

## Retraction

# Retracted: Research on the Model of Distance Education Resource Integration from the Perspective of Comparative Education

### Journal of Mathematics

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets 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 own 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] Z. Dan, "Research on the Model of Distance Education Resource Integration from the Perspective of Comparative Education," *Journal of Mathematics*, vol. 2022, Article ID 9589394, 8 pages, 2022.

## Research Article

# Research on the Model of Distance Education Resource Integration from the Perspective of Comparative Education

**Zhao Dan** 

*School of Preschool and Art Education, Xinyang Vocational and Technical College, Xinyang 464000, China*

Correspondence should be addressed to Zhao Dan; [xiaoyy@xyvtc.edu.cn](mailto:xiaoyy@xyvtc.edu.cn)

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In order to solve the problems of high data loss rate, long time-consuming resource integration, large amount of redundant data, and incomplete results of resource integration in traditional methods, a design method of distance education resource integration model from the perspective of comparative education is proposed. Association rules are used to mine resources and get effective resources in the context of comparative pedagogy, with the goal of increasing the impact of resource integration. Then, using a three-tier architecture, a remote education resource integration model is created, and the mining results are combined through the application layer, resource encryption layer, and multicast communication layer to achieve distance education resource integration. Simulation results show that the method of this article has low data loss rate, short resource integration time, less redundant data, and comprehensive integration results, which provides an effective technical support for the development of education.

## 1. Introduction

With the development and innovation of Internet technology, the network has rapidly penetrated into people's daily life. There are a large number of different types of resources in the network. These resources contain great value. They not only have a variety of expression forms, but they also cover a broad range of topics, including education, medical, trade, military, and economics [1, 2]. The foundation of resource application is resource integration. For example, in the military, integrating and analyzing collected resources can improve the efficiency and scientificity of military analysis and decision-making while also ensuring national security; in education, reasonable resource integration schemes are used to design teaching objectives and plans, which can point out the direction for educational development [3, 4]. Users may examine the market condition in the e-commerce business using integrated data resources, making it easier for them to make consumption choices that are in accordance with their important interests [5]. According to the above analysis, in many fields, the use effect of resources can be improved by reasonably integrating resources. In the field of education,

there are a large number of resource integration methods, which provide theoretical and technical support for the development of education.

Reference [6] proposed an information resource integration method based on WLAN. Firstly, a resource integration platform is established. The resources are preliminarily processed via the platform, which comprises a resource acquisition layer, resource integration layer, and application layer; then, the resource integration optimization model is built to further improve the platform pre-processing results. In the optimization process, the integration factor is introduced into the resource integration, and an average rate is set at the same time; finally, the two constraints are combined to realize the integration constraints of information resources. The experimental results show that this method can provide an effective integration method for resource application and improve the effect of resource use. Reference [7] proposed an online integration optimization method of information resources based on clustering algorithm. To begin, the approach calculates the user's interest in relevant information to acquire the keywords of information resources; the forgetting

function is then utilized to characterize the change in user interest, and the user interest model of information resources is created based on the findings. The user interest matrix is created using the established paradigm, and the user types are separated into two categories: core and noncore users. The K-means clustering algorithm and cosine similarity measurement technique are utilized to further segregate the two groups of users and determine their interest weights. Finally, the interest weights are ordered based on the weight calculation findings, and user behavior is projected to achieve online information resource integration and optimization. The experimental results show that this method has high user satisfaction because it fully considers the user's interest in resource integration. Reference [8] designed a large data stream integration system based on multidimensional hierarchical sampling. According to the multidimensional hierarchical sampling strategy, the system was designed. First, the system was separated into modules in the hardware design, such as classifier, CPU, and memory, and the system's stability was enhanced by enhancing module performance. Second, a data hierarchy model is developed in the software architecture, which is utilized to investigate the data flow and realize data quality detection using a clustering technique. Finally, to fulfill the function design of massive data flow integration, the data detection results are merged with the processing results of hardware modules. The testing findings reveal that the system can handle a huge number of data resources and integrate data efficiently in a complex environment, indicating that it has practical application value.

The above traditional methods have played a positive role in resource integration, but with the increase of the number of information resources in the network, they cannot meet the needs of real-time processing of a large number of resources. In the current application process, it is common that the data loss rate in resource integration is too high, the resource integration takes a long time, the amount of redundant data is large, and the results of resource integration are not comprehensive. In order to solve the above problems, this paper proposes a design method of distance education resource integration model from the perspective of comparative education.

