



## Web Services-Based Analysis of Human Resource Management Education Data for Infrastructure Development

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**Abstract.** In order to solve the problem that the theoretical teaching of the existing human resource management teaching platform is too boring, a data analysis of human resource management education based on Web services is proposed. Hardware components include memory, central processing unit, input devices, and output devices. Memory includes teacher memory and student memory. The central processing unit consists of three parts: the logic unit (ALU), the control unit, and the input/output unit. Software developed for web server applications and database applications respectively. Evaluating learning outcomes through comparative research. Research shows that as the number of students increases, the time to support research decreases to 1.0 seconds. Web-based human resource management training improves service quality and shortens work time.

**Keywords:** auxiliary teaching; distance teaching system; Web technology; equipment composition; program design; comparative experiment

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### 1 INTRODUCTION

Big data is widely used in many aspects of social life and is gradually changing the life of many businesses[19]. Therefore, colleges and universities should protect the changes of time, develop human resources without delay, use the digital training model of human resource management, and developing the right skills that meet the needs of the business. Human resource management is a comprehensive major, and students cannot fully grasp relevant knowledge through the pure

theoretical study. Therefore, colleges and universities usually provide some practical training links when setting up human resource management courses.

Currently, courses related to human resource management in colleges and universities are organized around the eight principles of human resource management. There are links to communication courses or networks in talent planning, recruitment, training, and compensation based on human resources management courses. Additional courses are mostly electives and the continuing education curriculum is weak. In addition, courses related to human resources management in colleges and universities are still at the level of traditional professional knowledge, and the teaching content is still the previous human resource management methods and tools, which are not well integrated with the digital age. In the existing curriculum system, there are relatively few contents that are closer to the development of the digital economy, such as digital human resource management and intelligent application of human resource management.

College and university education is the front and main channel for technical training. It can adjust the "goals", "contents", "pattern" and "method" of the creation of skills according to the new challenges and new social needs and the economy of the new time, and improve the quality. education that helps society and business. However, how to use the advantages of management skills in the information age to promote the development of colleges and universities in education, learning mechanism and work in schools, Chinese colleges and universities should strengthen the importance of teaching and human resource management. To analyze the theoretical meaning of education, clarify the new model and new directions of human resources management, thus creating a solid foundation for educational reform.

Under the premise that informatization has become an important factor in social development and economic construction, all countries in the world have made every effort to improve and develop their own digitalization and informatization levels, and make them gradually become indicators to measure the degree of modernization and development of regions and countries. Under the background of the new era, education informatization has become an important aspect of social informatization construction. Therefore, the infiltration of informatization into teachers' teaching and education management has become an inevitable trend that cannot be stopped. According to theoretical research, it can be found that education informatization mainly refers to the process of carrying out information technology planning for the educational process with the help of the organizational leadership of the education department in the modern education system, so as to achieve the goal of educational modernization. In short, today's education is the general use, achievement and use of information technology. Under the influence of information technology, human resource management has gradually brought out the concept of human information management. It is about integrating information technology with traditional human resource management to create a new type of human resource management in colleges and universities. At the level of theoretical research, human resource management information is often about the process of improving human resource management processes, methods and procedures. Content with the help of "network technology", "communication technology", "computer application technology" and other information technology. It has the characteristics of "low management cost", "high management efficiency" and "high participation efficiency". It can effectively realize the implementation connection between employees and organizations, disperse and concentrate resource information, optimize management processes, and promote the advantages of intelligent and intelligent development of human resources. Problems of Human Resources Management in Colleges and Universities under Educational Informatization The foundation of human resources management informatization in Chinese colleges and universities is solid, the storage capacity and processing capacity of servers have been effectively improved, and the network speed and basic environment have also been improved. Information products are relatively abundant, and the management level has been continuously optimized. However, in the context of educational informatization, there are many constructive problems in human resources informatization, which

