International Journal of Information and Communication Technology Education
Volume 20 • Issue 1

Construction and Application of a College English Blended Teaching System Based on Multi-Source Data Fusion

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ABSTRACT

By using modern data analysis techniques, this study aims to construct an innovative university English teaching effectiveness evaluation model based on particle swarm algorithm and support vector machine. The model is designed to improve assessment accuracy and personalization. The research process includes the methodology of data collection, preprocessing, model construction and evaluation. The experimental results show that the model can more accurately assess students' English learning effectiveness and provide customized suggestions for personalized education. This research is important for improving the quality of university English education, promoting personalized learning, and providing support tools for educational decision makers.

KEYWORDS

College English, College English Teaching, Evaluation Model, Multi-Source Data Fusion, Particle Swarm Algorithm, Support Vector Machine

In today's era of globalization and informatization, English has become increasingly important as a universal language for international and cross-cultural communication. University education plays a crucial role in cultivating students' skills, cultural awareness, and international competitiveness. However, the field of English language teaching still faces many challenges, including the diversity of student groups, the limited availability of teaching resources, and the need to improve the quality of education. To address these challenges, more and more universities are adopting the English Blended Education System (EBES), which combines traditional face-to-face teaching and online learning to provide students with personalized, flexible, and diverse learning experiences. However, how to evaluate the effectiveness of college English teaching remains an urgent issue to be addressed. To this end, this study utilized data analysis techniques such as particle swarm optimization and support vector machines to construct a new evaluation model that evaluates students' academic performance in college English courses in a more accurate, comprehensive, and personalized manner. This model not only has personalized learning support capabilities but also can process large-scale educational data to support educational policy formulation and decision-making. The contribution of this study is to provide a state-of-the-art evaluation model for college English education, which is expected to have a positive impact on improvement and innovation in the field of education.

DOI: 10.4018/IJICTE.342083 *Corresponding Author

This study has obvious novelty in the field of evaluating the effectiveness of college English teaching, mainly reflected in the following aspects: first, combining particle swarm optimization algorithm and support vector machine, two different advanced technologies, to construct a new evaluation model; secondly, emphasizing the importance of personalized learning, meeting the unique needs of students through personalized assessment, which is relatively rare in traditional assessments; thirdly, adopting a comprehensive evaluation method to integrate multiple evaluation indicators and data sources to understand students' English learning outcomes comprehensively; finally, applying these novel methods and technologies in the field of college English education to provide new possibilities for improving the quality of education. This study is expected to bring new perspectives to the development of English education evaluation methods, promote the realization of personalized learning, and improve the accuracy and comprehensiveness of evaluation.

LITERATURE REVIEW

In recent years, mobile tools such as Weibo, WeChat, and other mobile apps have been widely used for fragmented learning. The application of mobile tools enables learners to share learning content effectively and choose and control the learning process independently. To enhance acquisition of meaningful pieces of knowledge from a huge amount of information, fragmented learning helps students to adapt to the fast-paced learning mode of modern life, emphasizing the freedom and independence of learning, which meets the needs of modern people for free, efficient, and rapid learning. The design of the blended college English teaching model that combines online and offline education makes learning no longer confined to the traditional classroom environment and enhances more independent and diverse learning options for students.

Alshahrani (2023) focuses on college English classroom discourse. Through a detailed description and analysis of the collected data, referring to Sinclair and Coulthard's classroom discourse analysis model, the problem of patterns of classroom discourse is made clear. On this basis, a few strategies for college English teachers are put forward by Alshahrani to improve college English teaching and learning. It is necessary, for example, to consider the students' perceptional value for educators in College English teaching and new reform. Loncar et al. (2023) analyze the excessive emphasis on multimedia network technological teaching, which weakens the ethical responsibility of teachers and students; meanwhile, it causes conflicts and contradictions between student-centered teaching concepts and specific data in College English teaching reform. Currently, the application of network resources and multimedia teaching in the classroom has led to the demonstration of multimodality in college English teaching (Rahmawati et al., 2023). Under the multimodality-based college English teaching model, teachers should concentrate on cultivating students' multi-literacy, coordinating different modalities to achieve the teaching objectives (Bizami et al., 2023). In order to realize the quantitative evaluation and analysis of the effect of college English teaching innovation reform, Kilag et al.(2023) analyze the constraint parameters of college English teaching innovation reform effect evaluation by statistical quantitative analysis and abstract the entropy characteristic quantity of big data. The curriculum's ideological and political model is used to optimize the reform of college English teaching innovation, and quantitative analysis of the effect of college English teaching innovation reform is realized. To solve the problems, this paper sums up the evaluation contents of college English teaching quality and identifies the factors affecting the teaching quality of college English. Ali et al. (2023) provide a new and applicable solution to quantification of college English teaching quality. Ortega et al. (2023) discuss the design and implementation of multimedia-assisted college English independent education resources from the perspective of knowledge classification. Through their content analysis, some problems are found to exist in the design process of some college English multimedia teaching, and the status quo is analyzed. Presenting a reasonable application of theory in the classroom English teaching, multimedia helps college teachers to optimize classroom

teaching and improve English teaching quality. Alkaabi et al. (2023) explore how constructivism directs multimedia-assisted English teaching.

