

## *Retraction*

# **Retracted: Design of an Integrated System of Psychological Health Education Resources for Vocational Students Using Fuzzy Clustering Algorithm Analysis**

### **Security and Communication Networks**

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

### **References**

- [1] P. Wang, "Design of an Integrated System of Psychological Health Education Resources for Vocational Students Using Fuzzy Clustering Algorithm Analysis," *Security and Communication Networks*, vol. 2021, Article ID 6593155, 9 pages, 2021.

## Research Article

# Design of an Integrated System of Psychological Health Education Resources for Vocational Students Using Fuzzy Clustering Algorithm Analysis

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Mental health is an important part of the growth of students. Many mental health monitoring systems have many problems. When the resource capacity is large, traditional systems have problems such as poor stability, more resource fragments, and untimely system response. For this reason, this paper designs a system of mental health education resource integration for higher vocational students based on a fuzzy clustering algorithm. It builds the overall system architecture based on the SOA service architecture and designs each functional module of the system so that the system has the functions of teaching resource submission, resource audit management, user service, and resource storage. The density function method is used to initialize the initial resource clustering center to obtain the data clustering objective function, and the fuzzy clustering algorithm is used to establish the task model to realize the integration of the mental health education resources of the vocational students. System verification results show that the system has strong stability, fewer node resource fragments, and higher resource integration efficiency.

## 1. Introduction

With the deepening of higher vocational students' mental health education and the connotation construction of colleges and universities, various resources such as media materials, courseware, network courses, and teaching cases produced by education and teaching, as well as academic works, papers, patents, subject achievements collected by scientific research and lectures by experts and professors, are increasing [1]. These important assets are various and scattered, resulting in inconvenient use by users and low resource utilization [2]. Therefore, how to effectively integrate and share these resources, reduce the cost and cycle of collecting and saving these materials, and let users make full and convenient use of these resources has become a problem to be solved in the information construction of colleges and universities [3].

Xu and Shan [4] designed a modern educational resource management system in the cloud environment, designed the memory configuration according to the

working structure model of the memory, designed and debugs two crystal oscillator circuits, and completed the hardware design of the system. In the software design, the vector space model is used to calculate and classify educational resources, and then the resource weight is standardized to complete the redistribution of resources. So far, the design of the modern educational resource management system in the cloud environment is completed. The experimental results show that the system can effectively reduce the resource reuse rate and improve the resource utilization effect. Sha and Liu [5] designed the automatic integration system of electronic archives information under MVC mode. Based on the hierarchical design concept of model view controller (MVC), taking Struts structure as the overall structure of the system and XML as the data exchange carrier, the automatic integration of electronic archives information is realized. Through the control and management of roles, the distribution of work permissions of roles is realized, the backup and recovery of electronic archives information are completed through electronic archives

management, and the automatic integration of information based on knowledge element processing is realized by using electronic archives query and release. The data storage resource library is used to store information efficiently. Under the J2EE platform, the Struts method is used to integrate the information of the system architecture and complete the system design. The results show that the system can effectively use MVC mode to automatically integrate electronic archives information and automatically update the integration results. The system management is simple and effective and can provide diversified statistical analysis charts according to user needs. Li [6] proposed a wireless network-based ideological and political multimedia network teaching resource integration system. First, it outlines the radio resource management (RRM) issues and the planning strategies within the wireless network framework, in which the radio access technology (RAT) is under collective control, and different activities related to the CRRM issue are identified. Secondly, it summarizes the RRM problems and solutions in the wireless network, clarifies again the theoretical elements of the design and the teaching resource management evaluation process, and uses XML as the data exchange carrier to realize the automatic integration of teaching resources. Using the dSPACE platform, the subscription information is stored in the database by calling its API function and calling the subscribe function of the dSPACE framework. Whenever a new teaching resource enters the subscribed field, the dSPACE framework will automatically send an email to the subscriber. The experimental results show that, during the operation of the system, the security is strong, and the illegal theft or leakage of data in the education system is avoided.

Yang and Wu [7] introduced the rise, development, and popularization of MOOC network education mode to analyze the practical application problems of this education mode in the post-MOOC era and introduced a deep learning model based on SPOC to explore its application in psychological health education of college students. In the context of the Internet, on the one hand, many new resources and new possibilities have been improved for students' mental health education, and the use of Internet technology can improve the efficiency of mental health education. To this end, it is necessary for us to explore the psychological level of students in the context of the Internet, as well as the opportunities and challenges encountered by educators, and on this basis to explore innovative mental health education models and methods [8].