greatly affect the function and value of information technology. The degree of emphasis is relatively low. There are two main reasons for the lack of emphasis on education informatization and human resources informatization by university leaders. The first is objective reasons. Therefore, on an objective level, university leaders lack the awareness of investing heavily in the informatization of human resources management. The second is the subjective factor. Due to the lack of comprehensive, objective and systematic understanding of education informatization by university leaders, it is difficult for them to increase their emphasis on human resources informatization from the perspectives of "college education", "strategic development" and "talent training", and lack the basic foundation for informatization construction. In the long run, it will lead to relatively limited financial, human, and material investment in the construction of human resources informatization, and it will be difficult to form an informatization development pattern, which will affect the effectiveness and effectiveness of the development of human resources informatization, and is not conducive to the continuity of education informatization work.

Under the background of educational informatization, more and more informatization technologies are widely used in the process of college education and teaching, which greatly improves the teaching efficiency and training level of college teachers. However, in the context of human resources informatization construction, there are obvious conceptual problems. That is to say, it is difficult for the personnel department to combine the basic characteristics of education informatization to change the management concept, resulting in the human resources management mode, system, procedure and method still limited to the traditional management method and mode, and accustomed to the traditional business process and work form. As a result, the construction of human resources informatization cannot achieve ideal results. The reason is that information technology and management concepts have not been effectively integrated, so that information technology cannot play its due role in human management work, which in turn affects the effectiveness and effectiveness of human resources management in colleges and universities. In addition, due to the lack of modern management concepts, there are many mismatches and mismatches in the process of human resources informatization management. The backward concepts and advanced technologies have affected the order of human resources management more or less.

The first is that there is no strategic planning. The lack of regular work organization and general planning in colleges and universities during the creation of human data management data leaves the foundation for use and development of human information systems. At the same time, the lack of "development plan" for human information makes it difficult to manage the management of universities and colleges with a competitive environment, and can not meet the requirements of human control through the development of education. The second is the lack of system training. Due to the lack of attention of university leaders to human resources informatization, the training quality, efficiency and system construction of human resources managers have been seriously affected. For example, after the system test, the lack of system training for administrators makes it difficult for administrators to make full use of the information system or platform to improve management effectiveness. However, in the aspect of informatization literacy and informatization ability training, there is a lack of sufficient consideration, resulting in a slow process of human resources informatization construction. In addition, at the level of team building, colleges and universities lack outstanding talents who are not only familiar with business management, but also master information technology, resulting in an unsatisfactory overall effect of human resources informatization construction.

## 2 LITERATURE REVIEW

The work of human resources management is the necessity of the necessary skills with knowledge of business, law, management, and people management, and the ability to Human resource management in facilities and buildings [8]. Under the premise that informatization has become an

important factor in social development and economic construction, all countries in the world have made every effort to improve and develop their own digitalization and informatization levels, to gradually make them measure the level of reform and development of regions and countries. In the context of the new era, information literacy has become an important part of information development. Therefore, the delivery of information has become an important and constant part of teacher education, training, and educational management. As the digital transformation progresses, infrastructure development plays a crucial role in enabling the effective delivery of information and supporting the integration of technology into education systems

Under the influence of information literacy, the idea of managing people's information gradually emerged from the management of people. It is the integration of information technology with traditional human resources management to create a new form of human resource management in universities [14]. At the level of theoretical research, human resource management information is often about the process of developing methods, methods and principles of human resource management with the help of information technology such as "network technology", "communication technology", "computer. It has the characteristics of "low cost management", "high performance management" and "high participation". It can effectively realize the implementation connection between employees and organizations, disperse and concentrate resource information, optimize management processes, and promote the advantages of intelligent development of human resources [12].