## 2. Research Background

Comparative pedagogy is different from traditional teaching ideas. It mainly advocates education and teaching with a dialectical attitude. Specifically, it refers to discovering the defects and deficiencies in education through the comparison of different educational systems, educational ideas, and educational methods. At the same time, it excavates its advantages and optimizes them in different educational methods so as to promote the reform of the educational model. The development of comparative pedagogy has a certain role in promoting the whole field of education. Analyzing the advantages and disadvantages of different educational models and taking their advantages can improve educational methods. Figure 1 shows the research method system of comparative education under different principles.

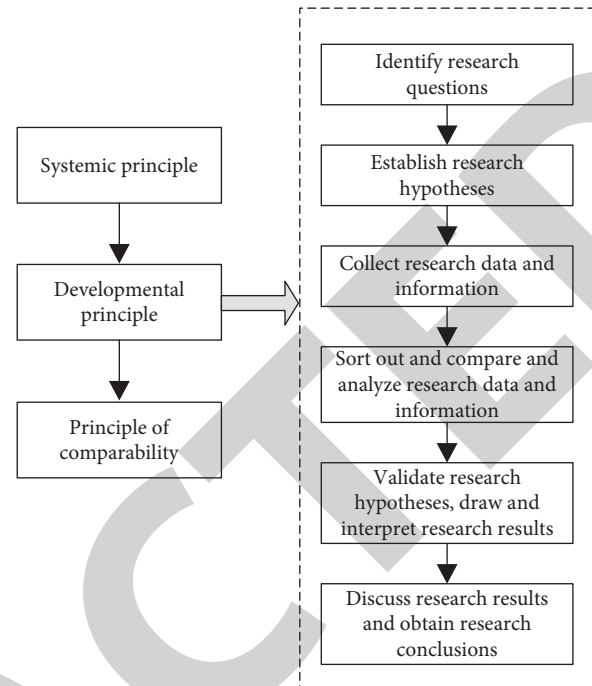


FIGURE 1: Comparative education research method system.

With the development of comparative pedagogy, education is about enriching educational methods, changing educational thoughts, and improving teaching levels, but more from the perspective of the educated, researching a teaching model of harmony and mutual assistance in various fields. In today's society, the communication between countries in different fields is gradually deepening, and this cultural integration in the field of education is also very obvious. It has certain practical significance to compare the cultural differences between different countries and different ethnic groups in this context. The Internet is mainly used to build communication bridges between various regions and countries in this process. Therefore, a large amount of data resources will be generated on the Internet, and how to effectively process these resources is particularly important. In data processing, resource integration is an effective method that can gather multiple data and resources. Users can find the resources they need in the integrated resources to provide a solid data foundation for education. Therefore, in order to further promote the development of the education field, under the perspective of comparative pedagogy, research on the integration method of distance education resources is the core of the research of this article and its ultimate goal.

## 3. Distance Education Resource Integration Model

According to the analysis in Section 2, while current educational concepts have gradually become deeply rooted in people's hearts after years of development and have attracted significant attention in related fields, it can be intuitively seen through comparative education theories that while the

depth of the public's research on educational concepts is in a straight line, the depth of the public's research on educational concepts is not. However, the presently developed resource integration techniques need to be enhanced in terms of resource processing impacts. As a result, it is required to investigate an efficient online education resource integration approach against the backdrop of comparative pedagogy development in order to improve the resource processing efficiency. Before that, in order to improve the efficiency of resource integration and avoid the impact of redundant data on the integration results, remote resources should be preprocessed first.

**3.1. Distance Education Resource Mining.** In order to integrate distance education resources more quickly, first of all, it needs to be mined and analyzed. In the field of resource mining, association rules are a recursive method of frequent set theory, which can scan the resource database many times to obtain the relevant information in the resource database and obtain the attribute association between resources [9, 10].

