An Intelligent Evaluation Path for English Teaching Quality: Construction of an Evaluation Model Based on Improved BPNN

Weihua Shen*[1], Wei Lu[2], Yukun Qi[3]
Institute of Foreign Languages, Civil Aviation Flight University of China, Deyang, 618300, China[1]
Department of Organizational Circumstance and Strategy, Brest Business School, Brest, 29200, France[2]
International Education Department, Chengdu Foreign Language School, Chengdu, 610000, China[3]

***Abstract*—The current intelligent evaluation methods for English teaching quality are inefficient and have poor evaluation accuracy for effective assessment. The paper suggests an evaluation model based on an upgraded Back Propagation Neural Network to overcome the aforementioned issues. First, the principal component analysis is utilized to lessen the dimensionality of the index system as we build an English teaching quality evaluation index system with reference to the results of the existing study. Then, we adopt a multi-strategy improved dragonfly optimization algorithm to evaluate Back Propagation Neural Network for its defects; an algorithm to improve it. Finally, to increase the efficacy and objectivity of English teaching quality evaluation, an intelligent evaluation model based on IDA-BPNN is developed. The experimental results demonstrate that the IDA-BPNN model has an evaluation accuracy of 98.96%, an F1 value of 0.950 on the training set and 0.968 on the test set, a Recall value of 0.948 on the training set and 0.966 on the test set. The aforementioned indicators are all superior to the most recent state-of-the-art approaches for evaluating teaching quality. The aforementioned findings thus demonstrate that the model suggested in the study has high performance and can successfully improve the accuracy and efficiency of English teaching quality evaluation, which has a positive impact on the development of English teaching careers.**

Keywords—Teaching quality evaluation; English; BPNN; intelligent evaluation; dragonfly optimization algorithm

I. Introduction

The importance of English education is increasing as globalisation picks up speed. English teaching(ET) nowadays is a course that is offered in most majors in most universities, aiming to cultivate more and better educated English professionals for the society and market [1,2]. As a result, numerous parties have paid attention to the standard of ET at universities, including school leaders, students' parents, students themselves, and major enterprises. An essential component of ET is quality evaluation (QE), which can assist teachers in identifying areas of weakness in their instruction and working to raise standards to increase effectiveness [3]. Because of its straightforward structure, broad applicability, and superior learning capacity, BP Neural Network (BPNN) is currently a popular tool in the machine learning industry [4]. Some researchers have successfully used BP neural networks for ET QE studies, with promising results. However, the commonly used Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation methods in teaching quality evaluation are inefficient and highly subjective, which can affect the results. The performance of traditional BPNN has shortcomings, which have a negative impact on the reform of ET, resulting in poor QE of ET based on BPNN [5]. In order to improve the objectivity and scientificity of English education quality evaluation, provide data support and improvement guidance for English education reform and innovation, this study proposes an improved dragonfly algorithm as the basic basis, and combines BPNN to establish an intelligent evaluation model for English education quality. Principal component analysis is used to reduce the dimensions of the indicator system. The research is innovative in two ways. The first is to implement an intelligent evaluation of ET quality using the enhanced BPNN, which increases the objectivity, accuracy, and effectiveness of ET QE. The second objective is to provide appropriate methods for addressing the DA's flaws and to optimise the BPNN using the enhanced DA, which enhances the functionality of the BPNN model. The research content mainly includes five parts. The first part is a review of the current research status of English education and BPNN. The second part, divided into three sections, constructs an English education quality evaluation model based on the IDA-BPNN model. The first section constructs an English education quality evaluation index system, the second section extracts common factors, and the third section discusses the BPNN optimization of the improved Dragonfly algorithm. The third part analyzes and evaluates the performance of the quality evaluation model. The fourth part discusses the results obtained in the study and fifth part draws the conclusion of constructing an English education quality evaluation model based on the IDA-BPNN model.