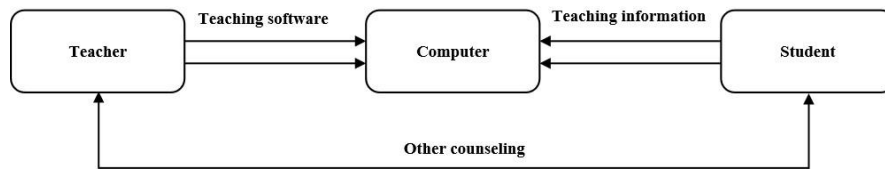
In the context of information education, more and more information technology is widely used in the school's education and training process, which greatly improves the efficiency of education text and level of training of university teachers. However, in the context of human resources informatization construction, there are obvious conceptual problems. That is to say, it is difficult for the personnel department to combine the basic characteristics of education informatization to change the management concept, resulting in the human resources management mode, system, procedure and method still limited to the traditional management method and mode, and accustomed to the traditional business process and work form. As a result, the construction of human resources informatization cannot achieve ideal results. The reason is that information technology and management concepts have not been effectively integrated, so that information technology cannot play its due role in human management work. In addition, there are many gaps in people's information management process due to the lack of modern management strategies. Background and advanced technology have more or less affected the control of people.

To improve education today and improve the quality of education, our country has created a distance learning program that uses computer technology and is training teachers to use all the advantages of computers. Web technology is a widespread use of programs, scripts, and tools to exchange information between clients and servers. Therefore, a web-based human resource management system was developed in this study to improve the lack of distance education. Design physical devices and applications from a hardware and software perspective. It is very important to improve the quality of teaching, strengthen the evaluation of teachers and students, and create a good environment for students to communicate remotely.

### **3 METHODS**

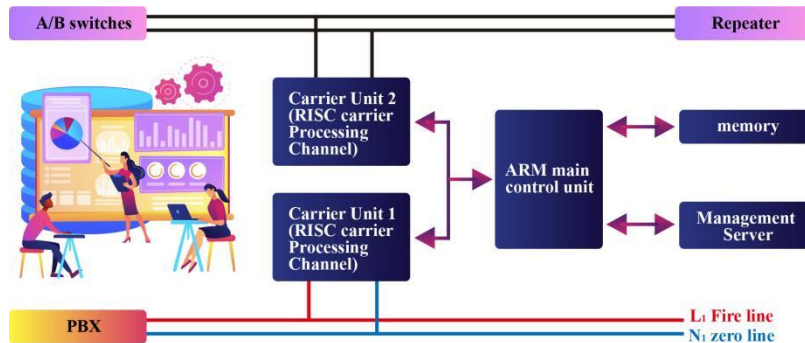
#### **3.1 Hardware Design of Human Resource Management Teaching System Based on Web Technology**

The computer is the basic equipment for the operation of the human resource management system based on the web technology. During distance learning, the computer is a means of communication between the teacher and the students. The logic of computer distance learning is shown in figure 1 [15].



**Figure 1:** Logic diagram of computer teaching.

The hardware structure of the system is shown in Figure 2 [13].



**Figure 2:** System hardware structure.

### 3.1.1 Memory design

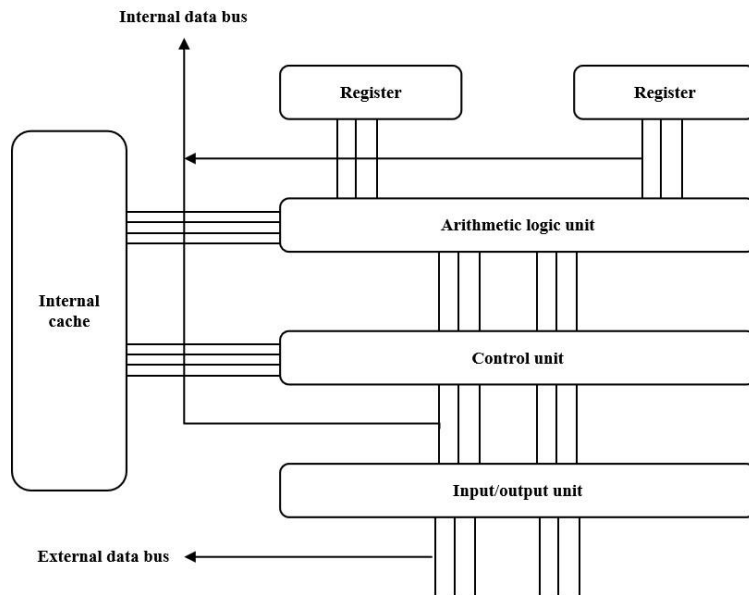
Memory is a document that is often used to store many teachers and many students. When using the system, the memory first copies the instructions of the number entered by the teacher, and then sends it to the next device in the system. When the instruction code gets too old or too difficult to modify, memory stores the instruction code that has not been modified, and always maintains the integrity and function of this instruction code. After completing the transfer instructions, the memory will re-send special transfer instructions to ensure that the connection is perfect before and after, and the connection error will not be more than 0.001 seconds. Therefore, the distance learning created by this study will not be affected. The tool plays an important role in teaching students, for example, ensuring the integrity and continuity of each lesson while fulfilling all the teaching requirements. Memory parameters are shown in Table 1.