The use of multisource data fusion in the context of college English blended learning systems has been a topic of interest in recent literature. Chen and Kim (2023) discuss the implementation of a blended teaching system for college English that utilizes multisource data fusion in edge computing. This approach allows for the integration of various data sources to enhance the learning experience for students. Similarly, Obeidat and Yaqbeh (2023) explore the use of multisource data fusion techniques for fault diagnosis in analog circuits, demonstrating the potential for this approach in educational settingsThe impact of blended teaching systems on language learning has been studied. For example, a study by Feng et al. (2023) focuses on the development of a machine learning-based multisource precipitation data fusion model, which could have implications for language learning systems. Additionally, the use of multimedia courseware-assisted teaching, as described by Gayatri et al.(2023), involves the merging of data from multiple sources to create a grouping detection model, highlighting the relevance of multisource data fusion in educational settings. Furthermore, the construction and application of college English blended teaching systems based on multi-data fusion have been explored in the literature. Du Tran and Nguyen (2023) discuss the impact of blended teaching systems on language learning, emphasizing the role of multisource data fusion in enhancing the learning experience. Similarly, the use of multisource sensing data fusion in the context of education management systems for higher vocational students is highlighted by Wang (2023), further underscoring the relevance of multisource data fusion in educational settings. Overall, the literature reviewed demonstrates the growing interest in the use of multisource data fusion in college English blended learning systems. The potential for this approach to enhance the learning experience and improve educational outcomes is evident in the studies discussed (Buhl-Wiggers et al., 2023).

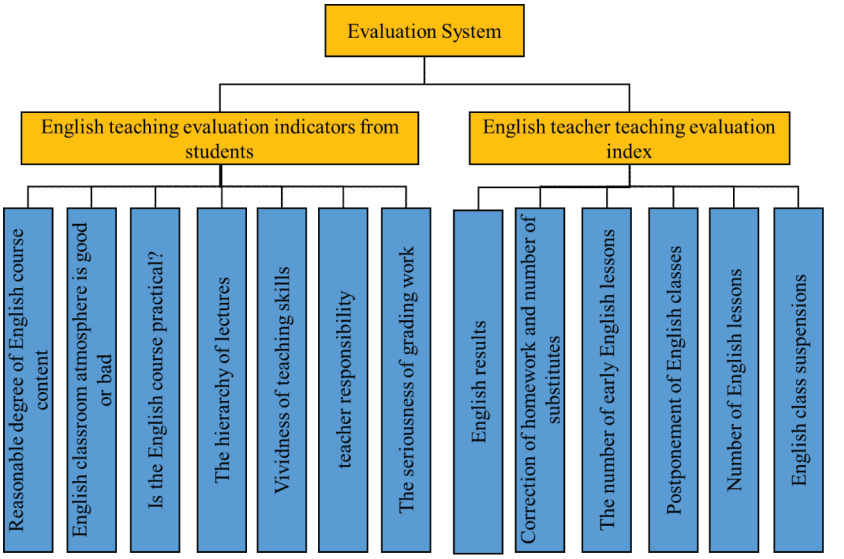
In order to evaluate the ability of personnel training of the university accurately, taking into account teaching and research conditions in engineering colleges and universities, this paper constructs a comprehensive evaluation index system of the cultivation of innovative talents in engineering colleges and universities. It proposes a method of comprehensive evaluation based on particle swarm optimization (PSO) and support vector machine (SVM) through analysis of the strength, activity, and effectiveness of the cultivation of innovative talents of universities (Mayr & Oppl, 2023). A clarification test was carried out of 46 evaluation index systems at 26 universities, and evaluation results show that the model has good regression results and is also suitable for evaluation grade of cultivation of innovative talents in engineering colleges and universities at present. Introducing an SVM oriented to small sample data and possessing good extension property can be an effective approach to predicting soil erosion because SVM has been applied in hydrological prediction to some extent. Chen et al. (2023) explored the application of an intelligence-based PSO algorithm in automatic selection of parameters for SVM, and they proposed a prediction model by linking PSO and SVM for small sample data analysis. Based on a PSO algorithm, a more flexible descriptor selection and model construction method variable-weighted support vector machine (VW-SVM) is proposed (Prihatini et al., 2023).

RELATED MATERIALS AND METHODS

Constructing the Evaluation System of College English Teaching Effect

The success of teaching college English is evaluated according to a number of different theories. The evaluation system for the effectiveness of college English teaching can help teachers and schools evaluate teaching effectiveness more scientifically, understand students' learning outcomes, learning difficulties, and needs, and provide a basis for teaching improvement (Yang & Kuo, 2023). The evaluation system can monitor the teaching process and results, identify problems and shortcomings

Figure 1. The Evaluation Index System of College English Teaching Effect



in teaching, adjust teaching strategies and methods in a timely manner, optimize teaching content and form, and improve teaching quality (Yang, 2023). It can provide personalized teaching support and feedback based on the individual characteristics and learning needs of students, helping them better grasp course content and skills and achieve teaching objectives (Wu et al., 2024). It can also manage teaching resources based on teaching effectiveness and needs, allocate teaching staff and teaching equipment and facilities, and maximize teaching efficiency. The construction of an evaluation system for the effectiveness of college English teaching is of great significance for improving the quality of college English education, innovating teaching models, and cultivating talents (Ningsih et al., 2023). In practical applications, it is necessary to develop corresponding evaluation indicators and methods based on different teaching characteristics and needs, strengthen data collection and analysis, and maximize the role of the evaluation system (Elbyaly & Elfeky, 2023). A multi-indicator evaluation system is built with teachers and students as its key constituents on the basis of pertinent theories. The evaluation index system of college English teaching effect is shown in Figure 1.

Student Evaluation Indicators

A wide range of student evaluation data were collected, which included evaluations of various aspects such as the rationality of the English course content, the classroom atmosphere, the practical significance of the English course, the organization and hierarchical nature of the lectures, the vividness of the teaching techniques, the teacher's sense of responsibility, and the conscientiousness in correcting the assignments. These evaluation indicators reflect students' multidimensional views of English education.

