

## Research Article

# Design of English Learning Effectiveness Evaluation System Based on K-Means Clustering Algorithm

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English is the universal language of the world. In the context of global economic integration, English learning is not only an essential course for business elites but also a required course for the general public. Currently, in colleges and universities across the world, English is presented as a compulsory first foreign language course. Therefore, how to improve the effect of English performance assessment in the context of smart teaching has become an important part of smart English teaching. Due to the influence of interference factors, human factors, or external factors, the traditional English language teaching evaluation system has the problems of high system sensitivity, long envelope delay jitter time, and short stationary state maintenance time. Therefore, this study develops an English learning effectiveness evaluation system based on a K-means clustering algorithm. The SQL Server 2005 database management software is used to develop the system database; various functional modules of the system are designed using ActiveX, with emphasis on the design of scoring functional modules; and different roles and permissions are given to administrators, teachers, and students. A student English learning effectiveness evaluation model based on BP neural network training and K-means clustering algorithm is designed to optimize the English learning effectiveness evaluation model and achieve effective English learning by solving the consistent estimate of the effectiveness of English learning assessment. The performance test results show that the proposed system has a lower sensitivity coefficient, a shorter envelope delay jitter time, and a longer period of steady-state maintenance, indicating that the system can achieve stable operation.

## 1. Introduction

As a universal language, English has become the language of most people in the world and is a widely used language. With the rapid growth of globalization in the economy, learning English has become the need of many people. In this context, improving the English language ability of teachers is very essential to enhance the English learning efficiency of college students and to acquire fluency in English [1]. Whether it is at the application level or in order to meet the requirements of professional evaluation, teachers must continuously improve their teaching ability [2].

Learning effect evaluation is the core part of the teaching process [1]. As a continuous cycle of the evaluation process, efficiency evaluation aims to help teachers further understand students' needs; timely adjust teaching plans and practical tasks; promote students' autonomous learning;

realize English learning through the recordings of all links of the learning process, the communication between teachers and students, and the feedback of students' information; and finally achieve the purpose of autonomous learning. The ultimate goal of effectiveness evaluation is to promote students' personal development and effectively cultivate and improve the effectiveness of students' autonomous learning, to integrate students truly into the evaluation process and realize the virtuous circle of evaluation [2]. English learning aims to meet the students' needs for personal development and social development for English talents. The needs for personal development and social development have become the standard of value judgment in foreign language learning. This characteristic of evaluation requires that modern educational evaluation must implement the principle of authenticity and implement authenticity evaluation [3]. In this context, relevant scholars have done a lot of research on

English learning assessment methods and achieved some research results.

Jiang and Xie [4] proposed a mobile foreign language-assisted learning evaluation system. The system is comprised of different modules for efficiency evaluation index setting, index value input, index value calculation, and result display module. Using the combination of different modules, an efficient mobile foreign language-assisted learning evaluation system is implemented. The experimental results show that the system greatly improves the evaluation accuracy and provides high performance. Zhang and Zhang [5] devised the ability evaluation and matching method based on machine learning and applied the combination of analytic hierarchy process (AHP) and fuzzy evaluation to evaluate the comprehensive ability of college students. They combined the advantages of fuzzy theory and neural network architecture and designed an improved comprehensive evaluation algorithm based on neural network model. Experimental results show that this method can improve the system evaluation accuracy and adaptive ability, and the evaluation results are objective, which has guiding significance for students' ability evaluation. Hu [6] proposed a teaching evaluation system based on machine learning approaches. A grid search was performed to find the optimal configurations for the weighted Naïve Bayes algorithm. As compared with the conventional NB algorithm, it was reported that the classification accuracy of the WNB algorithm is 0.81%, while that of the NB algorithm is 0.75%, and the model has a favorable effect in the teaching evaluation model. An English learning evaluation model based on particle swarm optimization was proposed by Wang et al. [7]. A quality evaluation index method was presented for the teaching of the English language using the particle swarm optimization method. The system was effective in evaluating English language teaching and predicting the quality teaching of English as a foreign language. Zhou [8] introduced an artificial intelligence-based platform for school English learning. The system is comprised of a data layer, technical layer, and service layer. The system was effective in providing a self-learning platform and can provide teaching services such as instant learning, suggestions for learning, and evaluations based on central technologies of artificial intelligence. The system has the potential to improve students' English listening proficiency in a better and more efficient way. Yao et al. [9] used an automatic scoring system based on CNN and LSTM. In addition, Deep Belief Network (DBN) was employed to investigate answers, questions, various students' models, and composite models. The system achieved good results in the automatic scoring task of simple answers in Chinese.