Parameters	Description
Storage speed/ms	5
Storage capacity/MB	256
Delay time/ms	2
The chip type	SPD chip

**Table 1:** Memory parameters.

### 3.1.2 CPU

The work base, also known as the work base, is one of the most important tools of science. The specific architecture of the CPU is shown in Figure 3 [3].



**Figure 3:** The composition of the central processing unit.

At runtime, the hardware processor first receives continuous instructions from memory through the arithmetic logic unit (ALU) and combines these instructions. The system has improved the overall performance of the site and improved the overall performance and efficiency of the facility. The processor parameters are shown in Table 2.

<i>parameter</i>	<i>Value</i>
<i>CPU frequency/GHz</i>	3.0
<i>Dynamic acceleration frequency/GHz</i>	4.5
<i>The core number</i>	<i>Eight core</i>
<i>The number of threads</i>	<i>14 threads</i>

**Table 2:** Processor parameters.

Then it is removed one step at a time and finally the most specific product of the joint instruction is obtained [9]. After all the integration instructions have been determined, the arithmetic logic unit (ALU) sets the integration instructions to get the set M, and then passes the set by making changes/advice to the control room.

It automatically filters and analyzes the command in the M-code. Finally, the received information is processed in the work to get the most specific information of the joint, which is then sent to the memory of both parties to receive and response from both parties.

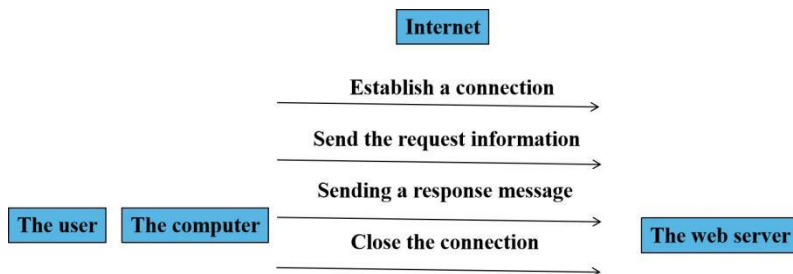
### 3.1.3 The input device and output device

The remote learning computer input and output devices are teacher-side input-output and student-side input-output. The primary function of input devices is to convert coded instructions into simple operations. Unlike the input device, the output device is responsible for converting the M class instruction into N code that represents the data transfer.

### 3.2 Software Design of Human Resource Management Teaching System Based on Web Technology

This course is a human resource management course based on web technology. Students and teachers can interact with computers. By writing programs, the entire learning process can be managed to meet the needs of learning. Therefore, according to the hardware, the related software that cooperates with the equipment is put together.

