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Research Article

The Construction of a Digital Resource Library of English for Higher Education Based on a Cloud Platform

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This paper conducts in-depth research and analysis on the construction of an English digital resource library for higher education through the cloud platform. The cloud platform allows the English resource library to achieve integration, efficiency, scalability, and interactivity and then solves the problems of how to realize the co-construction and sharing of resources among multiple platforms in vocational institutions and improve the utilization rate of resources. The construction of the English resource library in higher vocational institutions cannot be separated from the collaboration between institutions and enterprises, and institutions must face up to the problems existing in the construction of the current resource library. Firstly, the requirements of various aspects of the higher vocational English digital resource library system are given from three aspects, functional requirements, performance requirements, and operational requirements, in strict accordance with the requirement analysis steps; secondly, the overall technical architecture and network topology architecture of the education cloud platform where the higher vocational English digital resource library system is located are analyzed and given in general to ensure the security, scalability, and ease of operation of this platform and then the resource collection and resource storage. The application of cloud computing technology can solve the problems of difficulty in obtaining teaching resources, insufficient storage space, limited communication, and slow circulation; it can realize the integration and integrated management of various resources through technologies such as networking, virtualization, and distributed storage. Finally, based on the optimization strategies proposed in this paper, the core modules of the higher vocational English digital resource library system are designed and implemented, and some important and representative interfaces and source codes are demonstrated. To ensure the operation performance, the situation of multiple users operating the higher-level English digital resource library system at the same time is simulated, and the overall performance of the higher-level English digital resource library system is evaluated for the common operations such as uploading resource files, downloading resource files, and querying resource files, which confirms the rationality of the design strategy in this paper and greatly improves the user experience and increases the utilization rate of teaching resources.

1. Introduction

With the development of modern science and technology, "informatization" is strongly advocated in all occupations, and the education industry is no exception, and the rapid development of information technology has provided great convenience to the education industry. In recent years, the emergence of various information-based teaching methods such as flipped classrooms, catechism, mobile classrooms, virtual learning communities, and collaborative laboratories have injected new vitality into modern vocational education and provided various channels for students to learn independently. The traditional classroom is no longer the main source of knowledge acquisition for students [1]. The teaching mode of self-learning before class, internalizing during class, and improving after class has become one of the most advocated teaching modes for English teaching in higher education institutions. However, due to the lack of

sufficient teaching resources, it is often extremely difficult to implement this teaching model in practice, and its effect is not satisfactory. The use of cloud computing technology can solve the problems of difficult access to teaching resources, insufficient storage space, limited dissemination, and slow circulation; it can realize the integration and integrated management of various resources through networking, virtualization, distributed storage, and other technologies [2]. Using the cloud platform (i.e., cloud computing platform), we can easily realize the integration and utilization of resources, improve the efficiency of resource acquisition, and reduce the cost of resource storage management. Therefore, the establishment of a cloud-based higher vocational English teaching resource library is the most crucial step to solve the current bottleneck problem of higher vocational English teaching [3]. Teachers need to push learning resources to students before, during, and after class, while traditional higher vocational English digital resources have the characteristics of complex, scattered, disorderly, and incomplete content, and they also lack fragmentation suitable for mobile learning. Along with the forward movement of students' learning, the construction of ubiquitous and fragmented digital resources for mobile learning is increasing on the agenda. Traditional high-quality course resources do not have the characteristics of openness and sharing and are not suitable for mobile learning because of their complicated contents [4]. There are more studies on the construction of university English resources, but fewer studies on the construction of higher vocational English resources, and higher vocational students have their own practical and vocational characteristics. The traditional research on the content of higher vocational English resource construction based on cloud platforms is not comprehensive enough, such as the construction of students' independent learning resource library and the construction of a resource library for listening and speaking ability development which involve less content.

Using cloud computing to create an information platform for educational resources, a multitenant model is implemented with the help of SOA, SaaS, and network storage computing, which can be used by various educational institutions or other organizations for training and other purposes. With the distributed and parallel computing technology of cloud computing, the corresponding speed of servers is greatly increased [5]. The platform implements unified management of data, security, and applications in the "cloud" so that users only need to focus on their own business and do not need to spend more time on management. This mode greatly saves the investment of education information technology, changes the way the government invests in education, and will get more economical and better practical results and improve economic efficiency. It changes the obsolete way of learning for students, allowing them to choose their preferred personalized page form and style, select applications and resources on-demand, and integrate their learning, work, and life on this education cloud platform, greatly improving learning efficiency [6]. With the help of the education cloud platform, students can be provided with customized services to meet their different learning needs and learning styles and provide personalized learning support services such as learning tools so that students can develop lifelong learning using the education cloud platform, thus improving the overall education level for the establishment of a lifelong education system. Higher education students are not highly self-aware and do not develop the habit of searching English learning resources from the internet for a long time, much less spending a lot of energy to find learning materials. It is not only in line with the students' existing learning style but also can reduce the difficulty of searching for learning resources and strengthen their interest in English learning. Users only need to focus on their own business without spending more time on management. This mode greatly saves the investment in education informatization, changes the way the government invests in education, and will achieve more economical and better practical results. From the point of view of the development of teaching informatization, with the strong support and advocacy of the education department, the informatization infrastructure of vocational colleges has become more perfect, which has largely promoted the teaching reform, and the introduction of the blended learning model has brought vitality to the informatization process of higher vocational English. However, the lack of teaching resources has become a barrier to this process, and the lack of resources to support the implementation of the new teaching model has affected the final presentation effect Thus, the use of cloud technology to build English teaching resources in higher education is a part of the informatization process that cannot be ignored.