In addition to the above methods, some scholars have proposed a dynamic evaluation model of foreign language teaching based on the Markov chain [10]. The dynamic evaluation model based on the Markov chain takes the differences of learners as the premise and then evaluates the individuality of the object. The experimental results show that the model has unique advantages in the dynamics of the evaluation process and the predictability of the evaluation results and provides a certain reference for the quantitative

measurement research of dynamic evaluation in teaching practice.

Although the above methods can improve the evaluation effect of English learning efficiency and the accuracy of the evaluation methods to a certain extent, due to the influence of interfering factors such as human interventions or external factors, there are some problems such as high system sensitivity, long envelope delay jitter time, and short stationary state maintenance time. Therefore, to solve the above problems, this paper aims to cultivate and improve students' autonomous learning ability, realize the virtuous cycle of learning evaluation and effective learning, and design an English learning effectiveness evaluation system based on the K-means clustering algorithm. The experimental results show that the designed system can effectively improve the shortcomings of the traditional system, realize the quantitative planning of English learning efficiency evaluation, and realize the high-quality evaluation of English learning effectiveness.

## 2. Design of English Learning Effectiveness Evaluation System

### 2.1. The Overall System Architecture and Database Design

*2.1.1. System Overall Architecture Design.* An English language teaching evaluation system must not only meet the various functional requirements of students and teachers' evaluation but also achieve precise operation. In the development of an English learning effectiveness evaluation system based on the K-means clustering algorithm, we employed the Windows XP SP2 operating system as the background environment and used Visual Basic 6.0 and ActiveX for the development of different functional modules. The software system is composed of various functional modules. The overall architecture of the system is shown in Figure 1.

The system modules are further categorized into three layers: application server, database server, and client. Under this hierarchical structure, teachers, students, and administrators access the web server through the intranet to conduct the online evaluation of teaching and query the results of the evaluation.

*2.1.2. Database Design.* For an evaluation system, the database is its core and foundation. It organizes a large amount of data in the system according to a certain model and provides functions such as storing, maintaining, and retrieving data so that users can easily, timely, and accurately obtain the required information from the database [11]. The key characteristics of the database of the proposed English learning evaluation system are as follows:

- (i) It is compatible with other information management systems to facilitate information exchange and resource sharing. The database system designed in this article uses Microsoft SQL Server 2005 [6]. There are multiple data tables in the entire database. They are

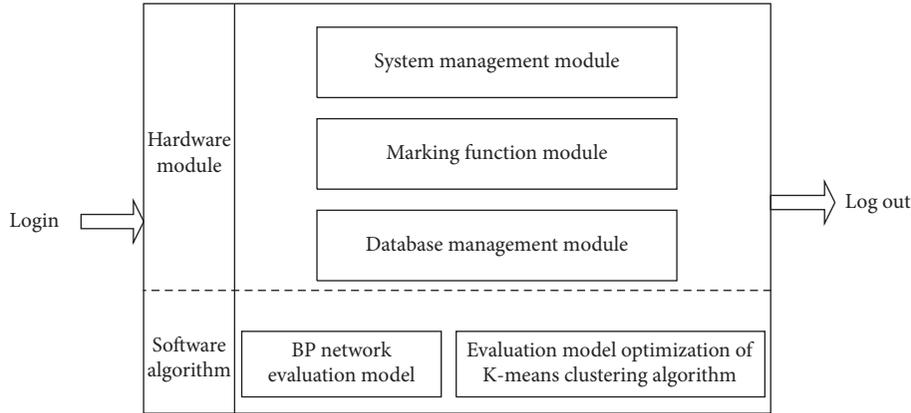


FIGURE 1: Schematic diagram of the overall system architecture.

used to record student information, course number information, semester course plan information, and basic information data of administrators, teachers, and students.

- (ii) In the database, multiple tables are designed to record the assignment information and assignment answer information issued by the teacher, the information of the work submitted by the students and the information of the self-evaluated work of the students, and the data of the work information of the student’s mutual evaluation. To achieve the purpose of integrating summative evaluation and process evaluation, the system adopts a digital method of scanning paper and pen test papers and designs test paper answer sheets and scoring record sheets. The table structures are shown in Tables 1 and 2.