Under normal circumstances, the association rule method can search the resource library. Assuming that there are  $N$  resource sets in the resource library, they are represented in the form of a set:

$$N = \{N_1, N_2, \dots, N_m\}, \quad (1)$$

where  $m$  represents the resource type. The item set corresponding to the resource set  $N$  is represented by  $L$ :

$$L = \{L_1, L_2, \dots, L_k\}. \quad (2)$$

In the formula,  $k$  represents the number of item sets. The process of using association rules to mine resources is the process of searching different sets of resources through item sets. Item set  $L_1$  is used to search resource set  $N_1$ , which is mainly manifested in finding effective resources in resource set  $N_1$ ;  $L_2$  is used to search resource set  $N_2$ , which is mainly manifested in finding effective resources in resource set  $N_2$ ; by analogy, the resource set  $L_k$  is searched through item set  $N_m$ , and the process is repeated until the resource set cannot be searched [11, 12]. Finally, the effective resources of all resource sets are obtained through integration to form an integrated resource set  $G$ , whose expression is

$$G = \{G_1, G_2, \dots, G_h\}, \quad (3)$$

where  $h$  represents the effective resource type.

In order to facilitate the mining and analysis of distance education resources, two concepts are added to the association rule mining, namely, the natural occurrence probability of attributes and the adjustment support rate of association rules [13]. Among them, the natural occurrence probability  $P_\alpha$  of distance education resource attribute  $\alpha$  refers to the frequency that the set distance education resource attribute appears in all distance education resources, which is defined as

$$P_\alpha = \frac{C_j(\alpha)}{m}, \quad (4)$$

where  $C_j(\alpha)$  represents the attributes of distance education resources.

When mining association rules of different distance education resources, they are independent of each other. The natural occurrence probability  $P(\alpha \times \beta)$  of attribute  $\alpha + \beta$  represents the product of the occurrence frequency of attributes  $\alpha$  and  $\beta$ , which is defined as

$$W_j^k = \frac{\text{sign}P(\alpha \times \beta) \left( |C_j(\alpha)| + |C_j(\beta)| \right)}{N_i^k \times M_j^k}, \quad (5)$$

where  $N_i^k$  represents the product index of multiattribute object decision-making and  $M_j^k$  represents the weighting coefficient of multiattribute object decision-making.

The adjustment support rate  $T_{ij}$  of association rules can well reflect the specific connection between different rules [14], which is defined as

$$T_{ij} = \sigma \sqrt{2 \ln(N)} \left( 1 - \frac{Q_{ij}}{\sum_{i,j=1}^M E_{ij}} \right), \quad (6)$$

where  $i = 1, 2, \dots, n$ ;  $j = 1, 2, \dots, m$ ;  $Q_{ij}$  represents the actual support rate of the association rule;  $E_{ij}$  represents the probability of occurrence of all attributes; and  $\sigma$  represents the degree of interest.

When using association rules to mine distance education resources, if  $T_{ij} = 0$ , it means that there is no specific association between the two resources, and if  $T_{ij} = 1$ , it means that the two resources have a certain association [15, 16].

According to the analysis results of distance education resources mining based on association rules, the correlation between different distance education resources can be obtained, and the effective resources in the resource library can be mined, which is conducive to the integrated analysis of distance education resources.

Figure 2 shows the remote education resource mining process based on association rules.

**3.2. Construction of a Model for the Integration of Distance Education Resources.** Based on the distance education resource mining results in Section 3.1, a distance education resource mining model is established. In the process of model construction, with the three-tier architecture as the technical support, the remote education resource mining model designed with the three-tier architecture has the following advantages:

- (1) The various levels of the model are independent of each other, and changes in the upper-level business functions do not affect the use of the lower level, and vice versa, which enhances the flexibility of the model
- (2) When accessing the resources in the model, the user request can be terminated in time to ensure the safety of the use of the model
- (3) All levels can respond to user requests and perform response processing according to specific task assignments, which improves the resource processing efficiency of the model

