

Research Article

Optimization of English Online Teaching Scheme Based on Cloud Platform Technology

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Due to the increasing progress of IT and cloud computing technology, traditional teaching methods and instructional resources can no longer meet the needs of modern education. How to use network technology to optimize classroom teaching and improve the quality and effect of online education is a topic worthy of in-depth discussion. Based on the current situation of English online education, this paper analyzes the theoretical basis and application status of cloud computing and puts forward the optimization strategy of English online education under the network environment, combining with the theories of constructivism and collaborative learning and building an instructional resource sharing management system based on cloud computing. The system can provide a great quantity of high-quality instructional resources for English online education and further promote the optimization of English online education.

1. Introduction

Nowadays, science and technology have been greatly developed, and IT has been widely used in various industries [1]. With the continuous reform of the education system and the intervention of network technology, the institution of higher learning has set off a large-scale teaching reform, including English education. The English classroom instructional mode is facing new changes [2]. In the traditional English classroom teaching, because the instructional materials are stipulated by the school, the lag of the content of the instructional materials can hardly meet the students' demand for the latest English information [3]. Thus, students' interest in learning English and the learning process of English is inhibited [4]. Moreover, the traditional ELT (English Language Teaching) has long been based on "a spoon-feeding" classroom instructional mode, which does not fully respect students' dominant position in learning activities, so that students are always in a state of passive learning or even forced learning [5]. As a result, students have a sense of resistance to learning English, and their awareness of autonomous learning is very weak. ELT is one of the important contents of school education. Nowadays,

the globalization of the world economy is intensifying. In this environment, the innovation and optimization of ELT are even more important [6]. At the present stage of international integration, the development of IT network has promoted the improvement and optimization of education and teaching. Especially in English online education, ELT for students by teachers and schools is mainly based on skills, and its efficiency has been significantly improved through the use of Internet resources [7]. By applying network technology to college English online education, more comprehensive talents can be cultivated, which is of great significance to the future development of our country [8].

Due to the increasing progress of IT and the popularization of technology applications, and with the deepening of ELT reform, network technology has been widely used in ELT [9]. "Cloud computing" refers to a network composed of hundreds of thousands or even millions of cheap servers, which can provide users with the required computer services in remote locations. Cloud computing is the product of the continuous development of data management technology, and it is a new data management computing model [10]. Centralized management of computers distributed in different places in cloud computing. It has powerful computing

power and massive storage capacity and can meet the needs of different types of application systems [11]. Cloud computing is a kind of computer capability provided to users as a service, which allows users to obtain needed services through the Internet without knowing the service providing technology, relevant knowledge, and equipment management ability [12]. Cloud computing is not a single technology or a product. It can be dynamically adjusted according to the needs of users, providing users with the computing power and storage capacity they need. It can be said that it is a brand-new service model [13]. The new network platform based on cloud computing, as well as its innovative ideas in service mode and technology, enable us to find a new way to solve the management and service of information resources [14]. Cloud computing platform can create a collaborative environment with a strong learning atmosphere and provide an interactive collaborative environment for collaborative learning. Based on the cloud platform technology, this paper constructs an optimization scheme of English online education to optimize the effect of English online education and stimulate students' interest in learning English. Its innovations are as follows:

- (1) This paper innovatively combines cloud platform technology with English online education and constructs an instructional resource sharing management system based on cloud computing. The system is characterized by openness, universality, and security. At the same time, the system can ensure that instructional resources can be fully shared so that instructional resources can be used conveniently by users to the greatest extent. It provides a great quantity of high-quality instructional resources for further English online education and promotes the optimization of English online education.
- (2) This paper summarizes the disadvantages of the traditional network instructional mode. Aiming at these shortcomings, this paper studies the optimization measures of English online education under the network environment and puts forward the optimization scheme of English online education and measures to promote the optimization of English learning efficiency according to the principles to be followed in optimization.

2. Related Work

Due to the increasing progress of IT and network technology, the educational field is faced with new teaching requirements and goals. How to optimize the network instructional mode has become one of the key research topics of the majority of educators. In the aspect of online teaching, many scholars have carried out the research.