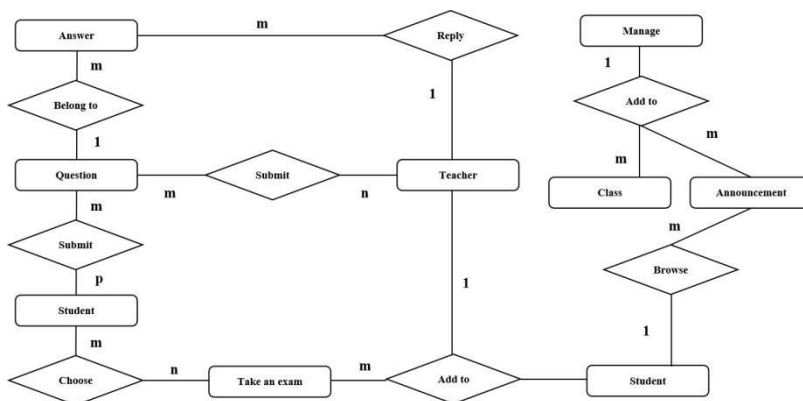
Web servers are currently the most widely used and efficient servers. Web-based refers to a computer that allows you to view Web-based HRM training information in a connected environment. Teachers can send information such as teaching requests and teaching materials from the server. The working principle is shown in Figure 4 [11].



**Figure 4:** How the Web server works.

In Figure 4, a connection is established between the web server and the network protocol browser. A message is a request that a user sends to the web server via a web browser to request access, access to the data, and other necessary requests. After the web server receives the request. When the response is complete, the web server is connected to the browser, and the web server is monitored and updated.

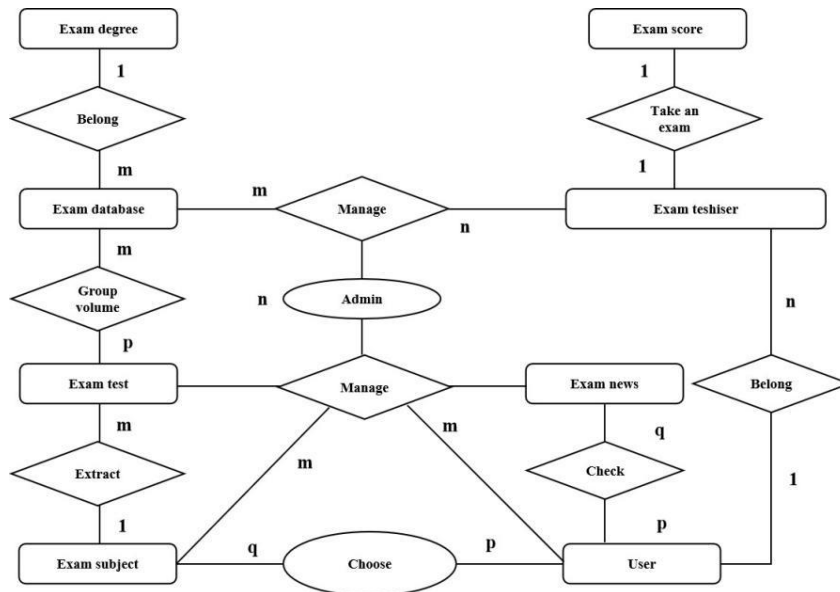
Databases are an electronic resource for storing education-related information. E-R plots are used to identify key features of the data to better understand the features of different types of data. Typical E-R plots on the online courses are shown in Figure 5.



**Figure 5:** E-R diagram of the online learning database based on Web technology.



Such as classes, questions, answers, announcements, management, instructions, class numbers, teachers, questions, settings, users, surface information, etc. Among them, each "class" table has a special meaning, and these tables contain necessary information such as student personal information, test scores, and teachers' notes [10]. The special advantage of using web technology is that if other changes are made in the middle of the student's education, the information of the previous educational process can be saved by entering the data, and learning can be done. The E-R diagram of the online survey site is shown in Figure 6 [5].



**Figure 6:** E-R diagram of the online examination database based on Web technology.

The data in the web-based remote assistant online test subsystem created for the study has 12 tables as shown in Table 3.

No.	Name	No.	Name
1	admin	7	exam_score
2	department	8	examsubject
3	examdatabase	9	exam_test
4	exam	10	examtetuser
5	degreeexamnews	11	user
6	examnews_log	12	waitforpass

**Table 3:** Database subsystem tables.

The exam database subsystem has the same characteristics as the online student database subsystem. Which the administrators can view for free only with fingerprint verification. Not only with passwords, but it also creates conditions to ensure the integrity of the student's test. On the other hand, the data of students in the web-based test subsystem can check some of the real problems of the student test data, which reduces teacher training and teacher development.



