teaching effectiveness of the two systems

Table 5. Comparative analysis of Ideological and political teaching accuracy of two systems

Number of students/person	Based on artificial intelligence network system/%	Based on MVC system/%
100	83	92
200	85	95
300	86	93
400	82	94
500	87	92

From Table 5, it can be seen that when the number of students is 500, the average ideological and political teaching accuracy of using artificial intelligence network system is 84.6%, while that of MVC system is 93.2%. Therefore, the ideological and political teaching accuracy based on MVC system is relatively high.

To sum up, the teaching effect based on MVC system is better, which can effectively improve the teaching efficiency and accuracy. Because the system uses the operation button of the optical fiber Ethernet controller to control the Sino German dual system course, and uses multiple pins to complete a large number of signal transmission, so as to improve the teaching efficiency. The MVC function module is designed to display the saved user list in the interface. Through the MVC division, the ideological and political intelligent teaching system of the dual system course in China and Germany can be divided, so as to improve the teaching accuracy and ensure the teaching effect. However, the teaching goal of using artificial intelligence network system is not clear, which leads to the problems of low teaching efficiency and accuracy, and poor effect.

6 Conclusion

It is an inevitable trend for colleges and universities to realize the intellectualization of teaching management. On the one hand, it can greatly reduce the workload of teaching managers and make the management process standardized and simplified. On the other hand, it can also improve the efficiency of the system and improve the teaching level with the help of advanced database teaching system. The operation of intelligent teaching system can also improve the service level for the school staff and students, and provide convenience for these users to quickly input and query information. The WebKit engine is used as the core module of the browser client, and the information transmission results are transmitted to the client. The operation keys of the optical fiber Ethernet controller are used to control the dual system courses. A large number of signals are transmitted by multiple pins, and the virtual classroom module is designed, improve teaching efficiency and accuracy. The MVC function module is designed to display the saved user list in the interface. Through the MVC division, we can divide the ideological and political intelligent teaching system of the dual system curriculum between China and Germany, determine the teaching objectives, and ensure the teaching effect.

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