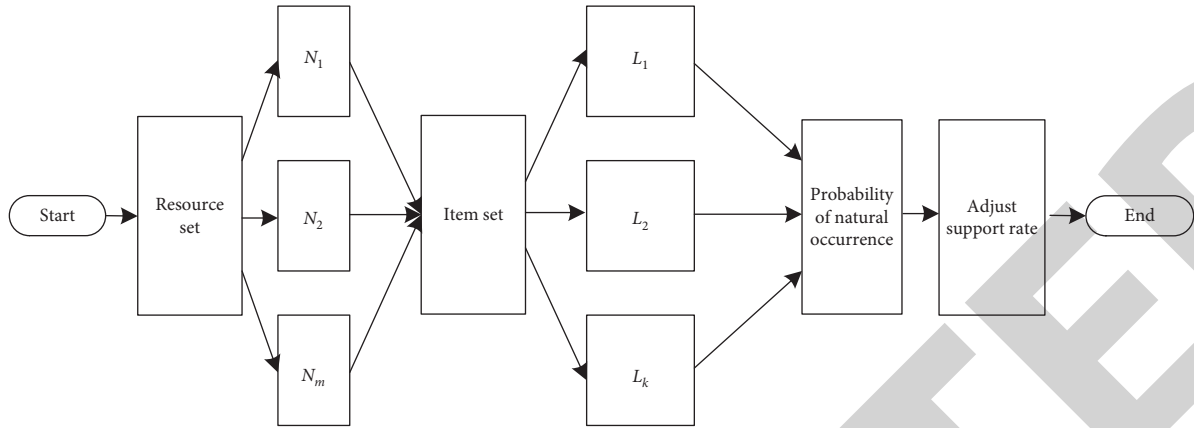


FIGURE 2: The process of remote education resource mining.

The components of the remote education resource integration model supported by the three-tier structure are shown in Figure 3.

**3.2.1. Application Layer.** In the process of users accessing the remote education resource integration model, by identifying user service requests, and transferring access control rights to virtualization software, user resource access permissions are formulated according to user role permissions, without affecting the user's application experience. The application layer's major job is to help the resource encryption layer and the multicast communication layer and process user requests. It is the central connection in the distant education resource integration model, which improves resource utilization and the model's overall function [17, 18].

**3.2.2. Resource Encryption Layer.** Since there are no independent resource nodes in the network, all servers can respond to user requests. Therefore, all servers together form a huge resource cache. In order to improve the security of cache resources, effective management and migration of these resources are required to improve the hit rate of encrypted resources, thereby improving the security of remote education resources [19, 20]. In this step, a key can be added to encrypt the resource, and the key can be expressed as

$$E(r) = [e_1(t), e_2(t)]^2, \quad (7)$$

where  $e_1(t)$  and  $e_2(t)$  represent a pair of keys.

**3.2.3. Multicast Communication Layer.** In order to ensure the consistency of conditions in the integration process of distance education resources, a clustering matrix  $U$  is constructed according to the distribution of different resources

$$U = \begin{bmatrix} u_{11} & u_{12} & u_{1n} \\ u_{21} & u_{22} & u_{2n} \\ u_{n1} & u_{n2} & u_{nm} \end{bmatrix}. \quad (8)$$

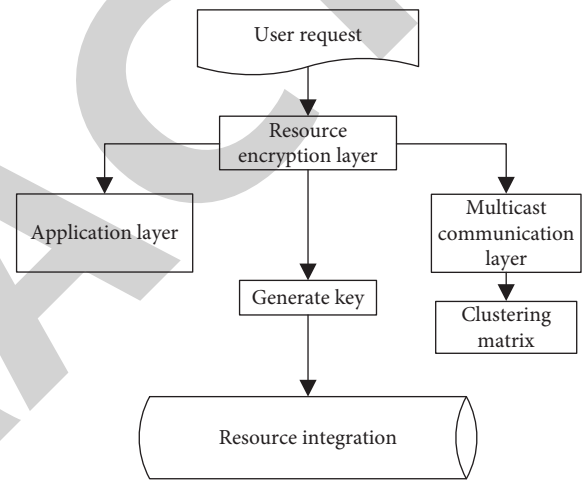


FIGURE 3: Schematic diagram of remote education resource integration model.

According to the clustering matrix  $U$ , the resource structure conditions are constrained and defined, the resource level integration environment is clarified through the condition constraint definition, and the evaluation scale conditions are unified to ensure that the best resource integration results are obtained.

The specific parameters of the multicast communication layer are shown in Table 1.

Construct a remote education resource integration model, use the parameters shown in Table 1 as the standard, discover the effective data in the resource concentration through encryption, clustering, and other steps, and eliminate invalid data, such as interference data and redundant data [21, 22], so as to realize the effective integration of a variety of distance education resources, to ensure that the model is progressive at all levels, and to achieve the goal of resource integration in a comprehensive and real-time manner [23, 24]. The constructed distance education resource integration model is expressed through formulas, specifically as follows:

$$Z = \sqrt{\frac{(x_{a1} - x_{a-1})^2 + (x_{b1} - x_{b-1})^2 + (x_{c1} - x_{c-1})^2}{\sum_{i,j=1}^M f(n)F(Q_{ij}) \times \sigma_{ij}}}. \quad (9)$$

TABLE 1: Multicast communication layer parameters.