Using Tables 1 and 2, the answers of the English course examination paper and the information of the teacher’s scores of all the questions about scorers are recorded.

**2.2. Functional Module Design.** The system specifically includes three roles, namely, administrator, teacher, and student. According to the permissions of the roles, the functional modules are designed as follows.

**2.2.1. System Management Module.** The system administrator has the functions of managing accounts, managing information, and assigning permissions, including student information management, various teaching management departments, and feedback information management of lecturers. The administrator can put forward opinions or suggestions for various subjects through B/S according to the privileges, and the administrator can inquire and reply to the submitted opinions and suggestions. Using this module, the administrator can put forward opinions on the teaching of teachers and students’ English learning. After the review is passed, the opinions of the administrator can be replied to through the public bulletin board.

TABLE 1: Test paper answer sheet.

Field	Is it empty?	Type of data
Test answer ID	×	Int (4)
Course ID	×	Varchar
Test question ID	×	Float
Test content	√	Text
Answer	×	Text
Score	×	Text

TABLE 2: Marking record sheet.

Field	Is it empty?	Type of data
Record ID	×	Int (4)
Student ID	×	Varchar (20)
Student name	×	Varchar (20)
Assessor	√	Varchar (10)
Score	×	Float

**2.2.2. Marking Function Module.** The scoring function module is used to integrate the new evaluation method with the traditional evaluation method. This article believes that the new evaluation method is based on the integration of the two to provide the advantages of the traditional evaluation method and introduce new evaluation ideas. This is the realization strategies for the reform of students’ English learning effectiveness evaluation. The realization of the entire test scoring function requires the coordination of the administrator and the teacher. The realization process of the scoring module function is shown in Figure 2.

According to Figure 2, the main user of the scoring function module is the teacher. In the entire examination process, the teacher is responsible for a series of tasks such as preparation of examination questions, examination scoring, and reporting results. In the overall design of the system, the test paper scanning function is assigned to the college-level administrator. The administrator organizes the original paper and test papers collected from the examination room and scans them to the server. The test paper folder is named after the course number plus the teacher number. The administrator adds

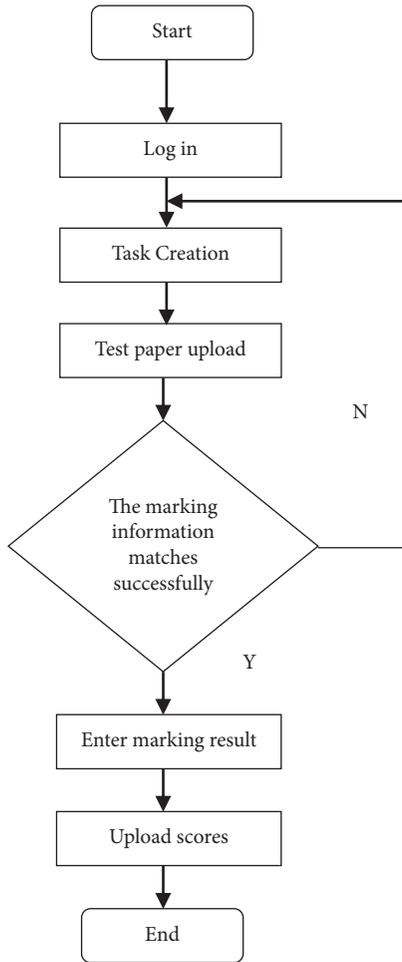


FIGURE 2: Operation flow chart of the scoring function module.

test paper answers and scoring tasks in the background, and the teacher enters their own course scoring task table to complete the scoring according to the answers.

**2.2.3. Database Management Module.** The interface of the database management module mainly contains the student's name, student ID, evaluator's name, and the score of each evaluation index. It is used to enter the corresponding student number in the student number box and click the "query" button on the bottom left of the interface to query the student's scores for each indicator in the database. It also includes the "next" or "previous" button to search for other student information backward or forward using student ID. When a student record is to be modified in the database, the "query" button can be used to find the student's record, then modify the information in the corresponding record box, and then click the "modify" button to change the modified information stored in the original database. When adding a new record to the database, it can be used to fill in the corresponding student information in each text box by clicking "add record" on the menu bar to add a new record to the end of the original database and then clicking the "exit" button or clicking "exit this system" on the menu to exit the

system. Figure 3 is a schematic diagram of the working principle of the database management module.