The necessity of establishing a resource bank for higher vocational English can be analyzed from both internal and external aspects: "internal" mainly refers to the change of students' learning style, and "external" mainly refers to the promotion of the information technology education process The internal and external changes and developments have put forward new requirements for learning resources and teaching resources, which make it urgent to establish a resource base for higher vocational English teaching. First, from the perspective of students' learning mode transformation, in the background of network development, students can search learning resources from the internet, and they are used to get the corresponding English learning materials from the internet platform. Cloud computing for higher education is an internet-based cluster service group, which is an easily scalable, user-targeted, and virtualized resource. The construction of a teaching library based on a cloud platform can improve the overall digital management level, deepen teaching reform, improve teaching quality, reduce the cost of software and hardware equipment, improve the utilization rate of resources, achieve maximum resource sharing, and solve the problem of uneven and insufficient resources. Under the teaching system, the analysis of resource data, timely replenishment of various types of tense and scarce resources, and understanding the user learning process propose the most suitable user learning methods and content to achieve push and trigger learning. The teaching resource base based on the cloud platform incorporates teaching resources from all over the world,

which is rich in resources and easy to expand, and the platform automatically analyzes the data of the resource base at this stage so that the data of the resource base can be expanded in time according to it to better meet the needs of users. And the platform also recommends excellent learning materials and learning methods according to each user's situation to realize push and trigger learning.

2. Current Status of Research

Modeling user profiles and their integration with the retrieval process is an effective way to develop personalized information retrieval within educational digital repositories [7]. Therefore, it gradually raises the question about the dynamic development of this profile for the resource retrievers to set up queries. Slimani et al. also focused on this issue, and eventually, they proposed two models for personalized search based on digital educational resources. The first approach is to build an index of repository resources, and the second approach is to build user profiles and facilitate their development after each query is submitted by the user based on a classical Bayesian network (a probabilistic graphical model) representing the search activity. This model is used to meet the user's personalized information retrieval needs [8]. Bedenlier et al. focused on the ARIADNE project, supported by the European Commission; the project's goal is to facilitate the sharing and reuse of digital educational resources [9]. To achieve this, a Europe-wide repository of educational resources, called the Knowledge Pool System (KPS), has been created. They found that a key feature of the KPS is the underlying metadata specification, which has been used in a wide range of experiments [10]. This, in turn, is the basis for the emerging metadata standard for learning objects developed by the IEEE Learning Technologies Standards Committee. In their article, they, therefore, focus on the analysis of the metadata model of the ARIADNE project and discuss the ARIADNE tools developed to support metadata authoring, database querying, and course development activities. On the contrary, reliable adaptive systems, which require adaptation strategies and key characteristics of students, will help to automatically change the educational environment. Thus, they introduced an adaptive platform whose constituent parts are personal data, psychological characteristics, and special educational needs. And it can customize the delivery of digital educational resources provided through a database using the specific characteristics of the student. In addition to this, the platform has some adaptations in the user interface to meet the needs in special education.

However, there is a lack of understanding of students' attitudes and competencies regarding the use of digital educational resources in professional learning in the relevant studies [11]. Therefore, Xu analyzed the competencies that students should have in using digital educational resources which include understanding the requirements of using digital educational resources in professional learning and understanding the methods of using digital educational resources in professional learning. Then, he used the experimental method to establish a model of students' ability to use digital educational resources in professional learning and made an experimental demonstration of the validity of the model [12]. With this, he hopes that the process of professional training suitable for students can be optimized, and the use of digital educational resources can be increased. A collection of tags created individually by different users is called a mass taxonomy, and the motivation of such users to tag may have an impact on the data description of the resource [13].

In his study, the focus is on how user motivation to tag resources can affect educational resource creators in terms of resource design. Then, based on the study, methods are proposed to identify the motivations of different types of users as well as to reduce the impact of such user motivations on the metadata of digital educational resources. Finally, it is concluded that a universal resource model is designed to match user motivations, thus more closely matching the individual needs of users. It is reflected in learning through the digital education resource library to make changes in user motivation to explore the resource development model that is more suitable for user needs. The content should be practical, concise, and convenient for mobile learning. Teachers should fully consider the students' English foundation and the actual needs of mobile learning when building an online resource library for higher vocational English. The complex knowledge is miniaturized to facilitate students' mobile learning so that learning can happen anytime and anywhere, thus meeting learners' needs for practicality.

3. Analysis of the Digital Resource Library Construction of English for Higher Education on the Cloud Platform

3.1. Analysis of Digital Repositories on Cloud Platforms. With the development of internet technology, the storage and analysis of big data are imminent, and the resources of colleges and universities have also increased dramatically with the popularity of teaching; the traditional teaching resource platform data cannot meet the requirements of big data storage of various resources due to excessive maintenance costs [14]. It is urgent to migrate the resource data of traditional storage methods to the big data platform and unify the storage and management to provide a rich, user-centered, cloud-based teaching resource library for every teacher and student in colleges and universities [15]. The overall level of education is improved for the establishment of a lifelong education system. Higher vocational students have low self-consciousness, have not developed the habit of searching for English learning resources from the internet for a long time, and will not spend a lot of energy looking for learning materials. Figuratively speaking, the resource library is a bridge built between various available resource servers at the bottom and the application and analysis of resources, thus realizing the migration of teaching resources on-demand, storage management, common construction and sharing, access on-demand, resource analysis, and resource recommendation, comprehensively improving the utilization of resources and increasing the mutual collaboration between teachers and students.