English Teacher Evaluation Indicators

Evaluation data of English teachers were also collected, including English grades, the number of homework corrections and substitute lessons, the number of early or late English classes, and the transfer and suspension of English classes. These indicators help to assess the teaching performance and professionalism of English teachers.

English teaching evaluation indexes from students and English instructor teaching evaluation indexes are both included in the evaluation index system for university English teaching efficacy.

The least squares support vector machine is fed the evaluation indices of university English teaching effectiveness as samples to produce the evaluation of university English teaching effectiveness.

Evaluation Principle of Least Squares Support Vector Machine

Least Squares Support Vector Machine (LS-SVM) is a classification and regression method based on statistical learning theory. The core idea is to solve the model parameters by minimizing the objective function based on the SVM in order to achieve data fitting and prediction (Chang, 2023). The SVM algorithm can be used to classify students' grades and other features, thereby identifying key factors that affect the effectiveness of English learning (Supriyadi et al., 2023). The following is the evaluation principle of least squares support vector machine:

1. Establish optimization problem: The goal of the LS-SVM is to solve the model parameters by minimizing the objective function. The objective function consists of two parts: regularization term and error term. The regularization term is used to control the complexity of the model and avoid overfitting; the error term is used to measure the degree of fit of the model to the training data.
2. Determine decision function: After establishing the optimization problem, the optimal model parameters can be obtained by solving the objective function. The LS-SVM determines the optimal decision function by selecting a set of support vectors and corresponding Lagrange multipliers. Support vectors are the sample points in the training sample that are closest to the decision boundary.
3. Prediction and evaluation: For new input samples, one should use the optimal decision function for prediction and evaluate based on the predicted results and true labels. The evaluation indicators can use commonly used indicators such as accuracy, precision, recall in classification problems, or mean square error in regression problems.

The LS-SVM solves model parameters by minimizing the objective function, thereby achieving data fitting and prediction. It has certain advantages, such as strong robustness to noise and outliers and high computational efficiency. However, it also has some limitations, such as relatively difficult processing of large-scale datasets, and may perform poorly in sample imbalance and multi-class classification problems. Therefore, when applying LS-SVMs, it is necessary to consider the characteristics of the data and the requirements of the problem comprehensively and choose appropriate evaluation methods and model tuning strategies.

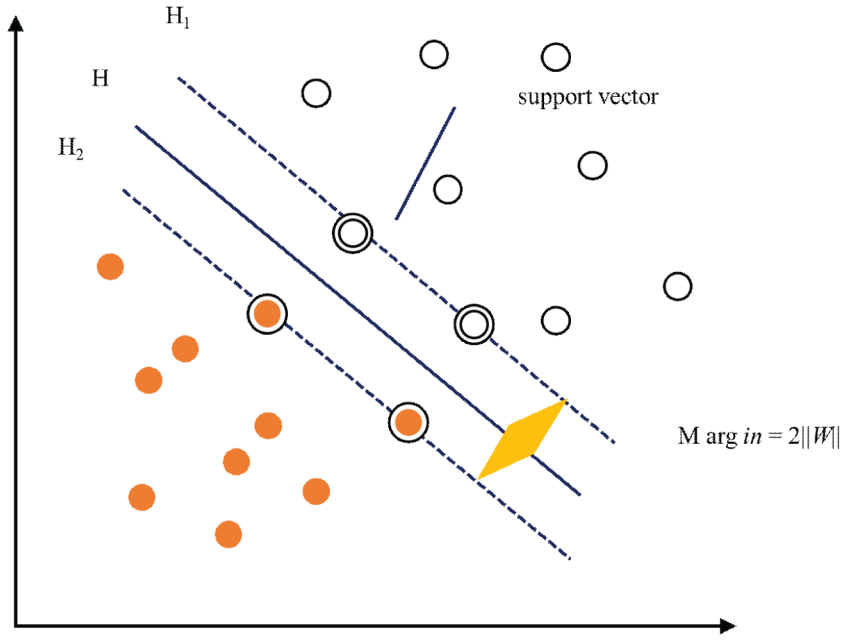
In this dissertation, SVM is chosen as the core algorithm for the evaluation model of university English teaching effectiveness. SVM is known for its high performance classification ability, adaptability to high-dimensional data, and ability to handle nonlinear relationships, which makes it ideal for effectively assessing students' English learning outcomes. SVM performs well in the face of multidimensional and complex educational assessment data, and it is expected to provide the education field with a powerful tool for deeper understanding of educational effectiveness and support for decision making.

With the advantages of simple structure, complete theory, strong adaptability, global optimization, short training time, and good generalization performance, SVM has received wide attention in the field of particle swarm optimization. It has become the current international and domestic research hotspot.

As shown in Figure 2, the evaluation is as follows : A set of training samples is set to be described by $s = \{xi, yi\}$, where i=1, 2, ..., l. The input data of the LS-SVM is described by xi; the number of training samples is described by l; the output data is described by yi. The linear regression function in d-dimensional space is Equation 1:

$$y = \omega^{\mathrm{T}} x + b \tag{1}$$

Figure 2. Support Vector Machine Algorithm



Among them, the deviation is described by *b*; the weight vector is described by ω.

The regression function in the high-dimensional feature space is Equation 2:

$$f(x) = \omega^{\mathrm{T}}\varphi(x) + b \tag{2}$$

Among them, φ(*x*) is the nonlinear mapping from the input space to the high-dimensional feature space.

The optimization objective function of the least squares support vector machine is Equation 3:

$$\min = \frac{1}{2}\left\|\omega\right\|^2 + \frac{1}{2}c\sum_{i=1}^{l} e_i^2 \tag{3}$$

The constraint condition is Equation 4:

$$\text{s.t. } \omega^{\mathrm{T}}\varphi\left(x_i\right) + b + e_i = y_i, i = 1,2,\cdots,l \tag{4}$$

Among them, *c* is the regularization parameter to control the degree of penalty for the error; *ei* is the error variable.