### 3. System Software Design

**3.1. The Design of the Evaluation Model for the Effectiveness of Students' English Learning Based on BP Neural Network Training.** To further improve the evaluation effect of the system, the English learning effectiveness evaluation model is designed. We employed the BP neural network training method [12] to design a student English learning evaluation model. A detailed introduction to the design steps of the model is presented in Table 3.

The trained neural network can be used as an effective tool that combines qualitative and quantitative methods to make a comprehensive evaluation of the target system outside the sample mode. The specific configuration of the BP neural network is as follows.

**3.1.1. Network Structure Layer Number Setting.** Existing research results have proved that the 3-layer feed-forward neural network can approximate any nonlinear relationship with arbitrary accuracy [13]. In order to reduce the consumption of memory resources and improve the learning speed of the network, this paper uses a 3-layer network structure to construct the evaluation model.

**3.1.2. Initial Setting of Weights and Thresholds.** The proper setting of the initial value range for the weight of BP neural connection and thresholds will effectively shorten the learning time of the network. The value range of connection weight and the threshold is usually  $[-1, +1]$  or  $[-2/n, +2/n]$ . This article sets the initial value range of network connection weight and threshold to  $[-1, 1]$ .

**3.1.3. Setting the Number of Hidden Layer Nodes.** The number of hidden layers play significant role in the overall performance of BP neural network. To set the hidden layer nodes of the BP neural network, we computed the number of hidden nodes as

$$K = \frac{\sqrt{xy + x^2 + y}}{MN}, \quad (1)$$

where  $x$  and  $y$  represent the number of nodes in the input layer and output layer, respectively.

**3.1.4. Network Learning Algorithm Selection.** BP neural network [10] often uses the gradient descent method to modify the connection weights and thresholds of the network nodes. In this method, the network gradually reaches the minimum point along the slope of the error function from a certain starting point during training, so that the error is zero. The learning method has problems such as being easy to fall into the local minimum during the training process. Therefore, this paper uses the L-M optimization algorithm to improve the traditional learning algorithm. The

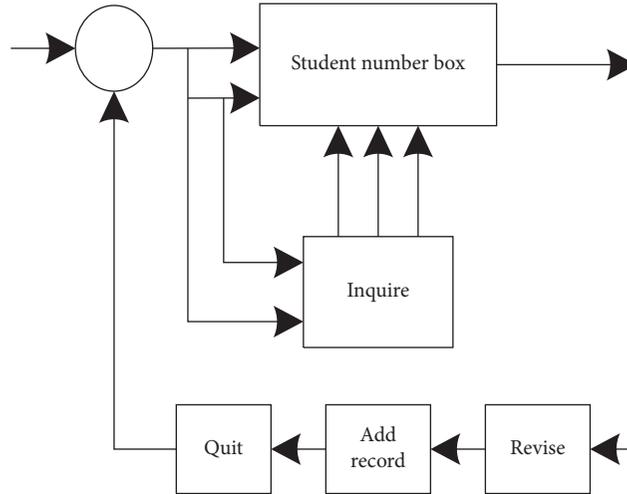


FIGURE 3: Schematic diagram of the working principle of the database management module.

TABLE 3: Model design steps.

Step	Functions
1	Determine the evaluation target system. The number of indicators is the number of input nodes in the BP neural network; that is, the number of neurons in the input layer of the BP neural network is 15.
2	Determine the number of layers of the BP neural network. The system adopts a three-layer network model structure with an input layer, a hidden layer, and an output layer.
3	Clarify the evaluation result. The number of nodes in the output layer is 1, which is the evaluation result of a certain student's learning effect.
4	Standardize the evaluation target value.
5	Use random numbers (usually a number between 0 and 1) to initialize the weights and network thresholds of the network nodes, input the standardized target sample values into the network, and give the corresponding expected output.
6	In the forward propagation stage, calculate the output of each layer node and calculate the error of each layer node.
7	In the back-propagation stage, correct the weights and check whether all sample pairs have been input.
8	Calculate the error. When the total error is less than the given error, the network training ends; otherwise, go to step (6) and continue training.
9	The trained network can be used for formal evaluation.

convergence speed and accuracy of the L-M optimization algorithm are relatively good, and it is suitable for BP neural network learning.