Given the maturity of the internet and the Hadoop distributed storage technology, the server side of this university teaching resource library adopts the Hadoop-based distributed big data storage architecture, and the client side adopts the B/S architecture [16]. The repository provides functions such as accessing various teaching resources from the internet by different users according to their needs, online learning by teachers and students, recommendation of various resources of interest by the system according to the characteristics of the users, resource data migration from traditional resource data platforms, analysis of resource data, management, and monitoring of resource data. The number of file IO accesses should be minimized, which can greatly ease the pressure on the user's synchronous access server and improve the performance of the Hadoop file server. Considered comprehensively, Linux operating system should be used. When storing massive file data, the metadata of the file will generally reach hundreds of *G*, or even reach the TB level, so that it is difficult to load into memory at one time, and on comprehensive consideration, the system uses the HBase distributed database to store the metadata of the file and the absolute address of the file and to create a unique index from it.

When multiple users access concurrently, the client often has relatively low access efficiency, which can be detrimental to the client experience if the access time is too long. This repository should meet the access time efficiency of the client when concurrently accessing large files, but after all, Hadoop is a distributed storage and computing platform developed based on Java, which often has great limitations on the storage and access of a large amount of small data. The system needs to be designed based on the existing small file merging scheme to facilitate both the read operation of small files and the write operation of small files so that the read files and write files can cooperate and do their best to meet the storage, access, and analysis of all kinds of resource data by most teachers and students.

This system provides cloud storage services in the B/S mode, in the server cluster, the web server runs the HUFFS API application, while the database server consists of MySQL and HUFFS cluster server. The client users are connected to the router and switch through the internet so that they can access the Hadoop cluster and get the resources and data in the corresponding cluster as shown in Figure 1.

Various teaching resources contain rich and practical educational information. The teaching resources in this resource library refer to various media materials, online courses, common examination questions, high-quality courseware, and classic cases that have digital form and can provide substantial help to various users in learning, teaching, and research and optimize education-related business processes through various resources. This resource library is required to be built with the participation of people from all occupations to establish its resource-rich, resource-worthy, and substantially helpful resource library [17]. Various users collect various teaching resources through various daily methods, then submit requests for storage resources via HTTP through the terminal client, and finally transmit them to the Hadoop cluster using the TCP connection after forwarding by the web server and then transmit and store teaching resources. To a large extent, it has promoted the teaching reform and the introduction of the mixed learning model, which has brought vitality to the process of higher vocational English informatization. With the participation of many users, this repository will become increasingly rich. However, with the construction of this repository, the number of daily users will increase, and concurrent uploads and storage of various resources will occur from time to time. The response to the request sent to the web server will become very slow due to the load pressure on the web server and will cause the web service to crash, which will seriously affect the user experience. To this end, a message queue-based web server clustering strategy is proposed to optimize the teaching resource request process.

While building this repository, the resources in the old repository are collected after a long time of maintenance and management, and if they are discarded when building this repository, it will cause a great waste of resources. In this paper, we examine the migration of teaching resource data and design and implement a migration of the old repository's resource data to this repository's Hadoop cluster while minimizing the impact on the repository's normal operation, in order to lower the repository's construction costs and increase resource utilization, as shown in Figure 2.

One of the reasons for the construction of this resource library is that the construction of the old teaching resource system is not standardized, the classification of resources is unclear, there is a lack of unified standards, the content is redundant and messy, which is extremely inconvenient for teachers to access various teaching resources and for students to conduct independent learning according to their situation, and brings a lot of inconvenience to the management personnel for the management of various resources; secondly, various teaching resources are reconstructed, resulting in the poor utilization of a large number of storage devices. The cost of maintenance gradually increases in the later period, which brings a certain economic burden to the schools. For the consideration of repository construction cost, avoiding duplicate construction, and improving the utilization rate of existing resources, it is necessary to migrate various teaching resources to this Hadoop repository data platform by using data transfer, data copy, or data migration technology through the business function of this repository to reduce the input cost and improve the utilization rate of resources. Three factors need to be considered in the design of this repository for the migration of teaching resources. Migrating resources intend to reduce costs and avoid duplication of construction, and if the cost of migrating resources is higher than the expected cost, then there is no point in migrating resources. Resource data migration must ensure that the business can be used normally, so it is necessary to choose the least online users late at night. When the data are migrated, the integrity of the data needs to be ensured, and the loss of all kinds of important data cannot be caused by sudden power failure or human intervention. The client adopts the B/S system architecture. The resource library provides different users with

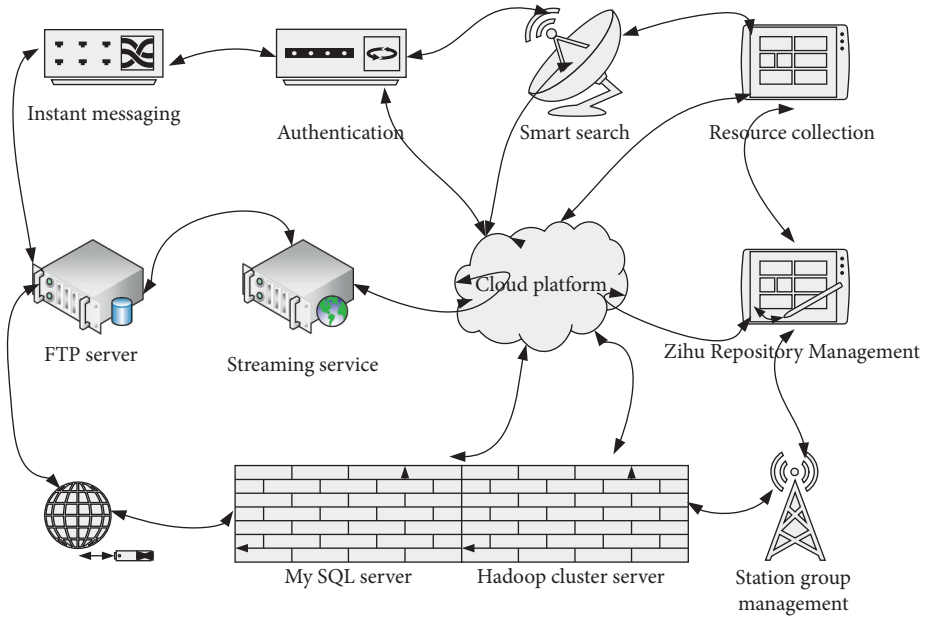

Figure 1: Overall technical architecture of the cloud service platform.