Using the introduction of Lagrange multipliers, the solution of the optimization problem is realized, that is, Equation 5:

$$\min J = \frac{1}{2}\left\|\omega\right\|^2 + \frac{1}{2}c\sum_{i=1}^{l} e_i^2 - \sum_{i=1}^{l}\lambda_i\left(\omega^{\mathrm{T}}\varphi\left(x_i\right) + b + e_i - y_i\right) \tag{5}$$

Among them, the Lagrange multiplier is described by λ.

The calculation of the optimal value is obtained under the KKT optimization conditions. The optimal value is solved as Equation 6:

$$\begin{cases} \dfrac{\partial J}{\partial \omega} = 0 \to \omega = \sum_{i=1}^{l}\lambda_i\varphi\left(x_i\right) \\ \dfrac{\partial J}{\partial b} = 0 \to \sum_{i=1}^{l}\lambda_i = 0 \\ \dfrac{\partial J}{\partial e_i} = 0 \to \lambda_i = ce_i, i = 1,2,\cdots,l \\ \dfrac{\partial J}{\partial \lambda_i} = 0 \to \omega^{\mathrm{T}}\varphi\left(x_i\right) + b + e_i - y_i = 0, i = 1,2,\cdots,l \end{cases} \tag{6}$$

Eliminate ω and e in Equation 6, and replace the quadratic optimization problem with the calculation problem of solving linear equations, and the calculation result is Equation 7:

$$\begin{bmatrix} 0 \\ y \end{bmatrix} = \begin{bmatrix} 0 & Q^{\mathrm{T}} \\ Q & \Omega + c^{-1}I \end{bmatrix}\begin{bmatrix} b \\ \lambda \end{bmatrix}, \lambda = \left[\lambda_1, \lambda_2, \cdots, \lambda_l\right]^{\mathrm{T}}; Q = [1,1,\cdots,1]^{\mathrm{T}}a \tag{7}$$

I represents the identity matrix; Ω∈R1×1 and represents the function, which is Equation 8:

$$y = \sum_{i=1}^{l}\lambda_i K\left(x_i, x_j\right) + b \tag{8}$$

In order to avoid the disaster of dimensionality, the formula is Equation 9:

$$K\left(x_i, x_j\right) = \exp\left(-\frac{\left\|x - x_i\right\|^2}{\sigma^2}\right) \tag{9}$$

Among them, the kernel function parameter width is σ.

The algorithm considers learning the local and global models separately and then mixing the two through the threshold model. Meanwhile, the algorithm uses a stronger algorithm privacy concept. While existing solutions are private enough for some settings, FedMix supposes that clients requiring privacy protection do not want these data to participate in the training of the global model at all. Therefore, FedMix allows any client to choose between a full exit from the federation or to provide only partial data. Good customers can still benefit from the global model and maintain their high level of performance while balancing the data distribution of the oblique profile. This is important when local datasets are particularly sensitive (such as medical data).

To optimize c and σ to represent two parameters to enhance the generalization ability of the parameter optimization problem, adopting the LS-SVM, one should complete these steps as follows:

1. Input a sample of college English teaching effect evaluation data.
2. The optimal are solved, and the particle swarm algorithm is used to implement the search.
3. Select the appropriate kernel function.
4. Calculate and obtain the optimization problem, calculate the optimal solution and describe it with α, as shown in Equation 10:

$$\alpha = \left(\alpha_1, \alpha_1^*, \alpha_2, \alpha_2^*, \cdots, \alpha_l, \alpha_l^*\right)^{\mathrm{T}} \tag{10}$$

5. Construct the decision function using the construction process, as in Equation 11.

$$y = \sum_{i=1}^{l}\left(\alpha_i^* - \alpha_i\right)K\left(x, x_i\right) + b \tag{11}$$

Particle Swarm Algorithm to Search the Parameters of the Least Squares Support Vector Machine

PSO is an optimization algorithm based on group intelligence, which finds the optimal solution by simulating the behavior of a group such as a flock of birds or a school of fish during the search and optimization process. It has the advantages of global search capability and fast convergence, and it is simple and easy to implement, it does not require derivative information, and it can be parallelized. Therefore, particle swarm algorithms have been widely used to solve problems in various fields and have achieved good results. The combination of a PSO algorithm and SVM can further improve the accuracy and robustness of the model. Through PSO, the optimal parameter combination can be found in the hyperparameter space, thereby optimizing the performance of SVM models. The following is the principle of the PSO algorithm:

1. Initialization: Initialize the position and velocity of a group of particles, with each particle having a position vector and a velocity vector. The position vector represents a point in the solution space of the problem, while the velocity vector represents the search direction and distance of the particle in the solution space.
2. Evaluate fitness: Based on the objective function of the problem, calculate the fitness value of each particle to evaluate the quality of the solution. The fitness value can be the value of the objective function or other indicators defined based on the objective function.
3. Update particle velocity and position: Update particle velocity and position based on their own historical and global optimal solutions, as well as information from neighboring particles. The updated velocity is influenced by the attraction of the particle's own historical optimal solution and the attraction of the global optimal solution, while the updated position is adjusted according to the new velocity.
4. Update global optimal solution: Compare the current particle swarm's optimal solution with the historical global optimal solution and update the global optimal solution. If the fitness value of a particle exceeds the historical global optimal solution, it is considered the new global optimal solution.
5. Repeated iteration: By continuously updating the particle velocity and position, as well as the global optimal solution, conduct multiple iterative searches until the predetermined stopping

condition is reached, such as reaching the maximum number of iterations or meeting the convergence condition.