**3.1.5. Network Conversion Function Selection.** The transfer functions of BP neural network neurons include log-sigmoid, tan-sigmoid, and purelin. Among them, sigmoid-type functions can well adapt to linear and nonlinear problems and are most widely used. Therefore, this study sets the conversion functions of the hidden layer and output layer nodes of the network to tan-sigmoid and log-sigmoid, respectively.

Finally, the reliability, difficulty, discrimination, and original score (that is, the score of the student taking the test) were used as the input of the BP neural network, and the evaluation value (the quantitative value of the learning effect) was used as the output of the BP neural network to establish BP neural network structure. Among them, the input layer contains 5 nodes, namely, reliability, validity, difficulty, discrimination, and original score; the hidden layer contains 11 nodes; and the output

layer contains only 1 node, which is the evaluation value of students' English learning effectiveness, and the value range is [0, 1].

**3.2. Model Optimization.** To further improve the reliability of system evaluation, the K-means clustering algorithm [13] was used to optimize the English learning effectiveness evaluation model. In the optimization process, let  $P$  represent the reliability evaluation index set of the system, which is composed of  $i$  evaluation index pairs and can be expressed as  $P = \{p_1, p_2, \dots, p_i\}$ ; the index values in the set are all nonnegative. We standardize the evaluation indicators using the following equation:

$$P_\psi = \int \frac{|p(\omega)|^2}{|p_i|} d_i, \quad (2)$$

where  $p_\psi$  represents the evaluation index value obtained after standardization processing,  $p(\omega)$  is the membership value of the evaluation index,  $p_i$  represents the maximum value corresponding to the  $i^{\text{th}}$  evaluation index, and

$d_i$  represents the minimum value corresponding to the  $i^{\text{th}}$  evaluation index.

According to the standardized processing results of the evaluation indexes, the fuzzy evaluation matrix  $V$  [13] of the evaluation indexes of the English learning effectiveness evaluation model was constructed and is expressed as follows:

$$V = a^{(1/2)} \omega \left( \frac{a-b}{a} \right), \quad (3)$$

where  $a$  represents the consistency judgment matrix and  $b$  is the critical value of the consistency index.

Let  $h(t)$  be the standard deviation corresponding to the evaluation index, which is used to reflect the degree of influence of the comprehensive evaluation results of students' English learning by the evaluation index. It can be computed as

$$h(t) = \sqrt{\int \int (\hat{a}/\hat{b})^2 DG_{xy}}, \quad (4)$$

where  $\hat{a}$  represents the mean value of the effectiveness evaluation index, and  $\hat{b}$  is the better value of the evaluation object;  $D$  represents the basic evaluation factor system of the evaluation matrix; and  $G_{xy}$  represents the degree of influence of the multifactor evaluation matrix on the comprehensive evaluation result. It is computed as

$$G_{xy} = \sum_{i=1}^n (l_i(k) - l_j(k)) \eta_{ij}(k), \quad (5)$$

where  $l_i(k)$  and  $l_j(k)$  both represent the index weight matrix and  $\eta_{ij}(k)$  shows the row vector of the index weight matrix.

Based on the standard deviation  $h(t)$ , the judgment matrix  $U_i$  of the judgment evaluation index scale was computed using the following equation:

$$U_i = \begin{bmatrix} u_{11} & u_{12} & u_{1n} \\ u_{21} & u_{22} & u_{2n} \\ u_{n1} & u_{n2} & u_{nn} \end{bmatrix}. \quad (6)$$

According to the judgment matrix  $U_{ij}$  of the judgment evaluation index scale, the judgment matrix  $F$  is constructed, and its function is to calculate the weight of each validity evaluation index:

$$F = \{f_{cd} | c = 1, 2, \dots, n, d = 1, 2, \dots, n\}, \quad (7)$$

where  $c$  represents the minimum value of the validity evaluation index weight,  $d$  is the maximum value of the validity evaluation index weight, and  $f_{cd}$  represents the parameter of the importance of the evaluation index.

According to the evaluation index weight obtained using (7) combined with the  $p(\omega)$  evaluation index membership value in (2), the specific weight is calculated as

$$F_{xy} = \frac{1}{p(\omega)} \left( \frac{R_x}{p_x} - \frac{R_y}{p_y} \right), \quad (8)$$

where  $R_x$  and  $R_y$  both represent the index weight of each factor, and  $p_x$  and  $p_y$  both represent the index weight coefficients.