II. Related Works

English is the most commonly spoken language in the age of globalisation, and demand for English majors has skyrocketed internationally. Education in English (ET) is a crucial position for developing students' English skills at universities. In this context, ET in universities has received attention from various researchers, and many scholars have put forward their own insights and strategies for ET. Turan et al. comprehensively compiled and analyzed the recent related literature, so as to explore the application path, application effect and development prospect of flipped classroom in ET, which has positive significance for the advancement of ET quality [6]. To increase the quality of ET and provide new ideas to the training of English teachers, Ng investigated the role of synchronous online teaching for pre-service English instructors [7]. By using the Arab League nations as an example, Hazaea et al. examined the drawbacks of the remote ET model based on computer technology as well as the potential solutions [8]. Goodman et al. examined the shift from code-switching to cross-linguistic perspectives in English teacher education, providing empirical and theoretical guidance [9]. The necessity and course of the shift to flexible learning, which has implications for English language teaching during the epidemic, was examined by Tarrayo et al. [10] using a state university in the Philippines as an example. They also looked at the development of ET models during the New Coronation epidemic. Based on a thorough analysis of the most recent research literature on English language teaching, Rose et al. studied the state of English and language teaching globally. They then discussed the difficulties that English language teaching is currently facing, provided solutions for those problems, and then talked about the direction and future of English language teaching [11]. Using videos based on multimedia technology in the teaching process and looking into the effects of video teaching, Waluyo et al. researched the effects of multimedia technology in ET and the requirement of its implementation [12]. An extensive analysis of ET in higher education was presented by Block et al., which prompted an examination of STEM lecturers as non-English teachers' self-positioning was investigated and analysed [13]. This analysis has theoretical ramifications for the advancement of English language instruction in higher education.

The use of machine learning techniques has impacted all facets of daily life and employment, and they are crucial in numerous professions. Numerous researchers have focused on BPNN because of its straightforward structure, superior classification performance, and broad variety of applications. In order to optimise research performance management, Chen et al. first analysed the BPNN's structural makeup. Based on this analysis, they applied BPNN to the problem, effectively raising the bar for research and advancing modern science and technology [14]. The necessity and significance of enterprise financial management risk prediction in the context of the digital economy were examined by Li et al., who realises the intelligent prediction of enterprise financial management risks [15]. The traditional BPNN structure was modified by Li et al., who then used the enhanced BPNN model to create a smart city building information model [16]. In order to improve the performance of BPNNs, Wu Y et al. created a model based on genetic algorithms (GA) improved Simulated Annealing (SA) algorithm and used GA-SA. In order to increase forecast accuracy and ensure production safety, a coal and gas protrusion prediction model was built using the enhanced BPNN [17]. Tang et al. proposed corresponding strategies to improve the BPNN for its defects and implemented medical image segmentation using the improved BPNN, thus assisting clinical diagnosis and treatment. Finally, the effectiveness of the model was verified by using color fundus image retinal vascular image as an example [18]. To improve the performance of BPNN and create GA-BPNN, Wang et al. applied the GA algorithm [19]. The improved adaptive GA algorithm proposed by Yan et al. was used to find the best BPNN parameters and boost model performance. Finally, a vehicle insurance fraud identification model based on the improved BPNN was built, offering fresh perspectives on how to safeguard consumers' rights [20]. In order to provide data assistance for investors' decision-making, Zhang et al. examined the application path and impact of BPNN in stock price pattern classification and prediction [21].

Nowadays, academics from many nations are paying close attention to ET, and BPNN application and study are very in-depth. ET QE is a crucial basis for assisting teachers in identifying areas of weakness and raising teaching standards. Despite the fact that there have been several studies on the subject, the majority of these findings are primarily theoretical and based on human judgment. This results in the teaching of QE being ineffective and lacking objectivity, which has an impact on the correctness of the teaching of QE. To address the aforementioned issues, the study develops an IEM of ET quality based on the development of BPNN in order to achieve an objective, scientific, and effective evaluation of ET quality. This will provide data support for reform and innovation of ET as well as for quality improvement, and will also show the direction of improvement, which is important for the advancement of English education in China.

III. English Education Quality Evaluation Model Construction using the IDA-BPNN Model

A. *Construction of English Education Quality Evaluation Index System*

Teaching QE is a vital responsibility with the goal to improve the calibre and effectiveness of ET education. And in order to carry out ET QE, a sensible, reliable, and efficient ET QE index system must be created. To ensure that the ET QE index system is functional and that the ensuing ET QE is accurate, it is essential to undertake ET QE index selection in accordance with scientific, developmental, and process-oriented principles. In light of the foregoing, the study chose language teaching QE indices on the basis of the five dimensions of teaching [22]. Following completion, 19 secondary indicators were attained, and Table I's ET QE index system was created.

In Table I, the ET QE index system constructed in the study contains five dimensions and 19 indicators, which is relatively complex. However, there are some variances in how certain factors affect the quality of ET in the actual ET. Therefore, studying some indicators that have a minor impact on the quality of ET requires more effort, but does little to increase the accuracy of that assessment. Additionally, if there are a lot of indicators, building more input nodes for the BPNN model will be necessary, which will make the model more complex. This is because adding the corresponding indicator data to the BPNN model for learning will result in a lot of dimensions of the input vector features. The length of the model's training process and accuracy both suffer as a result of the model's increasing complexity. The ET QE index mechanism needs to be simplified in light of the aforementioned. In order to score the ET QE index system, the study recruited 25 specialists, including 5 students, 15 English teachers, and 5 ET researchers. After that, values based on

AHP were assigned to each of the 19 indicators in Table I. The top 10 weight values for the indicators were chosen in order to reconstruct the ET QE index system, and Table II displays the simplified ET QE index system.