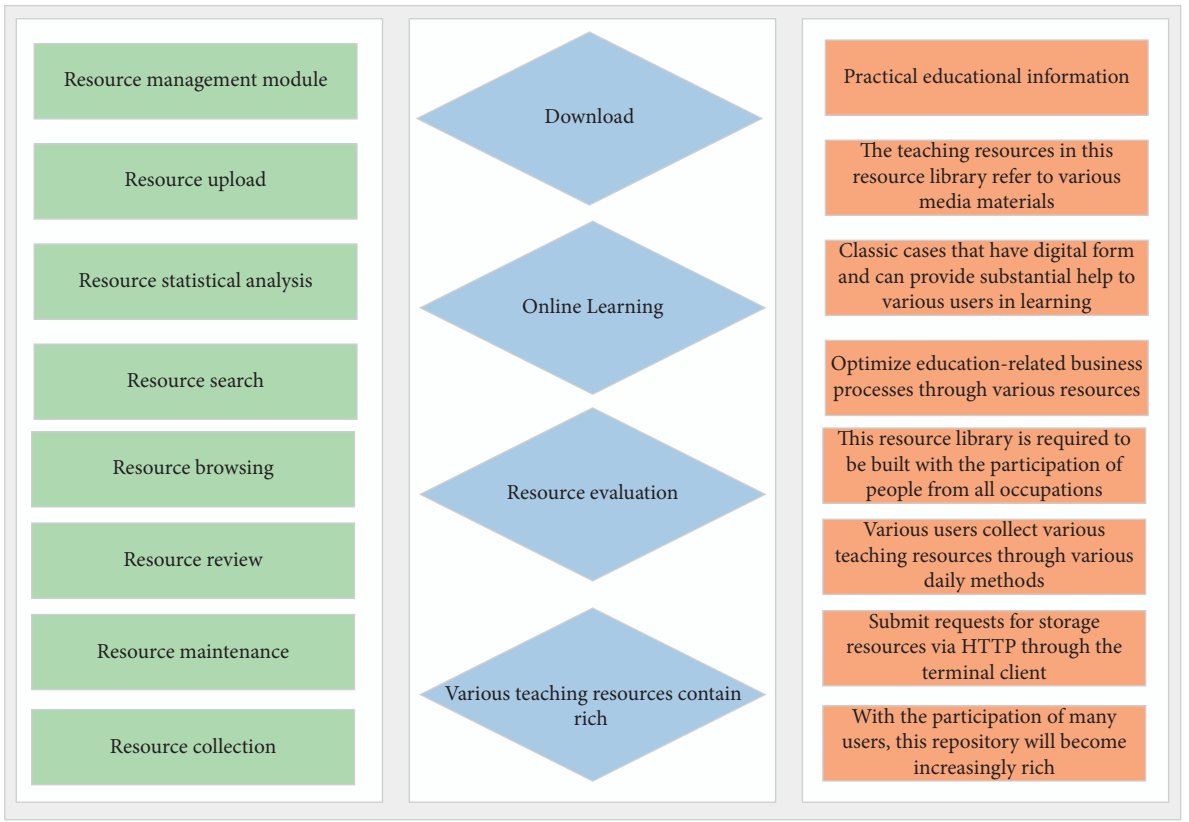

Figure 2: Functional diagram of the resource management module.

various teaching resources from the internet according to their needs and online learning for teachers and students, and the system recommends various resources of interest according to the characteristics of users and a traditional resource data platform.

There are numerous methods of data migration techniques, which have been summarized as structured data migration and unstructured data migration. Structured data migration refers to the migration of structured data from relational databases into nonrelational databases through

various suitable methods. Unstructured data migration generally refers to copying or moving resource files to a Hadoop cluster in some way. The main methods for unstructured data migration are direct replication copy, data mirroring migration, database built-in tools, etc. The following is a detailed design of structured data migration and unstructured data migration.

3.2. Performance Analysis of the English Digital Resource Library for Higher Education. The module should have the complete management right of the whole system function, with the authority to manage the basic data of the system and manage other users. The system administrator has the highest authority and is responsible for the maintenance and management of the whole system functions and has the authority to access the database directly and is responsible for the parameter setting of the whole system, which includes user management, permission management, file storage path management, announcement management, and database management. The system administrator is not involved in the maintenance of the repository, so he only has the authority to browse the resource information [18]. The resource manager is mainly responsible for the maintenance of the resource library, which includes uploading resources, downloading resources, browsing resources, retrieving resources, approving resources, and other functions. The resource manager can modify or delete the resources when reviewing them, so the position it holds is very important and can be said to be the core part of the whole system. Teachers are the most beneficial group in the resource management system, not only can they browse and download all the resources in the system but also can upload resources to share with other teachers. Teachers have the functions of personal information modification, resource browsing, resource retrieval, resource uploading, resource downloading, resource evaluation, etc. After logging into the system, teachers can browse the resources in the system and download the resources they are interested in to help organize their teaching; at the same time, teachers can also upload their resources to the teachers' private resource library, and if they want to share the resources, they need to apply to the resource manager as public resources and wait for approval before other users can use them. Students are the most used group in the teaching resource library and have the functions of resource browsing, resource searching, resource downloading, and resource evaluation. Students can log in to the system, browse all the resources in the system, and download the resources they are interested in, which provides convenience for learning after school. Students can also retrieve the information in the resource library and search for the information they want to browse. Students can also evaluate the resources and interact with other users while browsing them, as shown in Figure 3.