### 3.3 Realization of Network Assisted Teaching System

The particle swarm algorithm temporarily stores the user's command data in the list [8]. Centralized data extraction or symbol extraction is performed on the mixed data in the list to form independent processing capabilities, which are sorted into a matrix according to the type of data. The data-type matrix is constructed by the transformation of the Gaussian function, assuming that  $T_{i,j}$  is the extracted numerical data matrix,  $d$  is the ratio function bit between the data, and  $\lambda$  is the coefficient of the Gaussian function extraction, so that  $T_{i,j}$  can be represented by the data relationship as:

$$T_{i,j} = \exp\left(-\frac{d}{2\lambda^2}\right), i, j = 1, 2, \dots, n \quad (1)$$

The symbolic data is extracted through the definition of attributes, and the extraction process can optimize the storage speed of the system database designed in the research. The extraction process is as follows.

$$T'(x_i, x_j) = \begin{cases} 0, & x_i \neq x_j \\ 1, & x_i = x_j \end{cases}, i, j = 1, 2, \dots, n \quad (2)$$

The matrix  $T'_{i,j}$  extracted by the data display data type is:

$$T'_{i,j} = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 & 0 & 1 \end{bmatrix} \quad (3)$$

According to the extracted numerical matrix  $T_{i,j}$  and symbolic matrix  $T'_{i,j}$ , the matrix data distribution diagram is established.

Due to different data processing methods, the particle processing is required, and then the two matrices can be combined, as follows.

$$T'' = T_{i,j} + \sum_{i=1}^n P_i \times T'_{i,j}, i, j = 1, 2, \dots, n \quad (4)$$

In Formula(4),  $P_i$  is the weight coefficient of data particles;  $C_i$  is the number of common edges required by the integration matrix. The formula is transformed, and  $P_i$  is expressed as:

$$P_i = C_i / \sum_{i=1}^n C_i \quad (5)$$

It can be seen from the above formula that the data after using the particle cluster algorithm can be processed in a single output mode, which greatly improves the calling ability of the database. The particle swarm is used for calculations to increase database storage space. The range of improvement is not unlimited, and the improvement space is run to the maximum through the formula, as follows.

$$B_i - B = (R - R_i) \times (T - T_i) \quad (6)$$

In formula(6):  $B_i$  is the storage node of the database;  $R$  is the rising weight;  $T$  is the increased storage amount. In order to further improve the calling speed of database information data, the improved storage space is optimized as follows:

$$C_p^i = \sum_{j=1}^n lwB + wC, w_i \geq w \quad (7)$$

In Formula(7),  $C$  is the number of nodes between the data from the database to the user;  $w$  is the probability of data node pass processing, the impact of the system hardware must ensure that the data runs within a certain speed. This avoids the overloaded operation of the database and reduces the lifespan of hardware devices. To satisfy the conditions for stacking variables:

$$P_i^D = \begin{cases} 1, & T \geq T_i, \text{ or } D \geq D_i, \text{ or } C_p \geq C \\ 0, & \text{other} \end{cases} \quad (8)$$

In Formula(8),  $p$  is the data running rate, and the fast data feedback can be achieved only when the above conditions are met.

### 3.4 Advantages and Characteristics of The Micro-Lecture Teaching System Design

#### 3.4.1 Focus on the interaction between teachers and students

To facilitate effective communication and interaction between teachers and students, the system introduces various instant communication tools such as WeChat, allowing full use of it good, and remind teachers and students to carefully extract words from the text [18].The system will also integrate the video of the students' questions with the message, and the students will analyze the video content in detail, and then fully understand the relevant responses given by the teacher. The system will also design the video real-time communication function according to the actual needs.