TABLE I. EVALUATION INDEX SYSTEM FOR ET QUALITY

Dimension		Indicators	
Code	Name	Code	Content
X1	Teaching ability	U1	Clear and fluent language with Standard Mandarin
		U2	Thoroughly analyze the problem
		U3	Clear organization of courseware
		U4	Correctly Understanding the Teaching Village
X2	Teaching attitude	U5	Adequate lesson preparation
		U6	Strict teaching mode
		U7	Carefully listen to students' opinions
		U8	Patient in answering questions
X3	Teaching contents	U9	Focusing on Theory and Practice
		U10	Having scientific and ideological qualities
		U11	Correct teaching content
X4	Teaching method	U12	Emphasize induction and summary
		U13	Reasonable course arrangement
		U14	Multimedia teaching
		U15	Proficient in various teaching modes
X5	Teaching effectiveness	U16	Achieve teaching objectives and complete teaching tasks
		U17	Active classroom atmosphere
		U18	Students can apply what they have learned
		U19	Improving academic performance

TABLE II. SIMPLIFIED EVALUATION INDEX SYSTEM FOR ET QUALITY

Dimension		Indicators	
Code	Name	Code	Content
X1	Teaching ability	U1	Thoroughly analyze the problem
		U2	Correctly Understanding the Teaching Village
X2	Teaching attitude	U3	Strict teaching mode
		U4	Carefully listen to students' opinions
X3	Teaching contents	U5	Focusing on Theory and Practice
		U6	Having scientific and ideological qualities
		U7	Correct teaching content
X4	Teaching method	U8	Reasonable course arrangement
		U9	Proficient in various teaching modes
X5	Teaching effectiveness	U10	Improving academic performance

To assess the validity and dependability of the ET QE index system created by the study, Table II underwent reliability and validity testing. Table III displays the test results.

TABLE III. RELIABILITY AND VALIDITY TESTING

Project		Value
KMO inspection		0.864
Bartlett sphericity test	Approximate chi-square	7714.853
	DF	0.772
	Significance	0.000

The validity and feasibility of the study to create an ET QE index system are confirmed in Table III and suggest that the next stage can be carried out in accordance with Table II. Table III shows that the reliability and validity tests of the ET QE index system given in Table II are good.

B. *Public Factor Extraction*

Following the simplification, the ET QE index system is lowered from 19 to 10 indicators, thus lowering the BPNN model's complexity and raising the model's accuracy. The BPNN model still needs to build 10 input nodes after the streamlining, and this adds to the model's complexity. The dimensionality of the ET QE index system needs to be further lowered with the goal to increase the model's accuracy in assessing ET quality. In Table IV, this stage is accomplished by the study using principal component analysis (PCA) for public factors, as indicated.

The cumulative total variance contribution of the three public components in Table III was 78.05%. There are three factors with a combined value larger than 1 in Table III. These three public factors' variables therefore have a lot of explanatory power and can accurately and thoroughly depict the standard of ET. The constructed factors were extracted by descriptive statistics operation, and then a factor component matrix was obtained. Through this factor component matrix, the correlation between the public factors extracted by the study and the indicators can be described, so that the indicators corresponding to the public factors can be selected. Table V displays the factor component matrix that was culled for the investigation.

TABLE IV. PCA EXTRACTION RESULTS

Composition	Initial Characteristics			Extract the Sum of the Squares of the Load		
	Total	*Percent Variance/%*	*Cumulative contribution rate/%*	*Total*	*Percent Variance/%*	*Cumulative contribution rate/%*
1	3.925	39.25	39.25	3.925	39.25	39.25
2	2.026	20.26	59.51	2.026	20.26	59.51
3	1.854	18.54	78.05	1.854	18.54	78.05
4	.854	8.54	86.59	-	-	-
5	.759	7.59	94.18	-	-	-
6	.254	2.54	96.72	-	-	-
7	.203	2.03	98.75	-	-	-
8	.093	0.93	99.68	-	-	-
9	.025	0.25	99.93	-	-	-
10	.007	0.07	100.00	-	-	-

The content of Table IV shows that the indicators corresponding to public factor 1 are U_{10}: Improving academic performance; U_7: Correct teaching content; U_6: Having scientific and ideological qualities. These are the three indicators mentioned above Therefore, the data corresponding to the above three indicators are input into BPNN, which effectively reduces the input nodes of BPNN.