The statistical analysis function provides school leaders and network administrators with statistics about the resource library for decision-making reference use [19]. There are often great restrictions on the storage and access of a large amount of small data. The system needs to design a set of convenient small file reading operations based on the existing small file merging scheme. The items of statistical analysis include resource uploads, usage, resource access ranking, resource depletion, and statistics on the classification of the resource library and the total number of resources. In resource uploads, we can know the total number of resources uploaded, the number of resources to be reviewed, the number of resources deleted, and the number of users involved in uploads, and we can also see the statistical analysis data of each user's resource uploads. In the resource usage statistics, we can see how many registered users the resource library has, the total number of clicks on the resources, and the total number of favorites created by the users.

This function realizes the user and resource as the center and provides personalized resource recommendation service according to user behavior data. The service object of this function is the user, and the recommendation object is the resource, which solves the problem that it is difficult for the user to choose the resource. This function first classifies the uploaded resources according to the content of the resources to get the resource topic relationship and then forms the resource topic model; then, the system establishes the user personalized interest relationship based on the interest preference information registered during user registration and the daily collected user operation behavior data and then establishes the user personalized interest model Finally, based on the previously generated resource topic model and the user personalized interest model, the relationship between the user and the resource is generated, and a user recommendation model is established to recommend several resources to the user that the user has not acted recently.

The design and implementation of the user personalized interest model for this feature relies on user behavior data, and a wide variety of user behavior data is generated in this feature. Table 1 shows the user behavior data required for this feature. From the data in the table, some behaviors were generated by student and teacher operations, while some behaviors can be generated by all users (including visitors). In terms of data size, the data size of resource online browsing, resource access time, and search resources is the largest, while the data of resource welcome, favorite resources, unfavorite resources, resource comments, and other behaviors can only be generated by registered users (e.g., students and teachers), and these behaviors are of medium size; for downloading resources, resource exposure behaviors can only be generated by a small percentage of registered users authorized by the administrator These behaviors are of moderate size. From the point of view of real-time access, behavioral data such as resource access time, resource welcome, favorite resources, unfavorite resources, resource comments, and download resources need to be accessed in real time. Some behaviors, such as clicking on a resource to view it and searching for it, do not require real-time access.

This feature is mainly to associate users and resources and then make recommendations for resources. And there are 3 main methods to associate between them: user and resource, user and user, and user and resource feature. User-resource means the user is directly associated with a

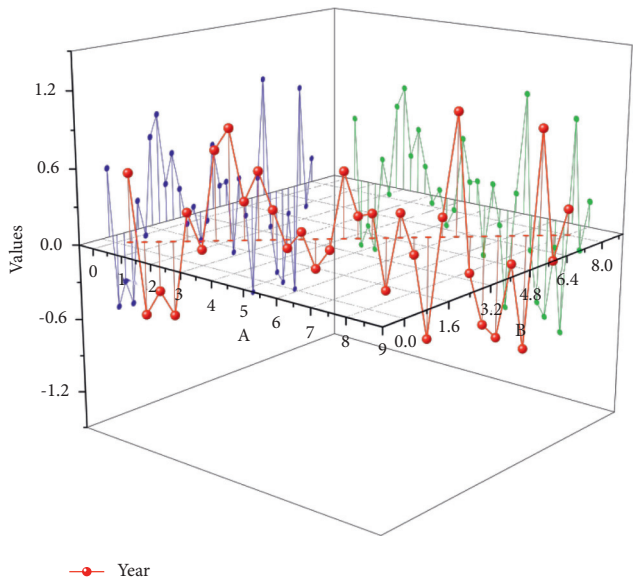

Figure 3: Average number of daily user visits to the platform.

Table 1: Structure of resource relationship data table.

Description	Type	Value	Field name
ID primary key	Int	13	ID
Relational data table number	Int	12324	Table ID
Resource number	Int	4324	Resource code
Resource name	Int	131432	Resource name
Resource relation data ID number	Int	54545	Resource ID
Description	Int	85654	Description

resource; user-user means the user is associated with other users who have similar interests; user-resource feature means the user is associated with certain resource hobby features of the user [20]. It is inconvenient for students to learn independently according to their own conditions, which brings a lot of inconvenience to the management of various resources. The reconstruction of various teaching resources results in low utilization of many storage equipment, and subsequent maintenance costs gradually increase. It also brings a certain economic burden. To facilitate management and design, a user's certain hobbies and other users with similar hobbies can also be treated as resource topics, and then users can be associated through resource topics, as shown in Figure 4. According to the above analysis, when an authorized user logs in to the system, the module will first generate resource topic information for the current user from three aspects, the resource itself, the user's hobby, and the resource characteristics, and then it will search for suitable resource information according to each resource topic, and after a series of filtering and ranking, it will generate a recommendation list for the current user. The core task of this module has two steps: one is to generate resource themes, and the other is to search for suitable resources according to the themes.

This design can be more flexible to recommend the required teaching resources according to the user's expectation; by configuring a combination of different recommendation engines, it can produce different information of the recommended list of resources to meet the user's expectation. If we study carefully, we can find that the recommendation engine is a recommendation strategy algorithm. Different users may require different recommended resources due to various reasons, some research users may like novel teaching resources, while other users may only focus on the type of resources they registered when they registered, so to meet the requirements of each type of user to the greatest extent, various recommendation strategies can be combined through the configuration of their behavioral data. The recommendation of teaching resources can be done by combining various recommendation strategies through the configuration, using the behavioral data of the user, and the hobbies registered at registration. After various recommendation strategies, the original list of recommended resources is generated, and then these resource lists are filtered, sorted, and merged to finally generate my recommended resource list, which is presented to the current user's interface in various visualized ways for the user's browsing and downloading.