Li et al. started by enumerating the disadvantages of the traditional network instructional mode and designed an English network instructional mode based on cloud computing [15]. Pais et al. introduced the concept of cloud computing and cloud architecture model. Through a brief introduction to the existing cloud platforms, they

understood the characteristics and functions of each cloud platform and proposed a network instructional model based on cloud computing [16]. Cui et al. pointed out that the way of sharing instructional resources in the traditional network mode is easy to create "information islands," which makes the connection between the islands "unsmooth," and it is difficult to meet the needs of users. Therefore, a research plan for an instructional resource sharing system is proposed [17]. Based on school ELT, Song et al. expounded specific strategies for optimizing school English classroom instructional mode in the network environment [18]. Zhang et al. pointed out that teachers can only give full play to the advantages of IT and network technology. Only in this way can students enrich their learning experience and promote students to acquire more subject knowledge in the teaching classroom, thereby providing a reliable guarantee for improving students' comprehensive ability [19]. Jiang et al. pointed out that network technology not only provides important information for teaching it has fundamentally integrated the resources of ELT and promoted the development of ELT. It made ELT change from the traditional classroom instructional mode to the network instructional mode under the IT environment [20]. Yang et al. believed that the application of network technology in ELT is mostly in the form of multimedia. The application of multimedia technology in ELT can not only cater to the interests of students but also strengthen the effective interaction between teachers and students [21]. Cui et al. analyzed the English classroom instructional mode in the network environment, conducted in-depth discussions on the optimization of classroom teaching, and proposed corresponding optimization strategies [22]. Zhang et al. believed that the application of IT in CET (College English teaching) has been inevitable for the development of the times. Through IT, CET will be comprehensively reformed. The use of IT to promote the optimization of CET is analyzed, and relevant solutions are proposed [23]. Jing et al. believe that the current situation of English online teaching, and through questionnaires, data statistics, and other methods to do an in-depth investigation and research. The significance and disadvantages of college English online teaching are analyzed in detail. And the strategy of using multimedia teaching to achieve the optimization of college English classroom teaching is discussed in reference [24].

Although scholars have done a lot of research on online education, there are few pieces of research on English online education based on cloud platform technology. This paper conducts detailed research on the optimization of English online teaching based on cloud platform technology.

3. Methodology

3.1. Cloud Platform and Data Mining Technology. Cloud computing has flexible expansion ability, powerful computing power, and massive storage capacity. Users can obtain various service resources through the network, without worrying that cloud computing service providers cannot meet users' needs. Cloud computing can enable users to obtain computing power, storage space, information services, and other

functions as needed [25]. The realization of all these functions is automatic management through specialized software, without the participation of manpower. This enables us to focus more on business realization, which is conducive to improving work efficiency, reducing development costs, and technological innovation.

The emergence of cloud computing has changed users' usage habits. Cloud computing technology is a new technology integrating distributed computing and virtual storage technologies. In today's information age, this technology is still developing rapidly [26]. Cloud computing can be divided into infrastructure services, platform services, and software services according to the different levels of services it provides. Now, more and more people will regard cloud computing as another way to use IT. In the near future, cloud computing may greatly change the role of IT. The traditional service model and organizational structure will need to be changed. All this is determined by the characteristics of cloud computing. Cloud computing does not have a unified conceptual model. It is the development of parallel computing, distributed computing, and grid computing [27].

The instructional resource sharing management system based on cloud computing connects multiple computers distributed in different places through the basic computer network environment, including computers, memories, and network interconnection devices. Virtual storage of a large number of teaching resources on multiple computers, and use the powerful computing power of cloud computing to provide unified services. Before constructing the instructional resource sharing management system, it is necessary to discuss the application mode of DM (data mining) in online education [28]. Educational DM is a systematic process that uses DM technology to optimize learning resources and the learning process. It is necessary to analyze the process from the perspective of system, information, and interaction, in which information interaction system is an effective analysis method. The educational DM framework is shown in Figure 1.

The existing network teaching resource sharing management system has some shortcomings. The existing instructional resource sharing management system still focuses on data storage for the management of massive data and has insufficient capacity for operation and calculation after storage, which cannot meet the requirements of high availability, consistency, and data immediacy.