Parameter	Specification
Number of link layers (layer)	12
Transmission rate (Gbps)	8.5
Resource transmission time limit (ms)	24–32 ms
Single-tier resource chain size (TB)	2

In the formula,  $a$ ,  $b$ , and  $c$  represent the input items of the model, specifically referring to the resource set, item set, and association rules;  $F(Q_{ij})$  represents the distance function between the association rules [25], and its expression is

$$F(Q_{ij}) = \sum_{i,j=1}^M \lambda_1 F(\alpha_{ij}) + \lambda_2 F(\beta_{ij}), \quad (10)$$

where  $\lambda_1$  and  $\lambda_2$ , respectively, represent support and confidence.

Figure 4 is the work flowchart of the remote education resource integration model.

In summary, the design of the distance education resource integration model from the perspective of comparative education is realized at the theoretical level. In order to verify its application effect, the following will proceed from a practical perspective to test the application effect.

#### 4. Simulation Experiment Analysis

The theoretical design of the remote education resource integration model through the above steps is realized. In order to verify its application value, it is verified by the form of simulation experiment, and its effectiveness is verified from two levels of theory and practice. The method of information resource integration based on wireless local area network and the method of online integration and optimization of information resources based on clustering algorithm are used as comparison methods to compare with the method in this paper and draw specific experimental conclusions through comparison.

**4.1. Experimental Dataset.** The data used in the experiment are from ERIC educational resources literature database. The platform judges the authority according to the IP address, and the displayed contents are accessible resources. Users can click “EBSCO academic retrieval (whole discipline)” and select subdatabases as needed. The experiment is carried out in the simulation environment of SPSS 9.0.

**4.2. Experimental Comparison Indicators.** The application effects of resource integration methods are analyzed from the following perspectives:

- (1) Data loss rate: this indicator refers to the loss of some data in the process of resource integration, resulting in insufficient resource integration results
- (2) Resource integration time-consuming: this indicator mainly reflects the efficiency of resource integration;

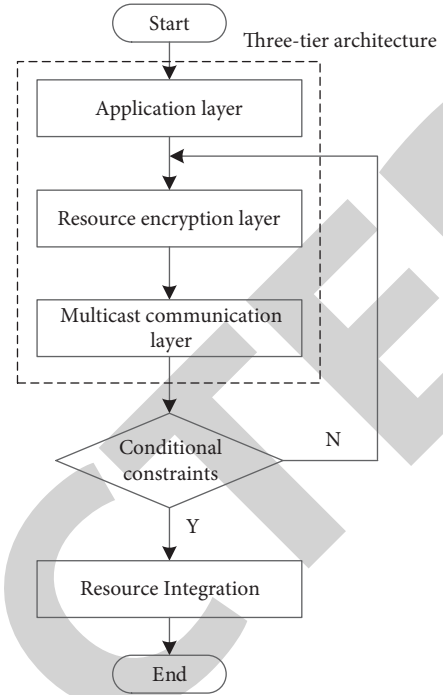


FIGURE 4: Work flowchart of the remote education resource integration model.

the shorter the time-consuming, the higher the efficiency.

- (3) Redundant data volume: due to a large amount of data, if repeated and redundant data are not effectively processed during resource integration, the amount of redundant data will be too large and affect the effect of resource use.
- (4) Comprehensiveness of resource integration results: used to reflect whether the integrated resources can meet the needs of different users.

Taking the above four indicators as the focus of investigation, comparing the application effects of the traditional method and the method in this paper, the comparison results are as follows.

#### 4.3. Experimental Results and Analysis

**4.3.1. Data Loss Rate (%).** First, using the data loss rate in the process of resource integration as an experimental indicator, the application effects of the three methods are compared, and the results are shown in Figure 5.