#### 3.4.2 Support automatic retrieval of tags and keywords

During the process of watching the micro-lecture videos, students can mark them in the form of post-it notes and record key words in detail. In this way, when viewing in the future, the system will display the marked content, and will also automatically search based on keywords to find text and video resources of other keywords on the Internet [6]. Students can view all relevant search structures through keywords to achieve rapid and automated retrieval of information. In this way, students can use the trivial time after class to study, the so-called breakpoint continuation. Not only that, marking can also ensure that students follow their ideas in real time, and when encountering problems, they can quickly find solutions on the Internet, thereby expanding the amount of course information.

#### 3.4.3 Intelligently promote learning content according to students' learning progress

By giving full play to the advantages of cluster analysis algorithms, the teaching system analyzes students' learning progress and needs in detail, searches for relevant resources based on the resource library, and pushes them in real time for students. The system attaches great importance to the organic relationship between knowledge content, so the important role of intelligent push is indispensable, especially in correctly guiding students' learning direction, maintaining learning progress, and mobilizing students' interest in learning. At the same time, further improving the teaching evaluation mechanism and organically integrating the micro-lecture system with classroom teaching can not only stimulate students' interest in learning, but also encourage teachers to update video resources.

### 3.5 Smart Mobile Terminal Function Module

#### 3.5.1 Authentication module

The task of the authentication module is to clarify the identity of students, teachers, and administrators, so as to record the student learning process in detail. When entering the system, the tasks of teachers and students are teaching and learning, and the role of administrators is to maintain and manage the system [7-1].

### 3.5.2 Digital learning resource database

Digital learning resources are not only micro-course videos, but also learning resources that match the teaching content, that is, program codes, Flash animations, and so on.

### 3.5.3 Learning evaluation module

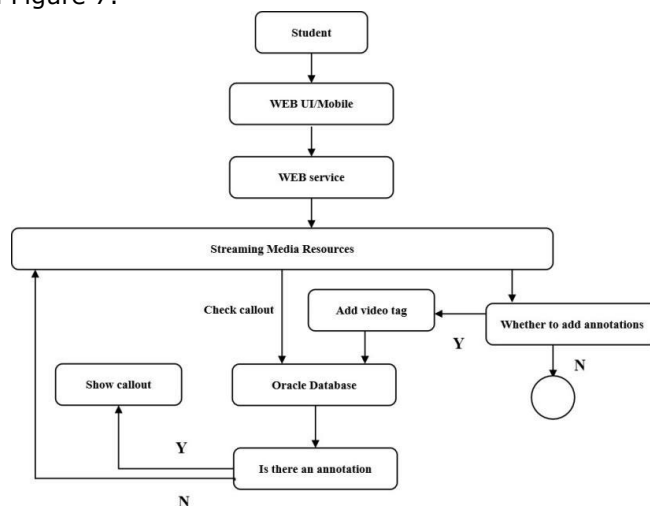
The mobile learning system can make a formative evaluation of students on the learning progress and effect, and students can obtain certain evaluation and help through teachers and classmates.

### 3.5.4 Learning resource sharing module

The design of micro-lecture learning resources requires the joint efforts of teachers and students. Students upload the micro-lecture videos and learning resources to the database, and administrators review and share them with other students after passing the test [2].

### 3.5.5 Video annotation, video playback module associated with video and annotation

Students can mark keywords when watching micro-lecture videos, and the client-side playback platform uses AJAX technology to display the marked information, so as to realize the organic association between marking and video. Students can search for the annotation information first, and click to associate with the video clip to retrieve the video. The specific process of video annotation is shown in Figure 7.



**Figure 7:** Video annotation process.

### 3.5.6 Information communication module

Students ask questions about the micro-class resources and leave a message, and then remind teachers through text messages, and teachers enter the system to reply [4]. The student terminal platform will comprehensively display questions, answers, videos, etc. At this time, students click on the question to open the video clip, and then further solve the problem according to the teacher's reply.

## 3.6 Experiment

In order to verify the effectiveness of the proposed web-based human resource management system, the research was tested with traditional computer remote learning based on data mining

technology and a subject in remote computer. Data analysis-based system to compare tuition and support opportunities. The experimental parameters are set as shown in Table 4.