We construct an English learning effectiveness evaluation model according to the effectiveness evaluation index and the corresponding membership value and weight:

$$F(t) = \sum_{i=1}^n \left( f(x_i) - \overline{f(x_j)} \right)^2. \quad (9)$$

The evaluation result  $F(t)$  takes a value in the interval [0, 100]. The higher the score, the higher the reliability of the English learning effectiveness evaluation system.

To further improve the quantitative evaluation ability of English learning effectiveness. in this paper, an optimization method of the English learning effectiveness evaluation model based on the K-means clustering algorithm is proposed. The evaluation problem is transformed into the problem of solving the objective function [14], that is, solving the consistency estimation value of English learning effectiveness  $\mu$  to obtain the estimated value of English learning effectiveness evaluation index [15], which can be expressed using the following equation:

$$\mu_j = \frac{1}{n} \sum_{i=1}^n X_i^j, \quad (10)$$

where  $X_i^j$  represents the estimated value of the evaluation index score.

The calculation of the estimated value of the evaluation index of English learning effectiveness is transformed into the least square solution, as given in the following equation:

$$T_{ij} = \sum_{j=1}^n [\mu_j] \times [G(h) + G(k)], \quad (11)$$

where  $G(h)$  represents the real part in the evaluation index distribution sequence and  $G(k)$  represents the imaginary part in the evaluation index distribution sequence.

The randomization of the change range of students' English learning effectiveness is realized by the substitution data method. The disturbance functional is carried out on the empirical distribution data to obtain the subclass set of class  $kes$ . Based on this, the expression of the utilization rate of English learning resources in the effectiveness evaluation is as follows:

$$K_{ij} = \int_j^i N'(z_{ij}) dz, \quad (12)$$

where represents the number of learning resources and  $z_{ij}$  is the degree of student's use of digital resources in the process of learning English.

Constructing a hierarchical tree, the establishment of the principal component characteristics for the evaluation of the effectiveness of students' English learning is realized by the K-means clustering algorithm [16]; the specific expression is

$$K(X, Y) = \sum_{i=1}^n (x_i - y_i)^2, \quad (13)$$

where  $x_i$  represents the prior distribution feature vector of students' English learning effectiveness evaluation and  $y_i$  represents the K-means cluster center vector. We combined

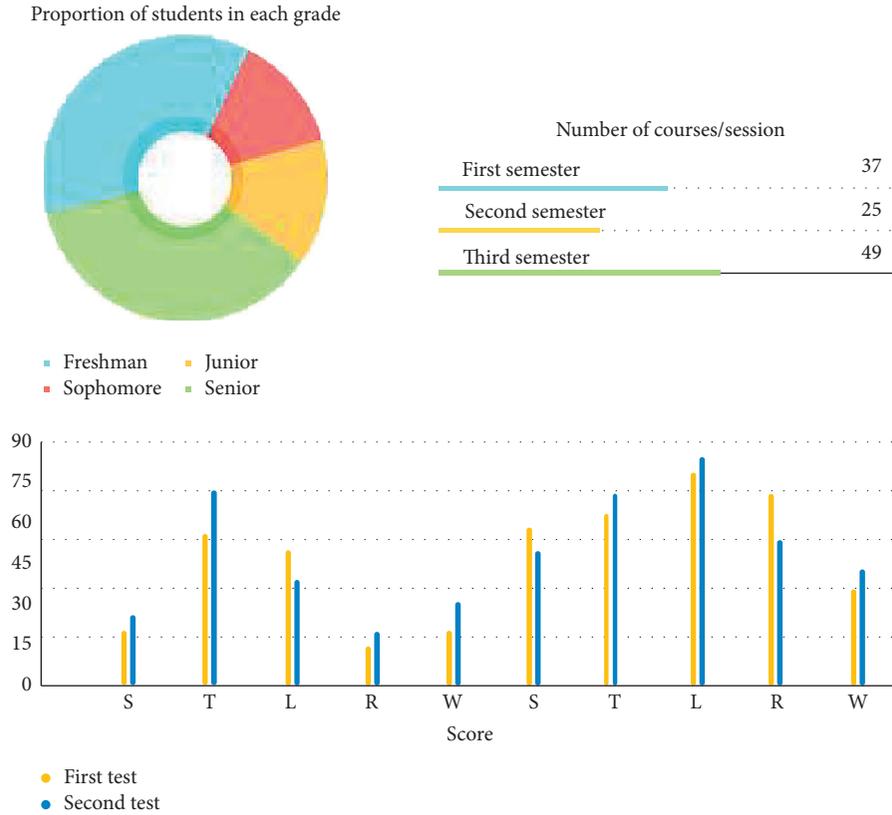


FIGURE 4: System test interface.