According to Figure 5, when the number of iterations is 3, the data loss rate of this article’s method is 5.2 percent, the data loss rate of the information resource integration method based on wireless local area network is 7.1 percent, and the data loss rate of the information resource online integration optimization method based on clustering algorithm is 6.4 percent; when the number of iterations is 10, the data loss rate of this article’s method is 5.2 percent; and when the number of iterations is 10, according to the data analysis results, the data loss rate of the method of this article in

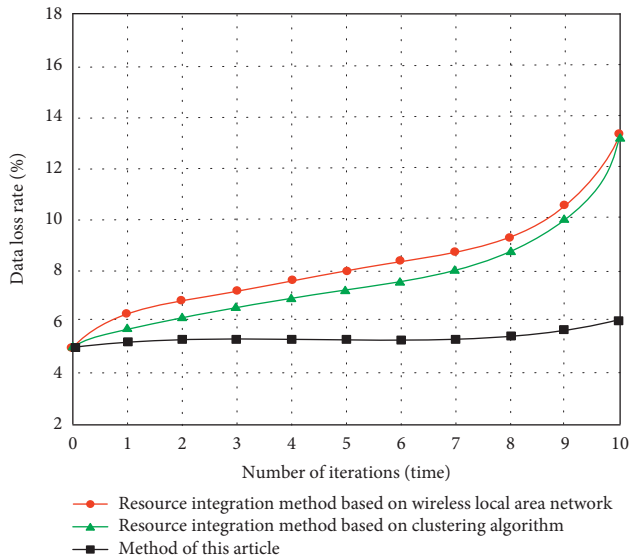


FIGURE 5: Data loss rate test results.

resource integration is low. By analyzing the changing trend of data loss rate under the three methods, it can be seen that with the increase of iteration times, the three methods show a continuous upward trend, but the upward trend of the method of this article is not obvious as that of the traditional method, indicating that the change range of data loss rate of the method of this article is small. Simulation results show that the method of this article can retain data information as much as possible in resource integration and avoid the negative impact of a large amount of data loss on the effect of resource use.

**4.3.2. Resource Integration Time (s).** To test the time consumed by the resource integration process for different data volumes between the method in this paper and the traditional method, in order to ensure the accuracy of the experimental results, to ensure that the data types and simulation platform parameters are consistent, the test results are shown in Figure 6 under this condition.

Figure 6 shows that the more data there is, the longer the resource integration procedure takes. The resource integration time of the information resource integration method based on wireless local area network and the information resource online integration optimization method based on clustering algorithm are both faster than the method described in this article when dealing with different amounts of data. According to the examination of particular data, the maximum resource integration time of the approach described in this article is 1.2 s, and the time needed for resource integration operation has remained steady when the quantity of data grows to 800 MB. The information resource integration approach based on wireless local area network has a maximum resource integration time of 9.3 seconds. When the quantity of data exceeds 1300 MB, the resource integration time stays constant; the online integration optimization technique of information resources based on clustering algorithm has a maximum resource integration

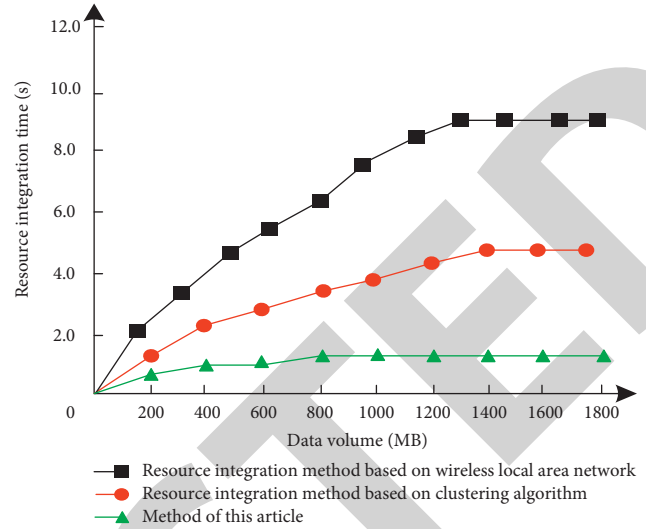


FIGURE 6: Time-consuming test results of resource integration.

time of 4.8 s. When the data volume hits 1400 MB, the resource integration time stays constant. According to simulation findings, the resource integration efficiency of the approach described in this article is greater when the quantity of data is variable.

**4.3.3. Redundant Data Volume (MB).** Due to a large number of remote education resources and a large amount of processing business, it is inevitable that there will be duplicate and redundant data, which will affect the effect of resource use, resulting in users not being able to obtain accurate resources. Therefore, the redundant data effect of the resource integration method must be checked. Test to ensure the smooth operation of resource processing tasks. The experiment uses the above three methods to test the amount of redundant data in resource integration, and the test results are shown in Figure 7.