4. Analysis of Results

4.1. Performance Results of the English Digital Resource Library for Higher Education on the Cloud Platform. The purpose of system testing is to check whether the software

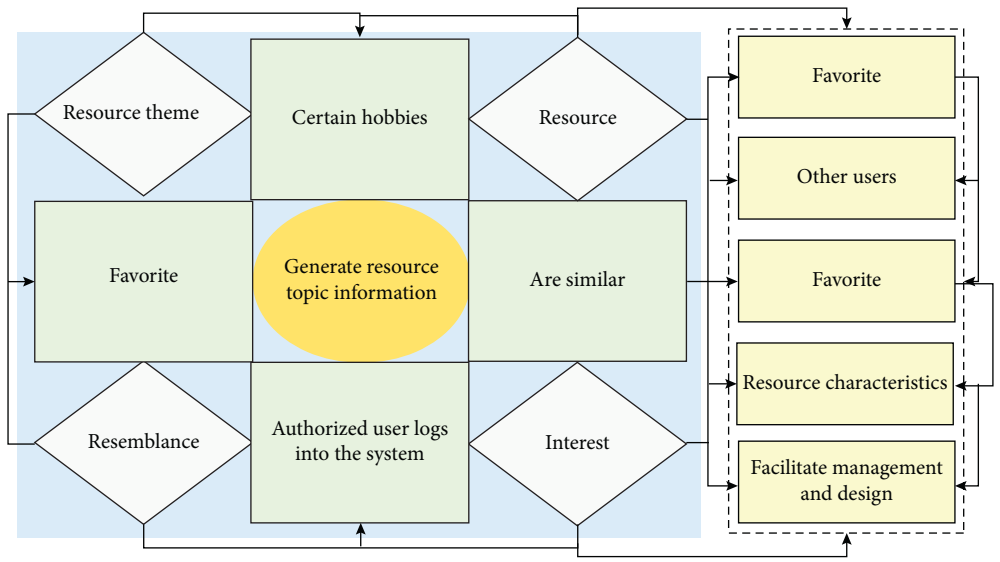

Figure 4: Map of ways to reach out to users and resources.

system meets the requirements; through testing, we can immediately find out the possible logical or physical errors in the software system and then better improve and optimize the system. This repository system is mainly used by many teachers and students, and the testing of this repository system is completed by functional testing and performance testing to ensure the normal operation of the system. To build the test environment, this repository uses the Eucalyptus cloud computing platform to build a private cloud environment and deploys Hadoop cluster, HBase, and MySQL database on it to store and manage various resources. This repository private cloud platform requires 10 physical servers, and the specific configuration and installation components are shown in Table 2.

Functional testing (also known as black-box testing) is a type of testing that only needs to confirm whether the module is functionally complete and correct, without focusing on the specific logic code. Finally, the test cases of the system are written according to the actual situation of the test results, and then the bugs in the system function can be modified immediately to ensure that the system works properly. All the test cases in this use case table cover all the core functional points, and all of them have passed the tests, responsible for the parameter settings of the entire system, including user management, authority management, file storage path management, announcement management, and database management. To ensure that the repository can better serve many students and teachers, it is necessary to test the resource storage performance, system swallowing metrics, IO response speed, and system response time of this repository. To ensure the integrity and correctness of the repository resources, three copies of each resource file are stored on the Hadoop resource cluster. Since the target users of this repository system are teachers and students of the school, although the school users may be over 10,000, the possibility of operating this repository system at the same time is very low, and it is known from experience that the amount of simultaneous online users will not exceed 1000, and the size of relevant resources in the repository is within 100 M. In summary, this test establishes 1000 users, and each user uploads 100 resource files of size 100 M once, the total size of the resource files is 10 TB, and each resource file has 3 copies, so it takes up a total of 30 TB space. To facilitate resource management, a user folder is created for each user in the cluster resource folder. Since a large amount of test data is used for this test, a shell script is executed to simulate the upload of the resource files, as shown in Figure 5.

In today's era, with the increasing amount of information, large data storage has become possible. According to the survey, the size of resource files generally does not exceed 5 G. To test the upload performance of large resource files, we prepare a large file of about 5 G and upload it synchronously through this repository system, which takes a total of 12430.4 seconds, and when downloading the large file, it takes a total of 11895.2 seconds, which meets the user's expectation. To simulate the concurrent load of certain users, monitor the performance of this repository system in real time, conduct a comprehensive test of the architecture of this repository, minimize the test time, and optimize the performance of this system to confirm and find problems early, the following LoadRunner test tool is used to conduct a load test of this repository system. It solves the problem that it is difficult for users to select resources. This function first classifies the uploaded resources according to the content of the resource, obtains the resource theme relationship, and then forms the resource theme model. This time, we recorded a series of operations such as user login, resource browsing, resource uploading, resource downloading, and logging out and then created a script to define load test scenarios, run scenario management, and monitor load tests to understand the performance of this repository and potential bottlenecks in real time.

After functional testing, the integrity of this repository system, the independence of resource data, and the high cohesion and low coupling of system modules are ensured; after performance testing, the high efficiency of system

Table 2: Physical equipment of the infrastructure platform.