The core idea of the PSO algorithm is to search in the solution space through cooperation and competition and find the optimal solution through information transmission and position adjustment between particles. Compared to traditional optimization methods, the PSO algorithm has better global search ability and convergence, and it is suitable for various types of optimization problems. However, this algorithm is sensitive to the dimensions of the problem and the size of the search space, and it requires parameter optimization and appropriate constraint settings based on the specific problem.

The position in the *d*-dimensional space is described by *xi*; the definition vector is described by $x_i = \left(x_{i1}, x_{i2}, \cdots, x_{id}\right)$, $v_i = \left(v_{i1}, v_{i2}, \cdots, v_{id}\right)$, $p_i = \left(p_{i1}, p_{i2}, \cdots, p_{id}\right)$, where i = 1, 2, ..., m; and the optimal position searched by all the populations is described by $p_g = \left(p_{g1}, p_{g2}, \cdots, p_{gd}\right)$. To calculate the particle position and velocity of update particle swarm algorithm, see Equation 12 and 13.

$$x_{id}^{k+1} = x_{id}^{k} + v_{id}^{k+1} \tag{12}$$

$$v_{id}^{k+1} = \omega v_{id}^{k} + c_1 r_1 \left(p_{id} - x_{id}^{k}\right) + c_2 r_2 \left(p_{gd} - x_{id}^{k}\right) \tag{13}$$

The process of PSO of support vector machine parameters *c* and σ is as follows:

1. Normalize and preprocess the evaluation data of college English teaching effect.
2. Set the individual extreme value Pibest and the global extreme value gbest, and the calculation of the fitness value of each particle is based on the current position of the particle. The calculation process is in Equation 14:

$$f = \sum_{i=1}^{N} \left| y_i - y_1^{'} \right| \tag{14}$$

Among them, *y*'1 is the predicted value; *N* is the number of training samples; and *yi* is the actual value.

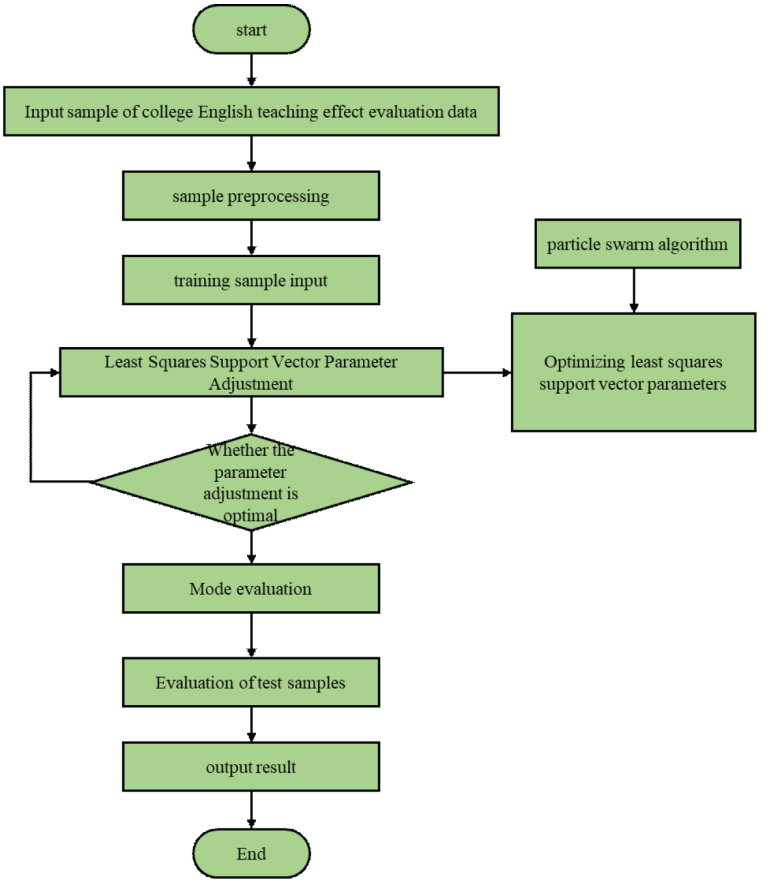
3. To generate a new population, update Equations 13 and 14 according to the particle position and velocity.

Evaluation Process of College English Teaching Effect Based on Particle Swarm Algorithm and Support Vector Machine

Figure 3 details the combination of the evaluation index system with the process of the model.

In order to evaluate the teaching effect of college English, the LS-SVM is used as the input sample, and the particle swarm algorithm is used to optimize the selection of kernel function parameters and regularization parameters. It should be determined whether the parameters are the optimal solution, and if not, the particle swarm algorithm is used to readjust the parameters until the optimal solution is found. Once the optimal solution is obtained, the test samples will be evaluated and the evaluation results will be output. Such an approach ensures that the evaluation process is optimized and does not change the intent of the original paper.

Figure 3. Flow Chart of the Evaluation Model of College English Teaching Effect Based on Particle Swarm Algorithm and Support Vector Machine



As can be seen from Figure 3, first, one should input the sample of college English teaching effect evaluation data as the least squares support direction.The particle swarm algorithm is used to solve the optimal solution of the kernel function parameters and regularization parameters. If so, one should then evaluate the test sample and output the results.

The following method has been carried out: selecting the English classroom teaching effectiveness for a computer major in a certain university as the research object; collecting sample data according to the evaluation indicators of university English teaching effectiveness; obtaining the quality grade value of university English classroom teaching through the actual situation of university English teaching and expert evaluation of university English teaching effectiveness; obtaining 200 data samples for testing; and dividing them into 10 data sets, each with 20 data samples.