Although the above system can realize the effective integration of resources, when the resource capacity is large, due to the scattered resources and inconvenient management, there are problems of poor system stability, more resource fragments, and untimely system response. Therefore, this article designs an integrated system of mental health education resources for vocational students based on a fuzzy clustering algorithm. It uses the theory and technology of resource integration to reduce resource fragmentation and improve system performance.

The contributions of this paper include the following three points:

- (1) When the resource capacity is large, traditional systems have problems such as poor stability, more resource fragments, and untimely system response. For this reason, this paper designs a system of mental health education resources integration for higher vocational students based on a fuzzy clustering algorithm.
- (2) This paper builds the overall system architecture based on the SOA service architecture and designs each functional module of the system so that the system has the functions of teaching resource submission, resource audit management, user service, and resource storage.
- (3) The density function method is used to initialize the initial resource clustering center to obtain the data clustering objective function, and the fuzzy clustering algorithm is used to establish the task model to realize the integration of the mental health education resources of the vocational students.

## 2. Design of the Integrated System of Mental Health Education Resources for Vocational Students

### 2.1. The Overall System Architecture Design

*2.1.1. System SOA Architecture Model Design.* Based on the SOA service architecture [9], this paper designs the mental health education resource integration system design for higher vocational students. Aiming at the problems of the traditional education resource integration system, the system can integrate the current wasteful education resources and flexibly respond to changes in business needs. It integrates the existing architecture, uses the SDO (service data object) concept in SOA architecture design to design a new architecture model, makes the components and supported transmission protocols in a low coupling state, makes the client process the data through the API provided by the data graph given by SDO, and writes the data into the data source to facilitate data reading and writing.

The basic architecture of SDO is composed of data objects, data graphs, metadata, and data relay services. Data objects are components used to store data, mainly composed of attributes of data entities; data graphs are a collection of multiple data objects, responsible for changes to data objects; data relay services are used to manage and call services in interfaces. Figure 1 is a schematic diagram of the SOA architecture model.

According to Figure 1, the service component encapsulates each service function into an SCA component, and the realization of the component can be implemented in languages such as Java, C, and C++. The service component is the cornerstone of the SOA architecture model. It only implements a specific service function. The service granularity is small and it can provide a flexible degree of reusability.

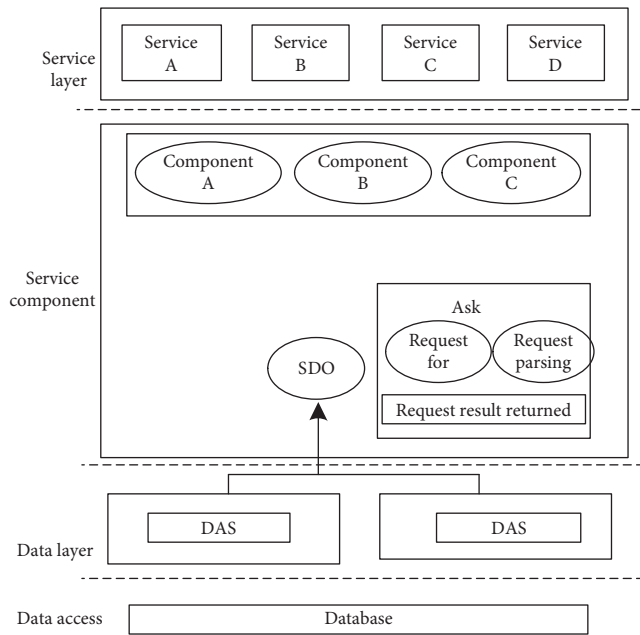


FIGURE 1: Schematic diagram of the SOA architecture model.

**2.1.2. System Overall Architecture Design.** In order to better complete the construction of the mental health education resource integration system for vocational students, first of all, establish an overall structure for the integration of mental health education resources for vocational students, as shown in Figure 2. Assign a unified structure and function to the integrated mental health education resource information for higher vocational students, and provide users with a unified user service interface and retrieval service, so that users can choose the information they need.