Each level of teaching content can be excavated and analyzed by the corresponding technology, forming the knowledge mining levels of philosophy mining, affection mining, science mining, technology mining, and practice mining. The development trend of IT is large scale, virtualization, and service. Therefore, the application of cloud computing technology in the management of instructional resources in institution of higher learning is also to adapt to the development of educational informationization in the future. Cloud computing technology plays an important role in efficient management of instructional resources and sharing of instructional resources.

3.2. Optimization Principles and Strategies of English Online Education under Network Environment. Data communication technology and computer network technology not only have a profound impact on human life and working style but also make the traditional education and instructional model greatly challenged [29]. The network instructional mode with Internet IT as the core is gradually deepening into ELT. Through the characteristics of multimedia teaching facilities and resource sharing concept, ELT has been optimized in many aspects such as resources and environment to a certain extent, and comprehensive network education with virtual teaching environment, diversified instructional resources, and networked instructional materials has been realized. Nowadays, in many teaching activities, not only multimedia technology is used in teaching methods, but also multimedia information is added to teaching contents. Using multimedia courseware for teaching has been the most extensive way in the development of multimedia teaching.

Multimedia technology can make English online teaching more intuitive so that students can more easily understand and accept the English knowledge they have learned [30]. This vivid image of multimedia can stimulate students to better remember and understand the knowledge content, so that the teaching content can become richer and more perfect, thus making English online education more vivid. However, this teaching method also has great disadvantages, such as too large amount of information, nonprominent focus, and loss of interaction between teachers and students. Therefore, ELT under the network environment needs to be continuously optimized and improved, and various optimization principles should always be adhered as the concept of online education, so as to realize the practical improvement of students' learning efficiency by the instructional mode.

If we use the self-made multimedia courseware to demonstrate the abstract and difficult content in a vivid and intuitive way, it will improve students' learning efficiency and optimize the learning process. Therefore, we should make full use of the IT network, rely on the combination of multimedia online education means and traditional instructional mode, and use them together. In order to give full play to the advantages of the network instructional mode, English teachers must change the traditional role orientation, adhere to the people-oriented teaching principle, and formulate targeted teaching plans according to the actual situation of students. While striving to enhance the teaching effect, it can also improve the quality and efficiency of students' autonomous learning, thus promoting the development of students' autonomy. And in teaching, teachers should always focus on students' feelings and increase communication with students.

The use of network technology in classroom teaching is mostly in the form of multimedia. The advantage of multimedia teaching is the interaction between teachers and students. In ELT, the use of multimedia technology can change the traditional instructional mode and improve the ELT system. English teachers must treat the use of network technology correctly, adhere to the teaching principle of human-computer interaction in teaching, and use multimedia to communicate and interact with students so that students can not only enjoy the convenience brought by IT