It can be seen from the analysis of Figure 7 that the redundant data ratio reflects the amount of redundant data. The higher the ratio, the more redundant data. When the three methods are used to integrate and process distance education resources, a certain amount of redundant data will be generated. The method of this article has the lowest proportion of redundant data, and the highest value is only 5%. The method of information resource integration based on wireless local area network has the highest proportion of redundant data, with the highest value reaching more than 20%. Although the redundant data ratio of the online information resource integration optimization method based on the clustering algorithm is lower than that of the information resource integration method based on wireless local area network, it is still higher than the method in this article. Simulation experiments prove that the method in this paper can effectively process invalid interference data in resource processing and improve the effect of resource integration. The traditional method is not suitable for resource integration, and it is easy to cause problems for users in resource use. This is because the method of this article

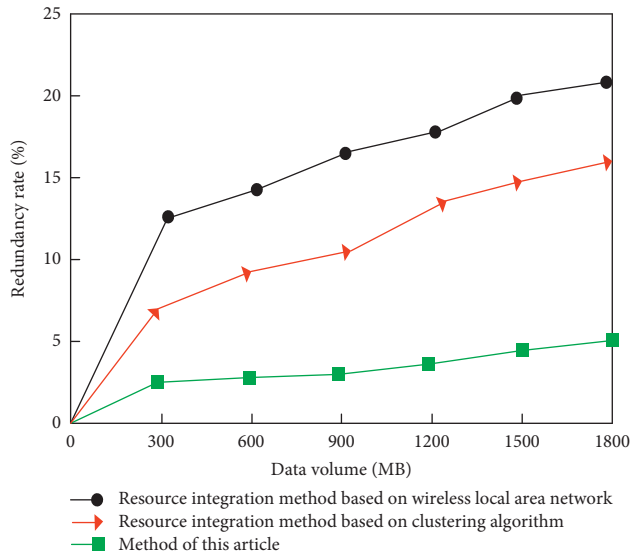


FIGURE 7: Test results of redundant data volume.

TABLE 2: Comprehensive comparison results/points of resource integration results.

User ID	Method of this article	Information resource integration method based on wireless local area network	Online integration and optimization method of information resources based on clustering algorithm
1	95.7	89.5	74.2
2	93.2	90.1	76.3
3	90.9	84.2	74.6
4	89.7	87.6	70.2
5	96.3	79.9	79.8
6	98.1	83.3	78.6
7	92.4	82.0	72.3
8	99.0	85.4	77.7
9	97.2	86.3	74.5
10	95.8	90.1	80.9

preprocesses the data in the process of resource integration and obtains effective data in data mining, thus improving the effect of resource integration.

**4.3.4. Comprehensiveness of Resource Integration Results.** The following is a further analysis of the resource integration effects of different methods. 10 users of online education websites are randomly selected for scoring. The three methods are evaluated in terms of resource comprehensiveness, whether they can meet the user needs, and whether the resources meet the personal needs. The evaluation results are expressed in scores. The score range is 0–100. The higher the score, the more satisfied the users are, that is, resources are more comprehensive. Table 2 shows the comparison results of different methods.

According to the data in Table 2, the overall evaluation score of the method of this article is higher than that of the two traditional methods, and the lowest and highest

evaluation scores are 89.7 and 99.0, respectively, while the highest evaluation scores of the information resource integration method based on WLAN and the online information resource integration optimization method based on clustering algorithm are 90.1 and 80.9, respectively. The comparison results fully verify the superiority of the method of this article and show that the integrated resources not only effectively eliminate the interference resources, but also improve the comprehensiveness of resources.

## 5. Conclusion

Data resource integration is conducive to the healthy and long-term development of various fields. Most researches integrate various types of resources to establish a resource management platform. However, traditional methods have many drawbacks in their applications. In this work, a remote education resource integration model was developed from the viewpoint of comparative education in order to complete the integration of distance education resources better. The experimental findings reveal that the approach described in this article has a low data loss rate in resource integration; the percentage of redundant data is the lowest, and the greatest value is only 5%. The approach described in this article has a higher overall assessment score than the two conventional methods, with the lowest and highest evaluation ratings of 89.7 and 99.0, respectively. The efficiency of resource integration is great, and the maximum time-consuming is just 1.2 s, indicating that the approach described in this article has a better application impact and a higher application value.

## Data Availability

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

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

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