In terms of the framework of the integrated system of mental health education resources for vocational students, under the traditional access mode, users will visit one site intensively, which will cause a serious burden on the system, and all the supports are mixed together, which is not conducive to management. The architecture of higher vocational students' mental health education resource integration system shown in Figure 2 is constructed by multiple system subsites. Each subsite serves only one user and uses a separate storage space to install an independent virtual machine on each subsite. Finally, the access interfaces of all subsites will be centralized on one server, that is, the exchange and sharing portal, which provides unified external services. The resource integration and sharing portal will regularly collect data and establish indexes from each subsite, providing a unified retrieval interface for each subsite. The system architecture effectively integrates different resource modules, reduces the complexity of the system, improves its stability, and improves resource storage performance [10].

**2.2. Functional Module Design.** The users and resource builders of the higher vocational students' mental health education resource integration system based on fuzzy clustering algorithm are students and teachers, and the

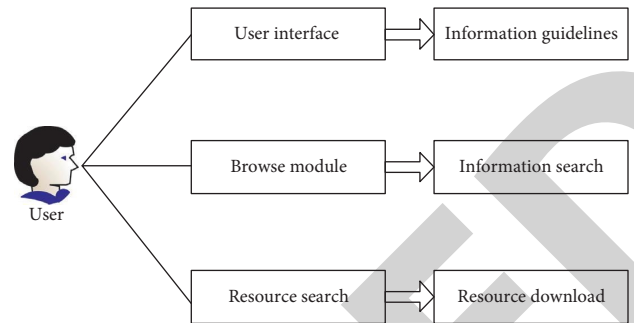


FIGURE 2: Schematic diagram of the overall system architecture.

administrators of the platform and data integrators are administrators. Therefore, according to user needs, the resource integration system is divided into service interface, data management interface, and data storage interface according to functions, as shown in Figure 3.

According to Figure 3, the data management interface mainly includes the teaching resource submission function module and the teaching resource audit management module, which are mainly used for content creation and resource management. The data storage interface mainly contains a resource storage module. The system saves potentially valuable resources and integrates and sends the data to the data cloud. The service interface mainly contains a user service module [11].

The system functional module architecture design is based on the analysis results of the system's functional requirements and divides each functional index into different functional modules to meet the user's application requirements. Among them, each subfunction module includes specific functions consistent with the overall function of the module. The analysis is as follows.

**2.2.1. Teaching Resource Submission Function Module.**

The teaching resource submission function module is mainly an operation function module established for resource providers, which mainly completes the management of the teaching resources submitted by users [12]. The main functional indicators include teaching resource collection and submission function, realizing the uploading of local teaching resources, describing based on the metadata structure, and submitting it to the resource management personnel for review. At the same time, the system reviews the completeness of the resource description information. Upload resource management function, which can display all uploaded resources in the form of list, views the download times and approval of each resource and provides resource retrieval, deletion, and information update of teaching resources. The personalized information function automatically scores the providers of resources according to the downloading and evaluation of teaching resources provided by users.

**2.2.2. Teaching Resource Audit Management Module.**

The teaching resource audit management function module is mainly to provide the relevant function operation platform of



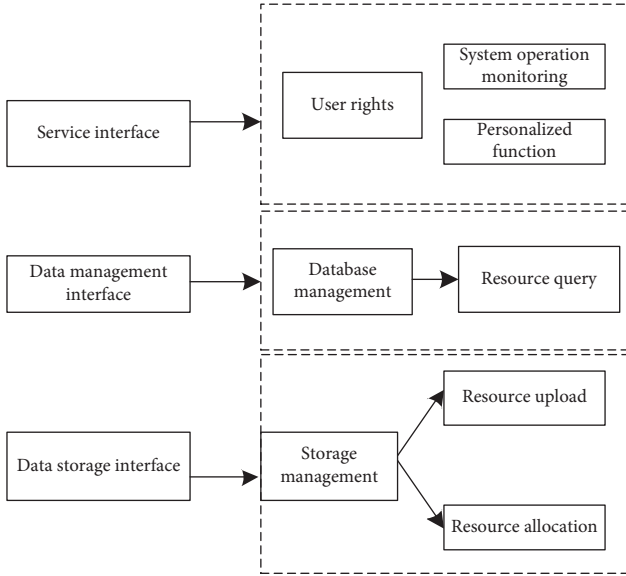


FIGURE 3: System function module architecture diagram.