<i>Parameters</i>	<i>Value</i>
<i>Length of the question number</i>	<i>5</i>
<i>Auxiliary level</i>	<i>3 level</i>
<i>Full score</i>	<i>100</i>
<i>Difficulty proportion</i>	<i>Medium</i>

**Table 4:** Experimental parameter settings.

#### 4 RESULTS AND DISCUSSIONS

Test comparisons were made based on the above benchmarks, instruction was given on different difficulty levels, and support was compared. As shown in Tables 5-7 [17].

<i>Knowledge point number</i>	<i>Embedded computer remote auxiliary teaching system based on data mining technology</i>	<i>Embedded computer remote auxiliary teaching system based on information analysis</i>	<i>The system in the research</i>
<i>1</i>	<i>95</i>	<i>70</i>	<i>65</i>
<i>2</i>	<i>94</i>	<i>68</i>	<i>66</i>
<i>3</i>	<i>96</i>	<i>75</i>	<i>68</i>
<i>4</i>	<i>92</i>	<i>80</i>	<i>70</i>

**Table 5:** The scope of the teaching system when the difficulty of the knowledge point is relatively difficult %.

<i>Knowledge point number</i>	<i>Embedded computer remote auxiliary teaching system based on data mining technology</i>	<i>Embedded computer remote auxiliary teaching system based on information analysis</i>	<i>The system in the research</i>
<i>1</i>	<i>97</i>	<i>81</i>	<i>72</i>
<i>2</i>	<i>97</i>	<i>82</i>	<i>75</i>
<i>3</i>	<i>96</i>	<i>79</i>	<i>77</i>
<i>4</i>	<i>99</i>	<i>85</i>	<i>78</i>

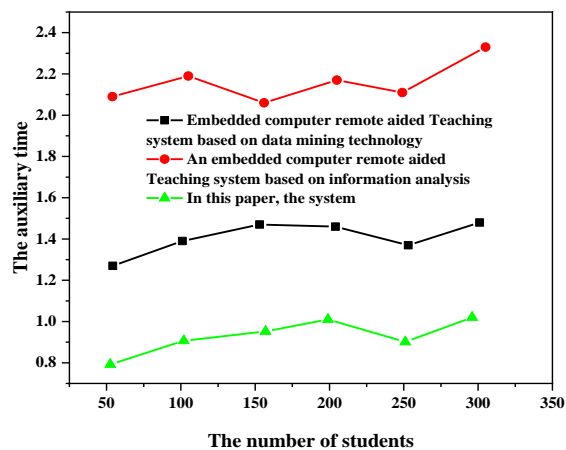
**Table 6:** The scope of the teaching system when the difficulty of the knowledge points is moderate %.

From Tables 5-7, it can be seen that the human resource management website proposed in the study has expanded the support and used different support for the content different words. When the complexity of the knowledge content is different, the support of the traditional support system is less than the support proposed in the study.

<i>Knowledge point number</i>	<i>Embedded computer remote auxiliary teaching system based on data mining technology</i>	<i>Embedded computer remote auxiliary teaching system based on information analysis</i>	<i>The system in the research</i>
1	98	88	76
2	99	90	74
3	99	87	70
4	99	85	72

**Table 7:**The scope of the teaching system when the difficulty of the knowledge point is relatively easy %.

Figure 8 shows the results of the competition time of the learning process and the two comparisons [16]. As shown in Figure 8, it can be seen that the learning support proposed in the study is able to distinguish the data and provide support in a short time, with less support time than traditional support systems. It has a strong service ability, better service results, and easier to use. As the number of students is constant, the research support time is 1.0 seconds.



**Figure 8:** The experimental results of auxiliary time.

## 5 CONCLUSIONS

This study presents a data analysis of web-based human resource management education. Human resource management training based on web technology was developed. The computer is advertising, the software program is the main part, and the basic physical parts are described, such as the memory, the central processor, input devices and devices, the applications such as web server, database, and remote embedded auxiliary tools. The use of training methods enables students to take online tests and learn online. This allows teachers to understand the true and clear of students' abilities and evaluate them correctly. This gives students access to better education at home and creates a better learning environment for them.

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