linear feature fusion methods to achieve clustering and fusion of evaluation indicators and obtain the final evaluation results:

$$K' = N(x)M(y). \tag{14}$$

Based on the clustering and integration of evaluation indicators, we complete the evaluation of the effectiveness of students' English learning, to optimize the evaluation model and improve the accuracy and practicability of the evaluation results.

#### 4. Simulation Experiment

To verify the performance of the designed English learning effectiveness evaluation system based on the K-means clustering algorithm, simulation experiments were carried out. In the simulation experiment, the effectiveness evaluation system of mobile foreign language-assisted learning and the ability evaluation system based on machine learning are used as the comparison systems to obtain the application performance of different systems.

*4.1. Experiment Preparation.* In this experiment, 200 non-English majors from grade 1 to grade 4 in a university were selected as subjects, and the students were evaluated for three months. The experiment established a learning portfolio for each student, which includes learning progress, learning content, self-evaluation and other evaluation of

learning effectiveness, and self-reflection of learning activities. Interviews and questionnaires were conducted before, during, and after the experiment to collect students' evaluation data.

In the selection of experimental data, the data attributes that are not related to the study, weakly related to the study, or redundant were deleted. The final selected data include total learning score (s), total test score (T), listening score (L), reading score (R), and writing score (W). These five attributes not only show the overall level of students' English performance but also provide information about the personal weaknesses that lead to the total score. To ensure the validity and accuracy of the experimental results, the data needs to be processed during data analysis [15–18]. The data is standardized here, and the processed data is used to complete the analysis. After the standardization process, the experimental data is transformed into a numerical value without a unit to measure the size; that is, these data are on the same order of magnitude, and the data can be compared and analyzed. We employed the Z-score standardization method. Figure 4 shows the system test interface.

#### 4.2. System Performance Verification

*4.2.1. System Sensitivity.* The purpose of the sensitivity test is to analyze and evaluate the system's resistance to attacks. The higher the sensitivity coefficient, the more vulnerable the system to attacks and the less strong the system's self-healing ability. In the test, MATLAB (R2015a) software is used to

TABLE 4: System sensitivity coefficient.

Iterations/ time	Designed system	Mobile foreign language-assisted learning effectiveness evaluation system	Ability evaluation system based on machine learning
2	0.13	0.23	0.30
4	0.13	0.27	0.32
6	0.14	0.29	0.33
8	0.10	0.26	0.34
10	0.11	0.26	0.30
12	0.09	0.27	0.31
14	0.09	0.28	0.35
16	0.07	0.28	0.35
18	0.15	0.20	0.39
20	0.09	0.23	0.38

directly obtain the system sensitivity coefficient, and the results are shown in Table 4.

The system sensitivity coefficient is expressed by a numerical value, and the specific numerical interval is 0–1.0. As shown in Table 4, the sensitivity value of the designed system is between 0.07 and 0.15, the sensitivity value of the mobile foreign language-assisted learning effectiveness evaluation system is between 0.20 and 0.29, and the sensitivity value of the ability evaluation system based on machine learning is between 0.30 and 0.39. It is evident that the proposed system has the lowest sensitivity coefficient, indicating that the system is not vulnerable to abnormal attacks and has strong self-repair capabilities.

**4.2.2. Envelope Delay Jitter Time.** The shorter the envelope delay jitter time is, the higher the stability of the system will be [19, 20]. Figure 5 shows the comparison results of the envelope delay jitter of different systems.

The envelope delay jitter time of the proposed system is shorter than those of the other two systems. Figure 5 shows the envelope delay jitter time versus the number of iterations for the three systems. After 8 iterations, the delay jitter of the proposed system does not change significantly and is stable at about 0.08 s, which confirms that the designed system has high stability, can better complete the assigned tasks, and has high applicability. It can be seen that the designed system can effectively reduce the average envelope delay of the evaluation system, improve the network utilization to a great extent, and reduce the jitter time of the envelope delay, indicating that the practical value of the system is higher than those of the other methods.