teaching resource audit, storage, and release for resource managers. The main functions include resource review function, according to the resource metadata model standard, reviewing and improving the description information of the resource, and providing the comparison and check function of the published resource to ensure the uniqueness of the resource in the system. The resource classification function, according to the attributes of the resource, such as the subject area and source of the resource, establishes tags for teaching resources, which is conducive to classified query [13]. The storage and management of teaching resources, based on the distributed storage and management system, store the resources to each node and establish an index in the unified database. The information interaction function is to interact and communicate with the providers and users of teaching resources through online communication platform and email.

**2.2.3. User Service Module.** The function of the user service module is to provide services according to the needs of users. Services are divided into remote services and local services. Remote services exchange values of remote services by means of value transmission in the defined remote interface, while local services call references by means of data exchange [14]. In this system, the call of some data may require multiple modules to call each other. Therefore, the service layer uses SCA modules to cause other SCA components to create component instances, build coarse-grained SCA service component modules, and call existing services through SCA binding mechanism. When the service is called by the client, the following two methods are usually adopted:

- (1) Declare the service as a local service and call it by SCA binding
- (2) Declare the service as a remote service, and specify the remote service to exchange data with other services in the same process

**2.2.4. Resource Storage Module.** The user service module is to review the format and metadata description of the resources submitted by the user and modify the non-standard metadata description. It includes submitting the resources that meet the requirements to the resource library and publishing them to the outside world. The resources that do not meet the requirements are returned to the user, and the user will see the management personnel's request for modification of the resource description in their work area. At the same time, the module can also set and modify user permissions, workflow, and so on. The specific function module operation flowchart is shown in Figure 4.

The original intention of the construction of the mental health education resource integration system for higher vocational students based on the fuzzy clustering algorithm is the storage, safety, resource utilization, and efficiency of teaching resources. It can store documents in any format, such as documents, books, databases, computer programs, multimedia publications, audio, and video. Two storage modes are supported: "digital stream storage" and "functional storage." The former is to save a digital document in its original shape, which may not be read after a few years due to software upgrades. It can only be recognized by special software or encoded by special experts; the latter requires a technical format and media. It always maintains its availability even when the medium changes. Obviously, "functional preservation" is a more rational storage model.

### 3. System Software Design

#### 3.1. Educational Resource Integration Preprocessing Based on Fuzzy Clustering Algorithm

**3.1.1. Selection of Cluster Centers.** First, use the density function method to initialize the initial resource cluster centers, and define the density function at sample point  $a_i$  as

$$a_i = \frac{1}{2T} \sum_{i=1}^n \alpha_i (x_a - y_b). \quad (1)$$

Here,  $\alpha_i$  represents the effective radius of the sample neighborhood density;  $y_b$  represents the convergence speed;  $n$  represents the number of samples;  $T$  represents the nearest neighbor of the sample; and  $x_a$  represents the root mean square distance of the sample. The calculation formula is

$$x_a = \int_{-\infty}^{\infty} z(t)h(t)du. \quad (2)$$

Here,  $z(t)$  represents the density of the sample and  $h(t)$  represents the random sample. It can be seen from formula (2) that the greater the density of samples around  $x_a$ , the greater the value of  $a_i$ . Therefore, it can be used to indicate the density of sample points in the sample space. Let  $a'_i = \max\{a_i, 1 = 1, 2, \dots, n\}$ ; then, the corresponding  $x'_a$  takes the density function relational expression of the first initial cluster center, thereby adjusting the density function of the initial cluster center to