Server 1 physical equipment situation		Server 2 physical equipment situation	
Machine name	Cloud platform front-end node	Machine name	Cloud platform back-end node
CPU	Intel E5-2609 V4, 4 cores	CPU	Intel E5-2609 V4, 4 cores
RAM	8 G	RAM	8 G
Disk space	2T SATA hard drive	Disk space	2T SATA hard drive
IP address	192.168.88.100	IP address	192.168.88.101
Installation components	CLC, Walrus, CC, SC	Installation components	NC

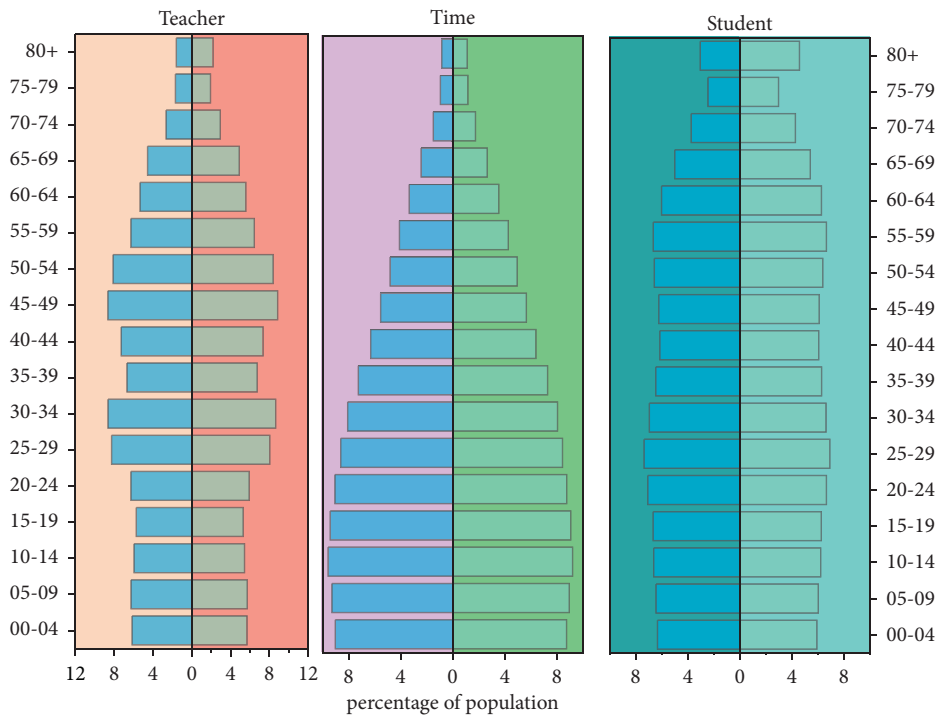

Figure 5: Analysis results.

access, the fault tolerance of resource data, the high scalability of resource servers, and the load balancing of data nodes of the repository are ensured. In summary, the number of interactions per second processed by this repository is relatively smooth, the load balancing capability is qualified, and the system response time is within the acceptable range of users, which is in line with the advantages of cloud computing for large-scale applications. Firstly, the test environment and the steps to build and publish to the private cloud platform are given, then the functional tests of the business functions of this repository are conducted, and some core test cases are given; secondly, the system performance tests of the business functions of this repository are conducted using the LoadRunner software tool, and after analysis and synthesis, the conclusion that this repository meets the initial requirements of users is given.

4.2. Analysis of Experimental Results. After testing, the system was able to accurately verify the normal login of legitimate users, accurately identify different permissions of different users, and smoothly access different management interfaces according to the user's click operation requirements. Logging into the system as different users, they visited the front page of the system and clicked on any resource to test whether they could browse resources, retrieve resources, download resources, collect resources, and evaluate resources; users other than visitors visited the back page of the system to test whether they could upload resources, review resources, modify resources, and delete resources. After the test, the results are as follows: all users can browse resources and retrieve resources; users other than visitors can download resources, collect resources, and evaluate resources; teacher users and resource administrators are allowed to upload resources; load test is a test method to test whether the system can work properly within a certain load level. Generally, you can test by increasing the number of accesses at the same time. For example, the first 50 people access the system at the same time to observe the system condition; if the system is normal, then increase the amount of access until the system cannot afford to crash.

In terms of the pedagogical effectiveness of the resources, teachers generally have a high level of agreement that the EngageNY platform digital education resources provide

greater progress for students. Also, from RAND Corporation, a survey of teachers in CSSS-adopting states about the instructional effectiveness of EngageNY and other resources for themselves or their students showed that, across all dimensions, significantly more teachers felt positive about the instructional effectiveness of the EngageNY platform resources than about the instructional effectiveness of other resources. Then, the appropriate resource information will be searched according to each resource topic, and after a series of filtering and ranking, a recommendation list of the current user can be generated. This is because mathematics teachers generally believe that EngageNY is more likely to provide students with opportunities to explain learning and demonstrate teacher work, with more emphasis on conceptual understanding, procedural skills, and practice for the same amount of instructional time and intensity. English teachers who used EngageNY felt that the platform provided students with opportunities to read nonfiction texts of sufficient complexity to greatly enrich their vocabulary and practice skills, as shown in Figure 6.

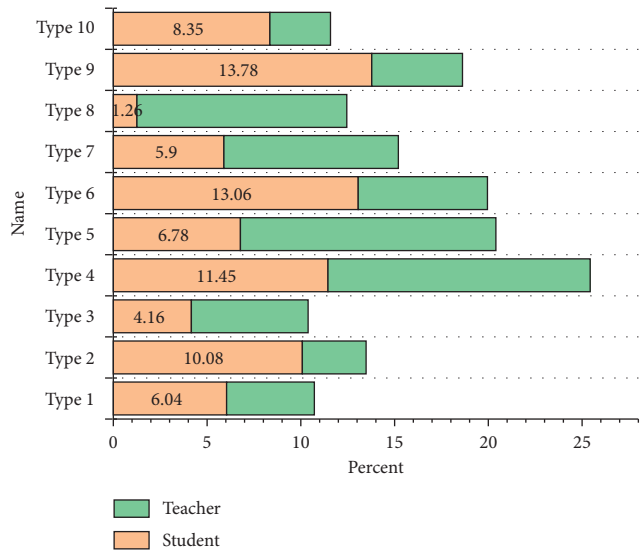

Figure 6: Teaching effectiveness.