**4.2.3. Duration of System Steady-State Maintenance.** Taking the steady-state maintenance time of the system as the experimental index, the traditional system is compared with the designed system, and the results are shown in Figure 6.

It can be seen from Figure 6 that the steady-state maintenance time of different systems shows a gradient growth trend while increasing the number of iterations. Among them, the steady-state maintenance time of the designed system is higher than that of the traditional system, and the maximum steady-state maintenance time can reach

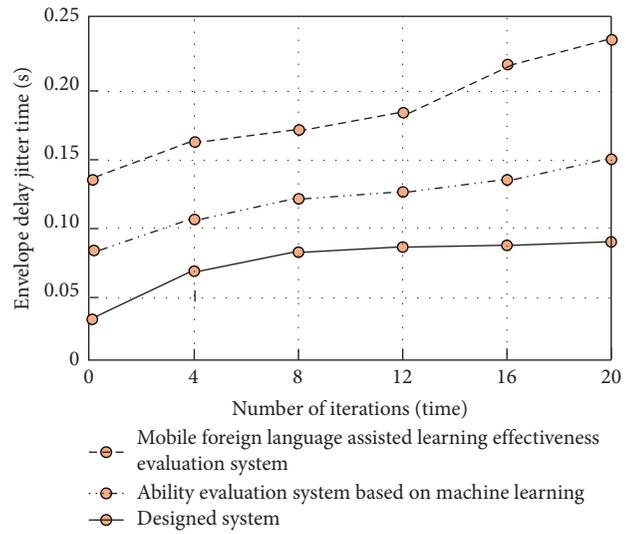


FIGURE 5: Envelope delay jitter time.

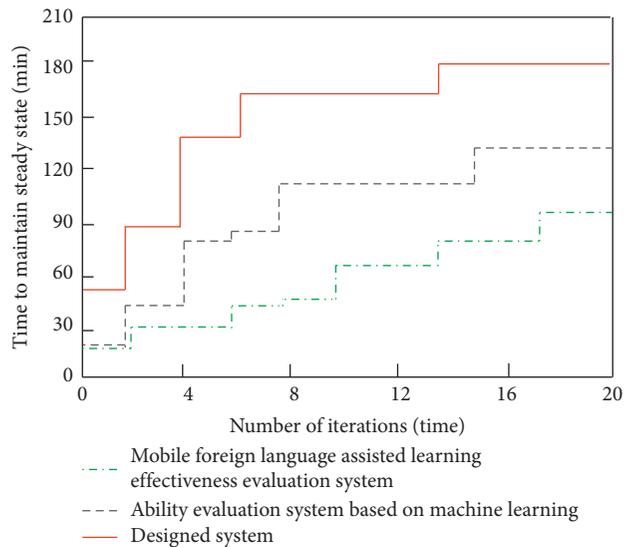


FIGURE 6: Duration of system steady-state maintenance.

175 min, while the maximum steady-state maintenance time of the mobile terminal foreign language-assisted learning effectiveness evaluation system is 105 min, and the

maximum steady-state maintenance time of the capability evaluation system based on machine learning is 125 min. Therefore, it is concluded that the designed system has strong stability and good robustness.

## 5. Conclusion

Aiming at solving the problems of high system sensitivity, long envelope delay jitter time, and short stationary state maintenance time in the traditional system, this paper presented an English learning effectiveness evaluation system. A student English learning effectiveness evaluation model based on BP neural network and K-means clustering algorithm is designed to optimize the English learning effectiveness evaluation model and achieve effective English learning by solving the consistent estimate of the effectiveness of English learning assessment. The system is comprised of various functional modules designed in ActiveX, with emphasis on the design of scoring functional modules, and different roles and authorizations are given to administrators, teachers, and students. The proposed system has a lower sensitivity coefficient, a shorter envelope delay jitter time, and a longer period of steady-state maintenance, indicating that the system can achieve stable operation. The experimental results show that the system can effectively improve the shortcomings of the traditional system and realize the high-quality evaluation of students' English learning effectiveness.

## Data Availability

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

## Conflicts of Interest

The author declares no known conflicts of interest.

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