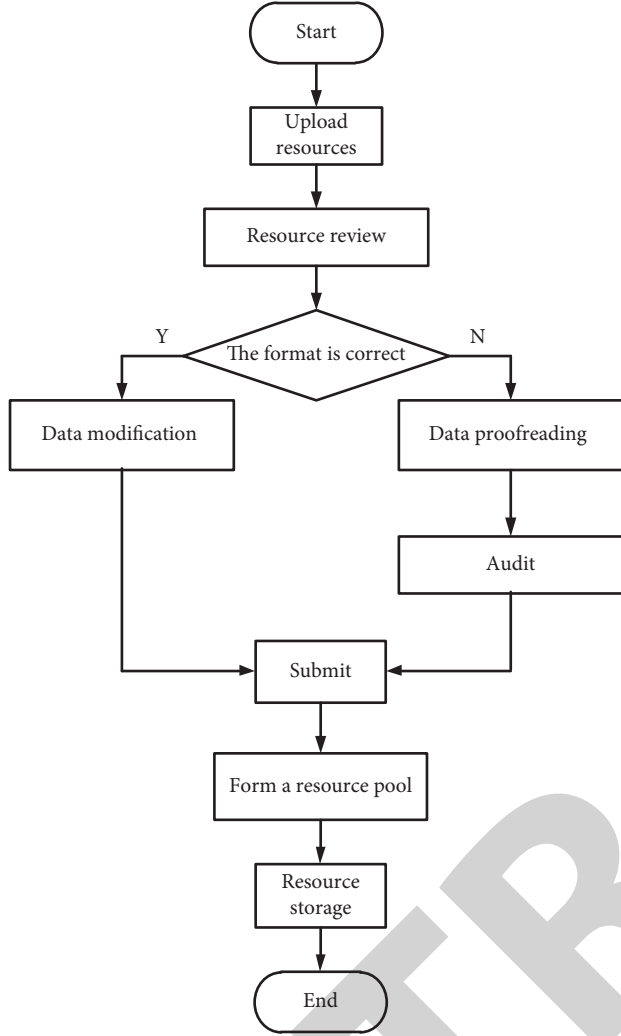


FIGURE 4: Operation flowchart of the resource storage module.

$$a_i^k = \sum_{i=1}^n \frac{1}{1 + |x_i + x_k|}. \quad (3)$$

Here,  $k$  represents the cluster position and  $|x_i + x_k|$  represents the Euclidean distance from sample point  $x_i$  to sample point  $x_k$ . The sample point  $x_k'$  corresponding to  $a_i^k = \max\{a_i, 1 = 1, 2, \dots, n\}$  is taken as the  $k$ -th initial cluster center position.

Because the resources in the system have their inherent locations, if hardware service providers need related resources, considering factors such as operating costs and speed, they should choose logical resource pools in the region or surrounding regions. The variable  $c$  is introduced here. If  $c = 0$ , it is considered as the logical resource pool in the region; if  $0 < c \leq 1$ , it is considered as the logical resource pool in the surrounding area. Under the condition of considering the above problems, the final initial clustering center composed of  $g$  hardware resources in this area or the surrounding area is selected as

$$K = \{k_1, k_2, \dots, k_g\}. \quad (4)$$

**3.1.2. Data Clustering Objective Function.** According to the acquired resource initial clustering center  $K$ , set the mental health education resource data of higher vocational students in the system as  $D$ ,  $D = \{d_1, d_2, \dots, d_N\}$ , where each resource has  $m$  attributes; then, the data space obtained is

$$D = \{d_{i1}, d_{i2}, \dots, d_{im}\}. \quad (5)$$

The objective function  $S$  of the fuzzy clustering algorithm and its constraints are as follows:

$$S(d_i) = \max \left\{ \sum_{i=1}^n \sum_{j=1}^n P_{ij}(n_a, m_a) \right\}, \quad (6)$$

$$\sum_{i=1}^n \sum_{j=1}^n P_{ij} = 1. \quad (7)$$

Here,  $P_{ij}$  represents the degree of membership and the relationship between the data point and the class center. Formula (7) is a constraint condition, requiring that the sum of each data point and the cluster center is 1. Due to the limitation of this condition, the cluster centers cannot be independent and are more sensitive to noise data. Therefore, the constraint condition of the membership function is modified as follows:

$$\sum_{i=1}^n \sum_{j=1}^n P_{ij} < 1. \quad (8)$$

The relationship between the data and the cluster center is represented by  $r_{ij}$ , and the relationship between different data points relative to the same cluster center is described in Figure 5.