The planning and construction of the resource bank must be scientific and reasonable to maximize its effectiveness and to make its utilization rate sustainable. At the same time, the content and modules of the resource library should be determined by combining the teaching objectives of higher vocational English and the learning characteristics of higher vocational students. The construction of the resource library should be student-centered, and the resources should be summarized and integrated according to the students' interests and employment-oriented so that students can find the contents they are interested in and can apply them to their studies in the resource library. In addition, all the contents in the resource library must be divided into different categories and clear. First of all, two modules can be set up according to the classification of courses, basic English module and professional English module, among which professional English should be divided into logistics English, mechanical English, automotive English, secretarial English, and other submodules; then, set up subcategories under the major course modules: teaching courseware, microlesson videos, exercises, test questions, skills' training, vocational examinations, and other contents so that teachers and students can quickly find the materials they need.

The construction of the English resource library is not a one-step, ultimate process, but a process that needs to constantly develop and improve with the development of education, so the resource library should make full use of the advantages of the cloud platform to implement dynamic management after the initial completion and adjust at any time according to the needs of teachers and students and development changes. In the process of putting it into use, a person should be assigned to be responsible for the management, timely handling, and repair of problems and regularly collect feedback and suggestions from users to effectively optimize the management and content of the repository. At the same time, the content of the repository should be constantly adjusted and updated according to the changes of relevant professions and social needs after the repository has been built. Through some incentive mechanisms, users of the repository can be encouraged to upload some useful materials that are not available in the current repository, and then the administrator will include them in the repository after the screening so that the users of the repository can become builders at the same time so that the construction team of the repository can grow and improve the repository, as shown in Figure 7.

Overall, in the second round of teaching practice, there was no significant difference between the scores of the two groups on the accompanying test, which verifies that the application of digital teaching resources from the initial adaptation to the emergence of teaching effectiveness is not achieved in one or two class periods. The existence of significant differences on the topic in the teaching practice is related to the application of digital teaching resources, with the help of which the author carried out rich teaching activities and strengthened the practice of sentence variation in a subtle way, in which the application of digital teaching resources was first seen to be effective.

Overall, as shown in Figure 7 of the ratio of classroom teaching behavior category analysis in group A, the ratios of teacher-student behavior in the experimental class were 53.86% and 46.14%, respectively, and the ratios of teacher-student behavior in the control class were 60.43% and 39.57%, respectively. In the second round of teaching practice, the teacher-student behavior ratios in the experimental class tended to be balanced, and the status of teachers and students in the classroom teaching supported by digital teaching resources tended to be equal, and the problems in the first round of teaching practice were avoided in the second round of teaching practice.

Analyzed from the perspective of the actor, the ratio of teacher's behavior in the control class of group A was higher than the ratio of students' behavior; analyzed from the perspective of behavior type, the teacher's verbal behavior was much higher than the students' verbal behavior, the teacher's speaking component was more, the ratio of

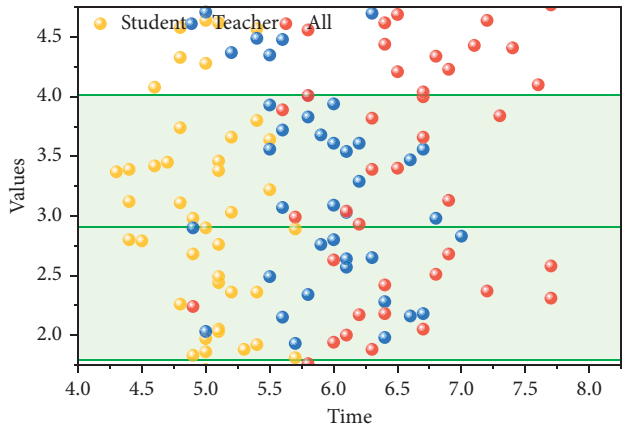

Figure 7: Results of the hands-on follow-on test.

students' activity behavior was higher than the teacher, the ratio of students doing exercises was higher, and the teacher-student interaction was less.

5. Conclusion

The construction of the resource base of any discipline cannot be achieved overnight but requires long-term persistence, constant updating, and dynamic management. This is especially true for the construction of the English resource base in higher education, which should not only be developed and improved with the development of education but also expand the content of the resource base in time with the social trend. Therefore, in the process of construction, the resource library can be dynamically managed by using the dynamic advantages of cloud computing technology in the data processing. Firstly, based on the changing needs of teachers and students, we will adjust, collect feedback from users, and optimize the content of the resource library management. To build a test environment, this resource library uses Eucalyptus cloud computing platform to build a private cloud environment and deploys Hadoop clusters, HBase, and MySQL databases on it. Secondly, according to the relevant professions and social needs, the resource library should be updated with English news, e-commerce information, and international expositions to help students understand the cultural background knowledge of business English, cultivate cross-cultural awareness, and enhance business English application skills. To sum up, the cloud era under scientific development has brought challenges and opportunities for higher vocational English and promoted the process of education informatization reform. To better play the function of cloud platform in the education field, relevant teaching researchers in higher vocational institutions should make full use of cloud computing technology to build the English resource library, combine the advantages of the cloud platform, make the resource library develop in the direction of efficiency, scalability, interactivity, and integration, realize resource sharing, improve resource utilization, provide perfect resource support for teachers' teaching and students' learning, and come out of a suitable path for the creation and application of higher vocational English resources. The aim is to develop a development path that is suitable for the creation and application of English resources in higher education.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

All the authors declare no conflicts of interest.

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