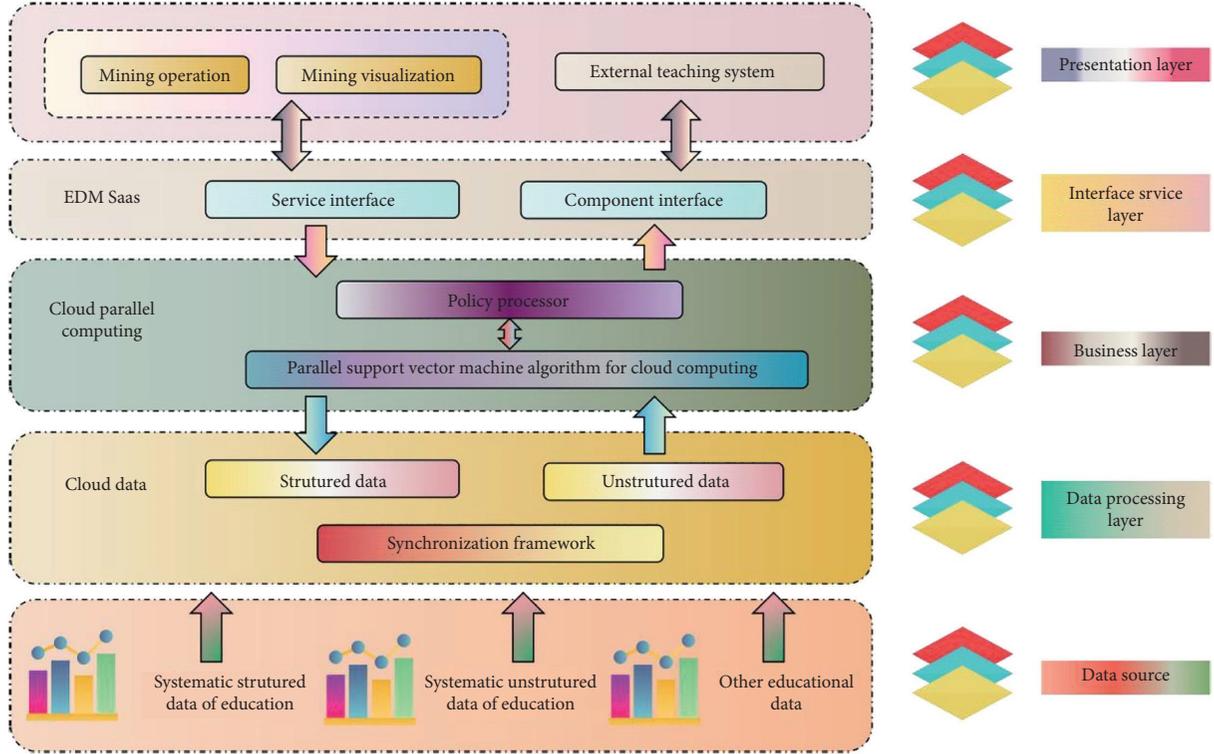


FIGURE 1: Educational DM framework.

but also have good communication with teachers, thus creating favorable conditions for obtaining the best teaching effect.

3.3. Optimization of ELT Online Education Based on Cloud Platform Technology. The application objects are education DM infrastructure, education DM platform, and education DM software, and the calculation objects are education big data. The overall goal of the instructional resource sharing management system based on cloud computing is to realize the unified registration management and description of scattered, heterogeneous, and various online instructional resources in the teaching management system. Various types of multimedia instructional resources can also be made into streaming media files with unified format or carry out on-site real-time acquisition through audio and video acquisition equipment; and then store them in the cloud server in a certain way. At the same time, by combining the information of personnel and courses in the teaching management system, a resource database is established. According to the actual teaching needs, dynamically allocate instructional resources to learners. The network topology diagram and programming mode of this system are shown in Figure 2.

Considering the scalability and flexibility of the project, the configuration of this system is not to directly use the web. config but to realize its own configuration class to avoid the oversize caused by directly using web. config. At the same time, it is also more convenient to read and does not need to convert types. The function of the system should aim at facilitating users' use and improve users' working efficiency

so that the system has better expandability. At the same time, the system should strengthen the construction of a system security mechanism, and one or more security mechanisms can be used. In the basic and important parts, higher security measures should be adopted to ensure the safe operation of the system. The core business process of this system is uploading and downloading resources. Before users can manage resources, they must log in and give permission.

The architecture of teaching management system based on cloud computing is a three-tier architecture, including display layer, business layer, and data layer. Data from teaching and educational administration systems, such as online courses, E-Learning, and online learning platforms, may be stored in databases and text files in structured and unstructured forms, and the ideal state comes from the multidimensional data warehouse. Suppose P_i represents the i th processor in

$$(i = 1, 2, 3, \dots, P). \quad (1)$$

The smaller the P_i value, the better the performance of the processor. Then the sum of processor performance is shown in the following formula:

$$P_s = \sum_{i=1}^P \frac{1}{P_i}. \quad (2)$$

The ratio of the performance of the i processor to the total processor performance is shown in the following formula:

$$\frac{Pc_i = 1/P_i}{P_s = 1/P_i * P_s} \quad (3)$$

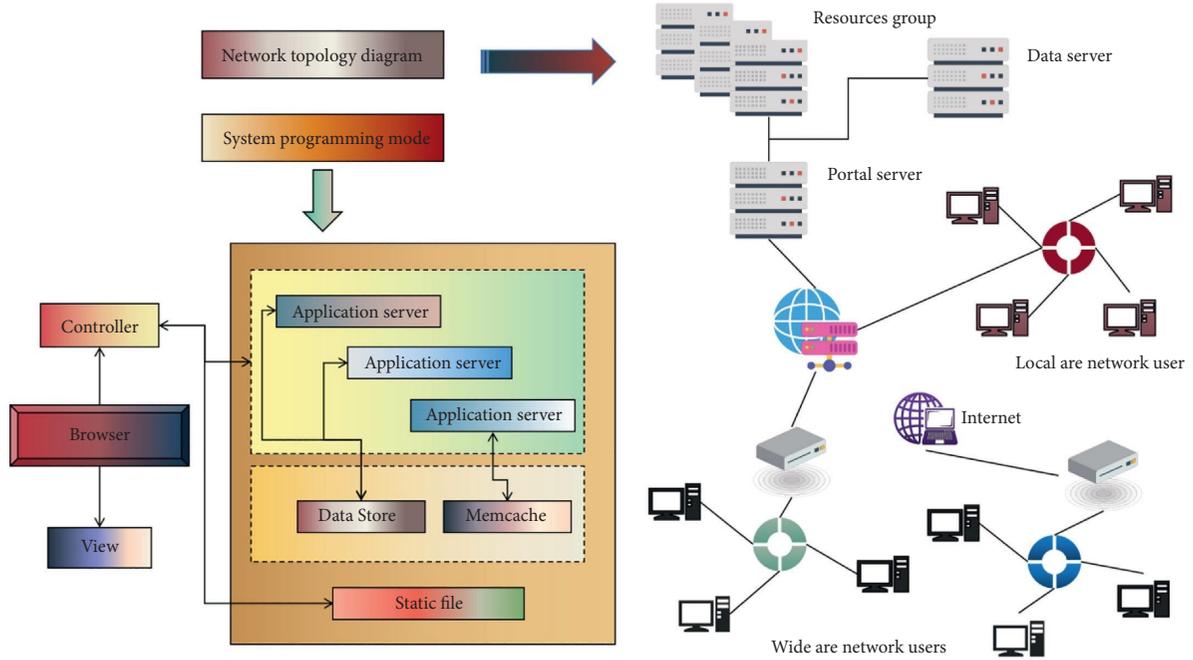


FIGURE 2: System network topology and programming mode.

The total amount of data required by the total access request of instructional resources in a certain period of time is shown in the following formula:

$$LH = \sum_{j=1}^L LH_j. \quad (4)$$

Then the total amount of data required for the instructional resource access request allocated to the i processor P_i is shown in the following formula:

$$X_i = \sum_{i=1}^{K_i} LH_i, K_i(L). \quad (5)$$

The collection, management, and storage of instructional resources have become the most basic and important link in the construction of instructional resources. The main features are digital processing of instructional resources, multimedia display of instructional resources, network transmission of instructional resources, diversity of instructional resources contents, sharing and using of instructional resources, etc. In the user module, users can manage

resources, upload, and download resources. Then, through the settings of the user's uploaded resources, in order to prevent the duplication of resources, the system will systematically match the user's uploaded resources according to the keywords to check whether there are similar files. The cloud computing module mainly reads data from cloud distributed files and databases and then calls Qizmtjob to perform every parallel DM calculation. Assume that the conditional probability of the instructional resource scoring data is shown in the following formula:

$$p(R | U, V, \sigma_r^2) = \prod_{i=1}^m \prod_{j=1}^n (N(R_{i,j} | g(U_i V_j^T), \sigma_r^2))^{I_{ij}}, \quad (6)$$

where $N(R_{i,j} | g(U_i V_j^T), \sigma_r^2)$ is the probability density function of $R_{i,j}$; I_{ij} is indicator function; and $I_{ij} = 1$ indicates that the user i has performance on j project; otherwise, $I_{ij} = 0$. According to the Bayesian probability theorem, the conditional probability distribution of matrix R, U, V can be obtained as shown in the following formula:

$$\begin{aligned} p(U, V | R, \sigma_r^2, \sigma_u^2, \sigma_v^2) &= p(R | U, V, \sigma_r^2) p(U | \sigma_u^2) p(V | \sigma_v^2) \\ &= \prod_{i=1}^m \prod_{j=1}^n (N(R_{i,j} | U_i V_j^T, \sigma_r^2))^{I_{ij}} \prod_{i=1}^m N(U_i | 0, \sigma_u^2 I) \prod_{j=1}^n N(V_j | 0, \sigma_v^2 I). \end{aligned} \quad (7)$$