In Figure 5, A, B, and C are three data points and O is the cluster center. The degree of membership of point C to the cluster center is 0.5 respectively. It can be seen that point C is more likely to belong to the cluster center O. But for class center E, the relationship between data points A, B, and C cannot be compared. Therefore, a weighting factor is proposed. Define the weighting factor as  $Q_{ij}$ , which represents the attribution degree of each data point relative to the same cluster center  $K_i$ . The formula is as follows:

$$Q_{ij} = \frac{w^T Y^T}{\sqrt{w^T X^T} \times \sqrt{u^T}}. \quad (9)$$

Here,  $w^T$  represents the logical resource pool with similar attributes;  $Y^T$  represents the standardized data in the resource attribute matrix;  $X^T$  represents the comprehensive performance evaluation index of the clustering cluster; and  $u^T$  represents the relevance of resource topics and its calculation formula is

$$u^T = \exp \left( \frac{\|x_i - x_j\|^2}{\sigma^2} \right). \quad (10)$$

Here,  $x_j$  represents the random value of the weighting factor and  $\frac{2}{\sigma}$  represents the improved objective function, which can be expressed by

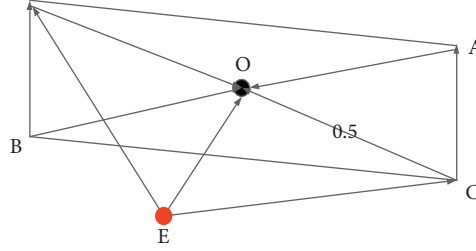


FIGURE 5: Relationship between data points and class centers.

$$\sigma^2 = \sqrt{\beta_{ij}(K^2 + \xi_y K_y)}. \quad (11)$$

Here,  $\beta_{ij}$  represents the new degree of membership.

**3.2. Implementation of the Integration of Mental Health Education Resources for Vocational Students Based on Fuzzy Clustering Algorithm.** On the basis of studying fuzzy clustering related technologies [15], a higher vocational student mental health education resource integration algorithm was designed, a corresponding task model was established, and the average distance was proposed to define the distance between two membership functions. On this basis, the similarity coefficient of the two fuzzy tasks is defined. The realization process of the integration system of vocational students' mental health education resources is as follows:

- (1) Fuzzy analysis of the resources occupied by real-time tasks to establish a fuzzy task set
- (2) Fuzzy clustering of historical tasks and real-time tasks in the resource database and feedback of the clustering results to the system
- (3) Finally, the system finds out the key resources used by real-time tasks according to the results and prioritizes them [16]

On the basis of the fuzzy clustering theory, the fuzzy clustering algorithm is used to integrate the mental health education resources of vocational students. The specific process is as follows:

Step 1: carry out fuzzy analysis on the task and establish fuzzy task set  $L = \{l_1, l_2, \dots, l_n\}$ ;  $l_i$  is the task resource and  $i = 1, 2, \dots, n$ .

Step 2: extract the membership degree of task  $L$  in resource  $l_i$ :

$$\beta(l_i) = \eta_i. \quad (12)$$

Here,  $\eta_i \in [0, 1]$  represents the utilization rate of the task at the resource, and at the same time, there is  $\eta_1 + \eta_2 + \dots + \eta_n$ .

Step 3: extract historical tasks from the historical task-resource library, calculate the similarity coefficient between the real-time task and the historical task, and obtain the fuzzy similarity matrix of the task set according to the calculation.

Step 4: deduce the relationship of the fuzzy matrix until the fuzzy equivalent matrix is obtained.

Step 5: find the historical task with the largest similarity coefficient to the real-time task in the resource library.

Step 6: cluster the task set according to the similarity coefficient.

Step 7: according to the information in the task-resource library, determine the resource occupancy of historical tasks in the system tasks, find out the key resources used in task execution, and then perform clustering to obtain the resource integration results [17].

Step 8: output the result of resource integration.

According to the above analysis, the overall system architecture is designed with the support of SOA architecture, and then the system functional modules are designed. According to the hardware design results, the fuzzy clustering algorithm is used to preprocess the educational resources, and the integration of mental health education resources for higher vocational students is realized based on the preprocessing results.

## 4. Simulation Experiment

In order to verify the effectiveness and application performance of the designed higher vocational students' mental health education resource integration system based on fuzzy clustering algorithm, simulation experiments are carried out. In the experiment, the modern education resource management system in the cloud environment and the electronic archives information automatic integration system in MVC mode are selected as the comparison system to verify the application performance of different systems from three aspects: system stability, resource fragmentation, and system response time.