RESULTS AND ANALYSIS

Analysis of Experimental Results

The experimental design parameters are large, so the default settings of some parameters are summarized in the following table. It is worth noting that the following parameters are only the default parameters, while different experiments may tune the individual default parameter values

whole, which will be emphasized in the experimental results. Experiments use a single Tesla-v100 graphics card as a computational resource, but for client-side computing processes, parallel computing should be implemented through distributed or multithreaded, but not under the premise of affecting the experimental results and resource saving. The serial computing is finally chosen to realize the pseudo-parallel. Adam (Adaptive Moment Estimation) is an adaptive learning rate optimization algorithm commonly used in gradient descent optimization in deep learning. The Adam algorithm combines the advantages of Adagrad and RMSProp optimization algorithms, dynamically adjusting the learning rate of each parameter while ensuring the correct gradient direction. In this paper, the Adam optimizer is selected as the optimizer for the neural networks in all the algorithms. Meanwhile, to avoid the contingency of the experiments, we will perform five rounds of repeated experiments for each set of experimental settings and then analyze the experiments. The mean value and the standard deviation of the indicators were used to analyze the experimental results.

When the Sigmoid function is selected for the kernel function, the parameters *Coef*0 of the experiment are selected as 0, -1, and -2 respectively. By comparing the experimental data, it can be seen that when *Coef*, the accuracy of the prediction results is relatively high, which is ideal. When the prediction accuracy reaches the highest value l, the value of *C* is 27.

To see the impact of the change of the penalty factor *C* on the experimental data results more intuitively, we have drawn three kernel functions with the same *v* value according to the relevant data of the penalty factor experimental table in the above three tables. The line chart of the prediction accuracy has been compared, as shown in Figure 4.

Three methods are used for the experiments. The three methods are the evaluation methods of particle swarm and SVM used in this study, the optimized BP neural network method, and the evaluation method of category-weighted gray target decision making.

Three methods were used to conduct 20 experiments on 10 data sets, and the time (test time, training time) used by these three methods in the experiment was counted, and the average value was selected. The test time comparison results of the three methods are shown in Figure 5. The training time comparison results of the three methods are shown in Figure 6.

The method proposed in this paper has a significant advantage over other methods in terms of time efficiency, and the method in this paper takes the least amount of time for training time and testing time. From the comparison of the results shown in Figure 5 and Figure 6, it can be seen that the method in this paper has obvious advantages over the other two methods in terms of time efficiency. Compared with the method of optimizing the BP neural network for college teaching

Figure 4. Comparison of Kernel Function Accuracy Rates for the Same x

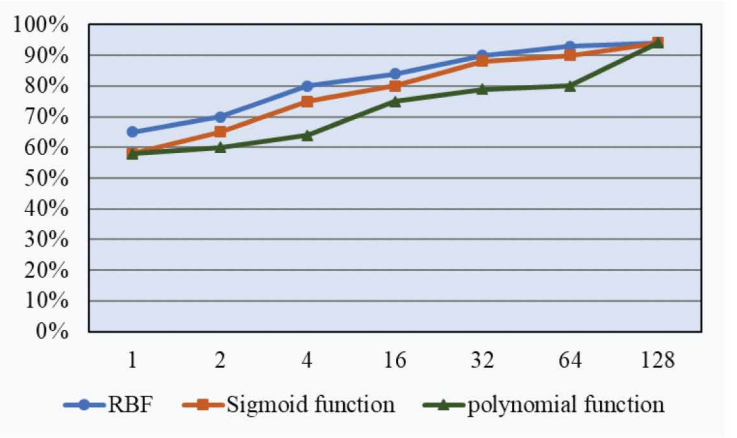


Figure 5. Comparison of Training Time Results

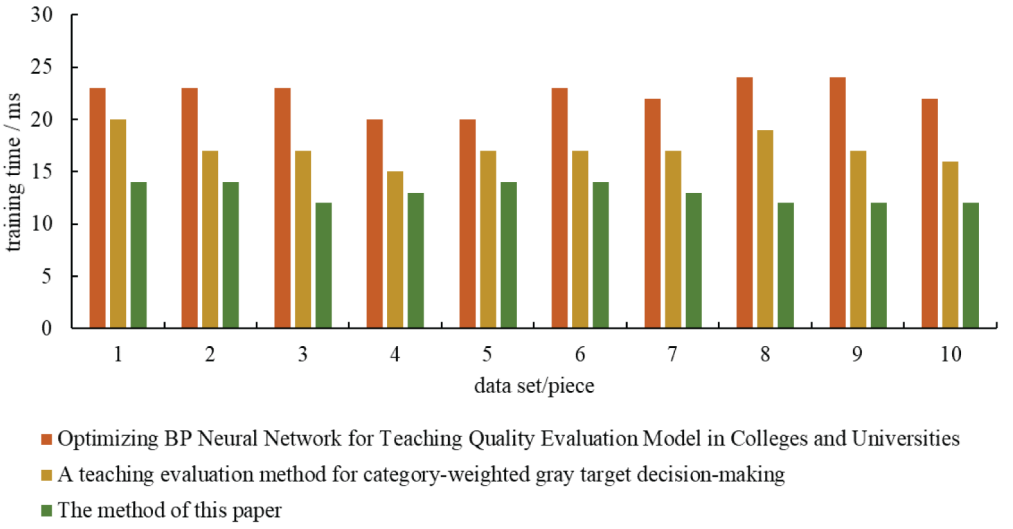
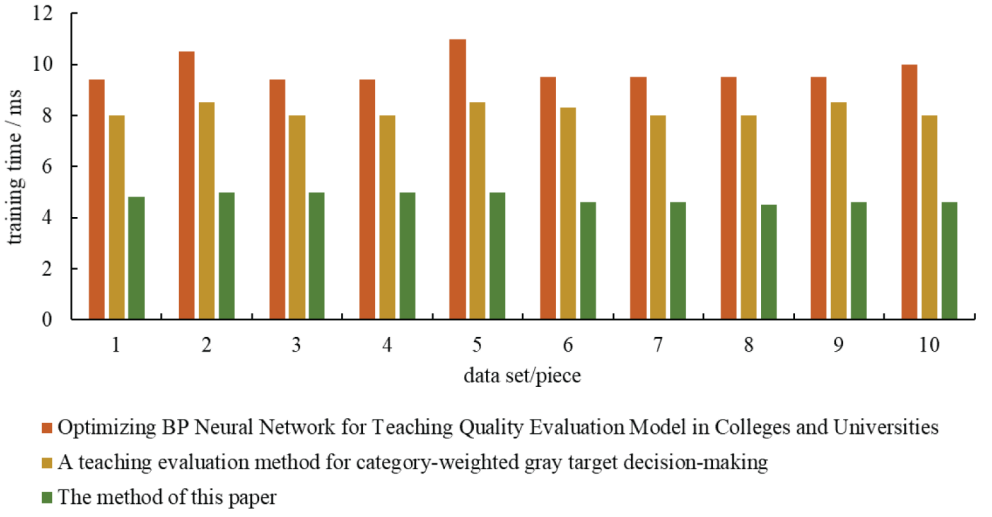