Take the logarithm of both sides to get the following equation:

$$\text{Lnp}(U, V | R, \sigma_r^2, \sigma_u^2, \sigma_v^2) = -\frac{1}{2\sigma_r^2} \sum_{i=1}^m \sum_{j=1}^n I_{ij} (R_{ij} - U_i V_j^T)^2 - \frac{1}{2\sigma_u^2} \sum_{i=1}^m U_i^T U_i - \frac{1}{2\sigma_v^2} \sum_{j=1}^n V_j^T V_j - \frac{1}{2} \left(\sum_{i=1}^m \sum_{j=1}^n I_{ij} \right) \text{Ln} \sigma_r^2 + \text{NDLn} \sigma_u^2 + \text{MDLn} \sigma_v^2 + C. \quad (8)$$

Finally, the estimated value of the matrix U, V is obtained as

$$E = \frac{1}{2} \sum_{i=1}^m \sum_{j=1}^n I_{ij} (R_{ij} - U_i V_j^T)^2 + \frac{\lambda_u}{2} \sum_{i=1}^m \|U_i\|_{\text{Fro}}^2 + \frac{\lambda_v}{2} \sum_{j=1}^n \|V_j\|_{\text{Fro}}^2. \quad (9)$$

In the mesh structure, nodes are connected with each other, and each node is connected with at least two other nodes, which makes the structure more complicated. Because the nodes in the network structure are connected with at least two other nodes, even if one of the links cannot work, it will not affect the whole network, so the mesh structure has high reliability. Through the interface service layer, the educational DM cloud system becomes a service. Through the service-oriented architecture, the DM cloud system and the teaching system are relatively independent and integrated with each other, which embodies the characteristics of software-as-a-service in big data cloud computing applications.

4. Result Analysis and Discussion

System testing works to test the performance of all aspects of the system according to the needs of the original users of the system to check whether the system can operate normally and whether it meets the needs of users. This system has a friendly interface and is simple and easy to use. It has two main menu bars, horizontal menu and vertical menu, which are convenient for different users to operate. The main interface has all the function menus of the system and displays the user information of each user. The operating system of the test server is Linux, the web application server is Apache Tomcat, and the database server is Microsoft SQL Server. The operating system of the client is Windows 10, and the browser is Internet Explorer. The stability of the system in this paper, the system in literature [16], and the system in literature [17] are compared, and the results shown in Figure 3 are obtained. The operation time of different systems is shown in Figure 4.

Because the system adopts a supervised algorithm when modeling mining data, the training sample data requires clear prediction results. It divides the condition term into hyperplane according to the sample prediction target to obtain the support vector for prediction. In the modeling of educational DM, the key point is to find the condition item and the prediction target item. When users access Web applications through the Internet, the Web server processes Web requests to generate job entries. The server gets these

job entries in the background and processes these business logics through worker instances. The data generated in this process is stored in Table and Blob. These specific operations in the background do not need to be known, and users can interact with the Web through a given API. Select the Glass, Iris, and Heart data sets to train under different algorithms and compare their accuracy. The support vector machine algorithm and the decision tree algorithm are the most commonly used algorithms. The accuracy comparison results with the algorithm in this paper are shown in Table 1.

In order to verify the performance of the algorithm in this paper, the concept of F1 value is proposed based on precision and recall to evaluate precision and recall as a whole. F1 is defined as follows: F1 value = accuracy * recall * 2/(accuracy + recall). We compare the F1 values of different algorithms experimentally. The comparison results are shown in Figure 5.

It can be seen that among the three algorithms, the F1 value of this algorithm is the best. Its F1 value is higher than the other two algorithms. In this experiment, literature method, interview method, and questionnaire survey method are used in the specific data collection process. The survey has been conducted in the first semester of 2021, and the subjects were 1,000 freshmen. The recovery rate of the questionnaire survey is 100%. Based on the questionnaire data of students' evaluation of English online teaching in the first semester, this paper further analyzes the current situation of using multimedia in college English online teaching. Students' evaluation of the use of multimedia in ELT is shown in Table 2.