**4.1. Experimental Environment and Parameter Settings.** The simulation experiment uses the Apache server to undertake the task of Web services. The Apache server is the most popular Web server today. Its fast, reliable, and easy-to-expand features have attracted the use of developers, regardless of whether it is in the Windows environment or the Linux environment. Ground support and Web applications loaded on the Apache server can be used across platforms without modification.

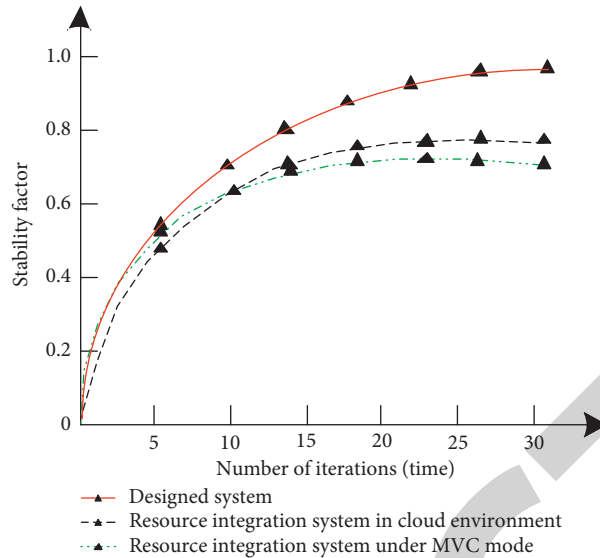


FIGURE 6: System stability comparison.

The simulation experiment uses a MySQL database server to store all kinds of information needed for the experiment. MySQL is a lightweight SQL database management system. Because of its powerful functions, high flexibility, and rich application programming interface, it is widely used in the development of small websites for users. Especially used in conjunction with Apache, it provides good support for building lightweight Web application development.

The simulation experiment uses MATLAB software to process the experimental data and images. At the same time, to ensure the validity of the experimental results, the number of experimental iterations is uniformly set to 30, and the consistency of other experimental conditions is ensured.

## 4.2. Analysis of Experimental Results

**4.2.1. System Stability.** In order to verify the stability of the designed system, it was compared with the modern educational resource management system under the cloud environment and the electronic file information automatic integration system under the MVC mode. The comparison result is shown in Figure 6.

Among them, the larger the stability coefficient, the more stable the system operation. It can be seen from Figure 6 that, as the number of iterations increases for different systems, the system stability coefficients are also changing. The stability coefficient of the designed system is 0.97 when the number of iterations reaches 30. As the number of iterations increases, the system tends to be more stable with less fluctuation. The maximum stability coefficients of the modern educational resource management system under the cloud environment and the electronic file information automatic integration system under the MVC mode are 0.77 and 0.70, respectively. The stability coefficient is lower than that of the designed system, which shows that the stability of the designed system is good.

**4.2.2. Resource Fragments.** Simulate the resource usage in the system under long-term use, and use MATLAB software to simulate and analyze the experimental data. Due to the random resource allocation and release, it will lead to the scattered distribution of resources in the system, which will cause a certain number of resource fragments in the system. By comparing the number of resource fragments in different systems, the application performance of different systems is compared, and the result is shown in Figure 7.

It can be seen from Figure 7 that the 20 nodes in the system all have different numbers of resource fragments. Among them, the designed system has fewer resource fragments, and there are only 40 resource fragments in the 10<sup>th</sup> node. In comparison, the modern educational resource management system under the cloud environment and the electronic file information automatic integration system under the MVC mode have higher resource fragments in 20 nodes than the designed system. It shows that the designed system can reduce the number of resource fragments to the greatest extent and release more idle nodes.

**4.2.3. System Response Time.** Comparing the system response time of different systems under the same experimental conditions, the results are shown in Table 1.

By analyzing the data in Table 1, it can be seen that when different systems are used to integrate the mental health education resources of higher vocational students, the response time of the system as a whole shows an increasing trend. However, by comparison, the system response time of the designed system is shorter, indicating that it can complete the task of resource integration in a shorter time.

In conclusion, the designed system may generate more idle nodes, which is conducive to inhibiting the generation of resource fragments, to improve the system utilization efficiency and reduce energy consumption.