Figure 6. Test Time Comparison Results

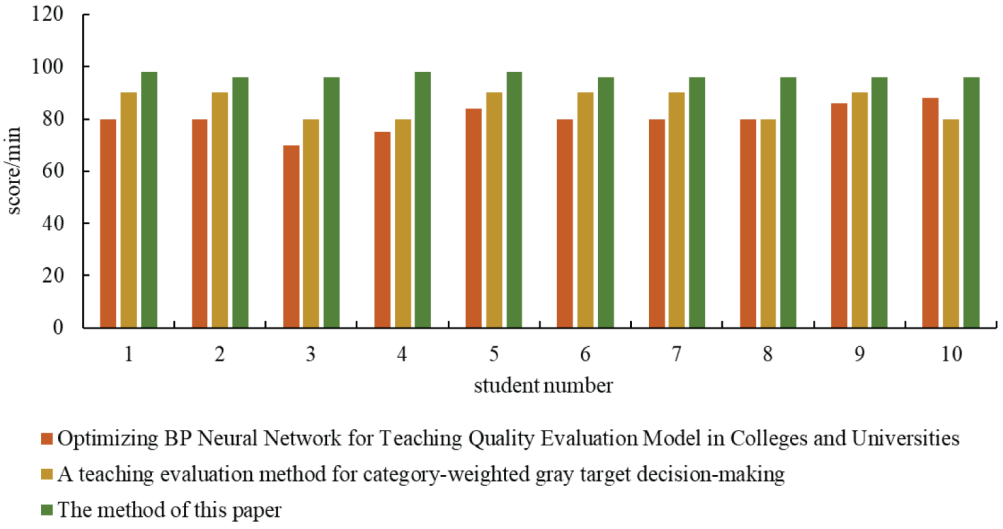


quality evaluation model, the training time is reduced by 9ms, and the test time is reduced by 4ms. The minimum time saving is 4ms.

In order to further verify the effect of the method in this paper, three methods are used in the college English classroom teaching of the computer major of the university, and the monthly college English test scores of 10 students of the computer major are counted, as shown in Figure 7.

It can be seen from Figure 7 that the monthly college English test scores of students using this method are better than those of the other two methods. The average score of students in this method is 95 points. The average English grades of postgraduate students with the teaching system method

Figure 7. Results of the Comparison of Scores



of grade-weighted gray target decision-making are 16 points and 9 points higher. After using the method in this paper, the students' English scores are the highest, which shows that the effect of the English teachers in this university is the best. This paper still has many shortcomings: the self-learning algorithm at low data heterogeneity; the accuracy is worse compared with other algorithms, especially in the case of data near I.I.D distribution; it is limited to the computational resources; many parameters in the experiments in this paper are not adjusted to be optimal, only conducting comparative studies by controlling the variables; the dataset used in the experiment did not apply a more complex underlying model; the universality of the algorithm needs to be further studied; the training time has no obvious advantage over baseline; and the model will also be larger, and this results in an increased pressure for the communication, which is not ideal, and therefore, the algorithm still needs to be further iteratively.

Analysis of Practical Applications

In the current context of globalization and informatization, college English education is facing many challenges and opportunities. In order to better address these challenges and improve the quality of education, many researchers have begun to explore how to use advanced technology and innovative methods to improve the English teaching evaluation system. In this context, this study aims to construct a university English blended learning system based on multisource data fusion and develop a new evaluation model to evaluate teaching effectiveness. However, despite achieving certain results, we must also recognize the limitations and challenges that need to be addressed in the research:

1. Limitations of data sources: The data used in this study mainly comes from the English teaching practices of specific universities or institutions, which may have limitations and biases. In order to increase the representativeness and reliability of research, future research can consider introducing more data sources, and data should be obtained from different schools, regions, and countries. In addition, collaborative filtering and other technologies can be used to analyze data from multiple perspectives to achieve more accurate evaluation results.
2. Guarantee of model accuracy: Although we have utilized advanced technologies such as PSO and SVMs to construct evaluation models, model accuracy may still be affected by various factors,

such as parameter selection and data quality. In order to improve the accuracy of the model, future research can further consider factors such as model features and data quality based on algorithm and parameter selection. Advanced algorithms such as deep learning can be used to combine more data and improve the accuracy and reliability of evaluations.