As can be seen from the data in the table, 69.5% of the students can quickly adapt to multimedia teaching. 58.3% of the students think its expression is rich in artistry. 80.6% of the students think that using multimedia can convey a large amount of information. 67.4% of the students think that teachers teach faster with multimedia. It can be seen that the expressive force of multimedia teaching is very strong, and most students welcome this new form of expression. Figure 6 shows the changing trend of students' scores after using different instructional modes.

Combined with the characteristics of English learning, the application framework of the educational DM cloud system in the English learning platform is derived from the basic application model of DM in online education. This element and its relationship are embodied in the data and behavior of English learning. MapReduce distributes the processing of massive data to each node to complete it separately, thus realizing the enforceability and fault

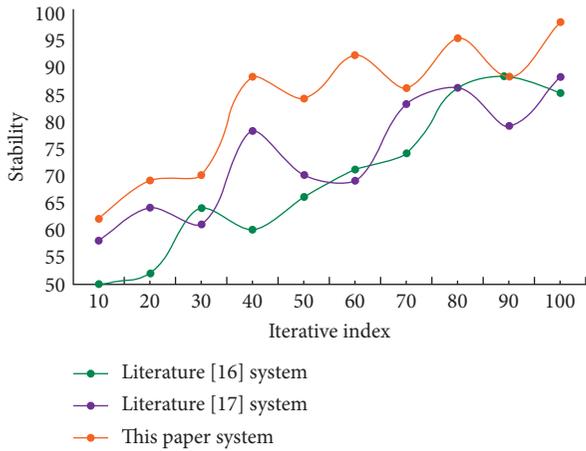


FIGURE 3: System stability comparison.

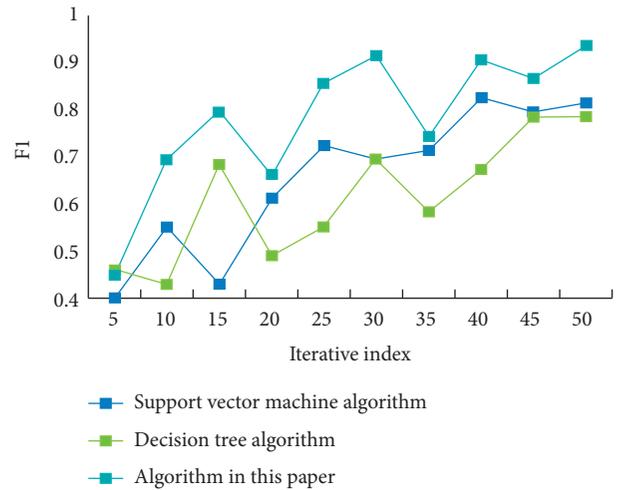


FIGURE 5: F1 value of different algorithms.

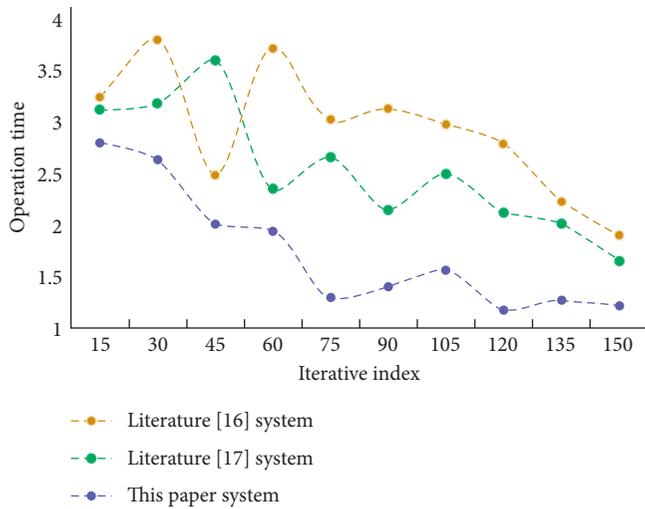


FIGURE 4: Comparison of computing time of different systems.