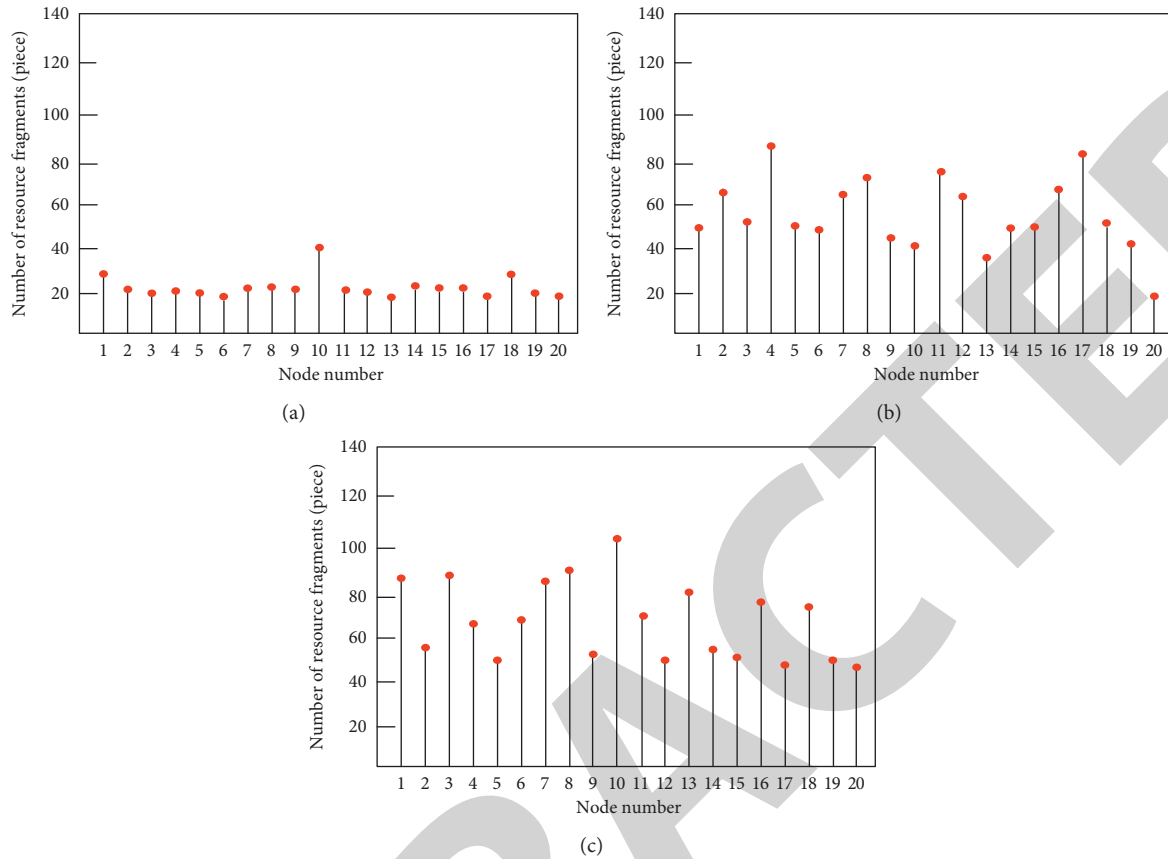


FIGURE 7: Comparison of resource fragments. (a) Designed system. (b) Modern education resource management system under the cloud environment. (c) Electronic file information automatic integration system under MVC mode.

TABLE 1: System response time(s).

Number of iterations/ time	Designed system	Modern educational resource management system under the cloud environment	Automatic integration system of electronic archives information under the MVC mode
5	2.3	5.7	4.6
10	2.5	5.8	4.7
15	2.6	5.8	4.9
20	2.6	6.0	5.3
25	2.9	6.3	5.6
30	3.0	6.5	6.0

## 5. Conclusion

This paper designs a higher vocational student mental health education resource integration system based on a fuzzy clustering algorithm. The experimental results prove that the system is effective and feasible, can realize the reasonable scheduling of resources, and improve the utilization and efficiency of system resources. However, the problem to be studied in future research is how to effectively reorganize and redistribute various resources when the memory resources in the system share conflicts and whether this problem will be used as a starting point to optimize the designed system.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

The author declares no conflicts of interest.

## Acknowledgments

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