3. The challenge of personalized learning: Although personalized learning is one of the important goals of this study, achieving truly personalized education still poses challenges. The learning needs and backgrounds of different students vary, and further exploration and improvement are needed to better meet the individual needs. In order to achieve truly personalized education, future research should continue to explore how to better utilize big data and artificial intelligence technologies, combine individual differences of students, and provide tailored learning experiences for each student. At the same time, attention should be paid to the role of teachers and their key role in personalized learning should be played.
4. The integration of education policy and practice: The evaluation model proposed in this study needs to be combined with education policy and practice in order to better guide education reform and improve education quality. How to effectively translate research results into practice and promote the in-depth development of educational reform is an important topic for future research. Through cooperation with education administrative departments and schools, reform and innovation can be carried out in curriculum design, teaching methods, evaluation systems, and other aspects in order to better promote the development of college English education.

In summary, although this study has achieved certain results and insights, there are still some limitations that need to be further improved and explored. Future research should delve deeper into these limitations to promote the development and innovation of university English education evaluation. The research results and methods of this article can play an important role in the following practical applications:

1. Education policy formulation: An evaluation model based on multisource data fusion can provide objective and accurate English teaching effectiveness evaluation data for education departments and school leaders, which helps guide the formulation and adjustment of education policies.
2. Teaching improvement and optimization: Through in-depth analysis and evaluation of teaching effectiveness, teachers and schools can make targeted teaching improvements and optimizations based on the evaluation results, improving teaching quality and student learning outcomes.
3. Personalized learning support: An evaluation model based on personalized learning needs can provide students with more personalized and accurate learning support and guidance, helping them to learn English more effectively and improve their academic performance.
4. Educational resource allocation: Through the application of evaluation models, schools can better understand the utilization and distribution of educational resources, which helps to allocate educational resources reasonably and improve resource utilization efficiency.
5. Integration of educational research and practice: The application of this research method can promote the integration of educational research and practice, transform scientific research results into practical teaching actions, and promote educational reform and innovation.

Overall, the research findings of this article can play a positive role in various aspects of the education field, providing strong support and guidance for improving the quality of college English education, promoting educational reform, and promoting student learning. In the future, the following development directions can be considered in the field of college English education evaluation:

1. Personalized evaluation models based on big data and artificial intelligence: Further research can be conducted to develop more accurate personalized evaluation models using big data and

artificial intelligence technologies. Tailored evaluations and feedback can be provided for each student based on their individual differences and learning needs.

2. Interdisciplinary cooperation and research: Future research can integrate more knowledge and methods from interdisciplinary fields such as education, psychology, and computer science in order to promote cross-border cooperation and innovation in university English education evaluation research.
3. Educational technology application and intelligent evaluation system: With the continuous development of educational technology, intelligent evaluation systems can be developed in the future, combining virtual reality, augmented reality, and other technologies to provide teachers and students with a richer and more vivid evaluation experience.
4. Establishment and optimization of teaching quality evaluation standards: Future research can continue to improve and optimize the evaluation standards for college English teaching quality, ensuring the scientific, objective, and effective evaluation indicators and providing a reliable basis for teaching improvement and quality enhancement.
5. International perspective and comparative research: In the future, we can strengthen communication and cooperation with international peers, draw on advanced international experience, carry out evaluation and comparative research on university English education from an international perspective, and promote the international outlook of university English education in China.

Through continuous exploration and innovation, the field of college English education evaluation will usher in more diversified, intelligent, and personalized development, providing more effective support, guaranteeing improved education quality, and promoting student learning and development.

CONCLUSION

The purpose of teaching is to optimize the teaching structure comprehensively. An effective teaching system adjusts teaching behavior and the scientific management of teachers. Recently, the quality of students has greatly decreased, necessitating higher teaching system requirements and creating challenges for teachers. Teaching work has a very high requirement of practical work and should have certain scientific theories and methods as the basis. The teaching index system is the basis, and the choice of method will directly affect the scientific validity of the results. By constructing a blended learning system for college English based on multisource data fusion, this study demonstrates how to evaluate and improve the quality of college English education effectively in the context of modern education. The introduction of the English Blended Education System (EBES) provides students with personalized, flexible, and diverse learning experiences, combining the advantages of traditional face-to-face teaching and online learning and promoting the improvement of students' English language skills while cultivating digital technology and collaborative skills, meeting the diverse learning needs of students. The evaluation model constructed by this research utilizes data analysis techniques such as the PSO algorithm and an SVM to evaluate students' academic performance in college English courses in a more accurate, comprehensive, and personalized manner. This model not only has personalized learning support capabilities but also can process large-scale educational data, providing support for educational policy formulation and decision-making. The development of this model represents an important innovation in the field of education and provides new methods and tools for solving the challenges and needs in the field of education.

In order to enhance the applicability of the study, future research could explore more efficient methods to delve into the evaluation index system of university English teaching to make it more comprehensive and scientific, including in-depth study and adoption of more advanced methods to improve the accuracy and efficiency of assessment of university English teaching.

DATA AVAILABILITY

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

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

FUNDING STATEMENT

This work was supported by the 2020 “13th Five-year Plan” Project of Education Science Research in Hebei Province, Special Project of Educational Decision-making and Consultation, “Research on the Cultivation Path of Hebei County Rural Primary School Teachers under the Concept of Holistic Education” (Project Number 2005013).

ACKNOWLEDGMENT

The authors would like to show sincere thanks to those whose techniques have contributed to this research.

PROCESS DATES

Received: 1/10/2024, Revision: 2/23/2024, Accepted: 2/26/2024

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