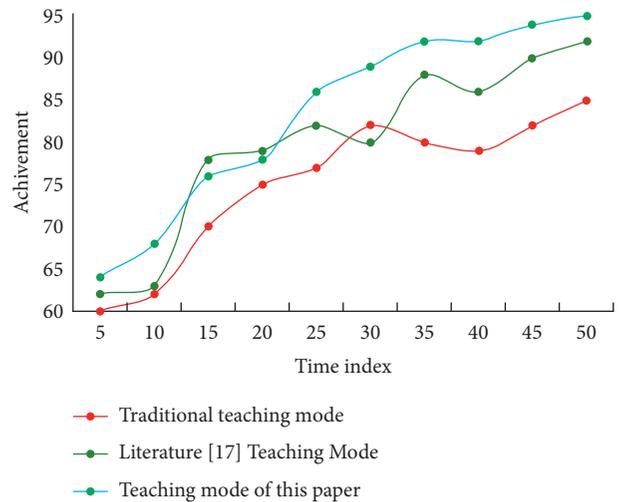


FIGURE 6: Changes in student performance after using different instructional modes.

TABLE 1: Accuracy of different algorithms.

Sample set	Glass (%)	Iris (%)	Heart (%)
Support vector machine algorithm	88.34	89.31	87.54
Decision tree algorithm	86.12	85.34	85.27
Algorithm in this paper	89.14	90.13	90.68

tolerance of the work. Any Map function is an operation on the original data. There is no coupling between them, and they are all done in a parallel environment. Because performance DM to support educational decision-making is the mining of static data, here we think that the purpose of mining is to assist the process of instructional design, which can be considered as a large instructional design and a systematic project; therefore, its process and state is the process of assisting teaching analysis, design, development, implementation, management, and evaluation through DM. The resource sharing rates of different systems are shown in Figure 7.

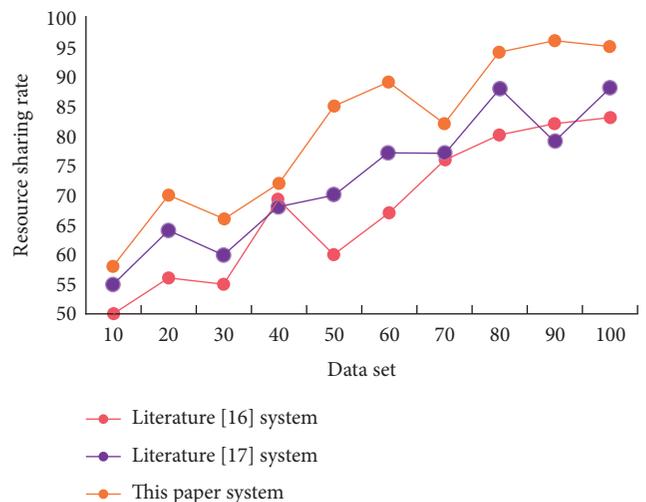


FIGURE 7: Resource sharing rate of different systems.

TABLE 2: Students' evaluation of the use of multimedia in ELT.

	Adapt quickly	Strong performance	Convey a large amount of information	Lectures are fast
Number of people	695	583	806	674
Proportion (%)	69.5	58.3	80.6	67.4

Use the system test cases designed above to test the instructional resource sharing management system. From the test results, the functions of the system all meet the functional requirements put forward in the stage of system requirement analysis. Moreover, the calculation time of the system is fast and the stability is high. The highest resource sharing rate of this system can reach about 95%, which is 5%–15% higher than other methods. It can effectively provide high-quality resources for English online education. Mining learning performance data can effectively improve the ability of supporting educational decision-making and effectively optimize instructional resources and teaching process.

5. Conclusions

- (1) Due to the increasing progress of network technology and IT, English online education is facing new opportunities and challenges. On the one hand, English teachers need to meet the challenge and find out new ideas and methods to optimize online education. On the other hand, English teachers need to seize the opportunity, to use network technology and IT to innovate teaching ideas and instructional models, so as to give full play to the advantages of network technology and IT and achieve ideal teaching results.
- (2) Based on the shortcomings of English online education at present, this paper puts forward the optimization strategy of English online education under the network environment, combined with constructivism and other theories. This paper combines cloud technology with English online education and constructs an instructional resource sharing management system based on cloud computing. The system makes full use of the characteristics of cloud computing and achieves the purpose of eliminating "information islands."
- (3) Experiments show that the resource sharing rate of this system can reach about 95%, which is 5%–15% higher than other methods. It can effectively provide high-quality resources for English online education. This system can effectively enhance the interaction between teachers and students, promote resource sharing, and greatly improve the effect of English online education.

Data Availability

The figures and tables used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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