TABLE V. STUDY THE EXTRACTED FACTOR COMPONENT MATRIX

Indicator code	1	2	3
U_1	-.162	.102	.351
U_2	.013	.134	.056
U_3	.154	-.052	-152
U_4	.155	.335	.174
U_5	-.253	-.103	.068
U_6	.307	.371	.905
U_7	.259	.913	.455
U_8	-.355	-.160	.135
U_9	.092	.353	-102
U_{10}	.953	.405	.147

C. BPNN Optimization-based on Improved Dragonfly Algorithm

The accuracy and training effectiveness of BPNN will be directly impacted by its initial weights and thresholds. In order to better and more efficiently obtain the best parameter selection for BPNN, the study uses DA to find the optimal model parameters. An optimisation algorithm known as DA, which simulates the behaviour of dragonfly populations, was recently presented. Due to its superior efficiency, DA offers a wider range of applications in diverse optimisation issues. In the population of DA, it is generally divided into two kinds of populations, one of which is a static population, mainly the other is the dynamic population, which is mainly responsible for migratory behavior. In DA in Eq. (1), the separation behavior of the population S_i is shown.

$$S_i = -\sum_{j=1}^{n} X - X_j \tag{1}$$

The dragonfly individual is located at X, the first j neighbouring individual is located at X_j, and the number of neighbours is given by n in Eq. (1). The alignment behavior A_i is calculated by Eq. (2).

$$A_i = \frac{\sum_{j=1}^{n} V_j}{n} \tag{2}$$

In Eq. (2), V_j represents the flight rate of X_j. The aggregation behavior C_i is expressed as in Eq. (3).

$$C_i = \frac{\sum_{j=1}^{n} X_j}{n} - X \tag{3}$$

Foraging behavior F_i See Eq. (4).

$$F_i = X^+ - X \tag{4}$$

In Eq. (4), X^+ is the location of the food the dragonfly is searching for. The avoidance behavior of E_i is shown in Eq. (5).

$$E_i = X^- + X \tag{5}$$

In Eq. (5), the natural enemy's position is represented by X^-. During the DA iteration, the direction of flight of the dragonfly is determined by the step vector ΔX of the individual dragonfly. During the next iteration, the step vector ΔX_{t+1} is shown in Eq. (6).

$$\Delta X_{t+1} = \left(sS_i + aA_i + cC_i + fF_i + eE_i\right) + w\Delta X_t \tag{6}$$

In Eq. (6), s, a, c, f, e is the weight of the individual's separation, alignment, aggregation, foraging, and avoidance behaviors; w is the inertia weight. On this basis, it is possible to obtain the vector X_{t+1} of the individual's position at the next iteration, see Eq. (7).

$$X_{t+1} = X_t + \Delta X_{t+1} \tag{7}$$

The initial population diversity and worldwide search capabilities of DA are both lacking. To remedy this drawback, the study introduces an inverse chaotic mapping strategy based on Tent chaotic sequences, which optimizes the initial population of DA. If the population individuals have d dimensions, when the population initialization is performed, the individuals of d dimensions are generated X_{id}, which are mapped into some space based on the chaos mapping theory to obtain CX_{id}. As shown in Eq. (8).

$$\begin{cases} X_{id} = X_{\min d} + rand\left(X_{\max d} - X_{\min d}\right) \\ CX_{id} = X_{\min d} + X_{\max d} - X_{id} \end{cases} \tag{8}$$

In Eq. (8), $X_{\max d}, X_{\min d}$ are the lower and upper limits of the values. Let the initial population of DA be X, and the population obtained by chaotic mapping be CX; merge the two to obtain a new population with $2n$ dragonflies. To determine the top n individuals to create the new beginning population, the fitness values of every individual in the population are calculated. In DA, the traditional inertia weight convergence strategy is linear descent. However, the algorithm's rate of convergence differs from the rate at which the inertia weights converge, which has a detrimental effect on the algorithm's rate of convergence. In order to control the algorithm's convergence, the study suggests a nonlinear decreasing inertia weight technique. Equation (9) illustrates the nonlinear inertia weight lowering technique.

$$w = w_{\min} + \left|w_{\max} - w_{\min}\right| \exp\left(\frac{-\alpha t}{t_{\max}}\right) \tag{9}$$

In Eq. (9), $w_{\max}, w_{\min}$ are the maximum and minimum values of the set inertia weights; α is the adjustment coefficient; and $t_{\max}$ is the maximum number of set iterations. Fig. 1 depicts the enhanced inertia weight modification method.

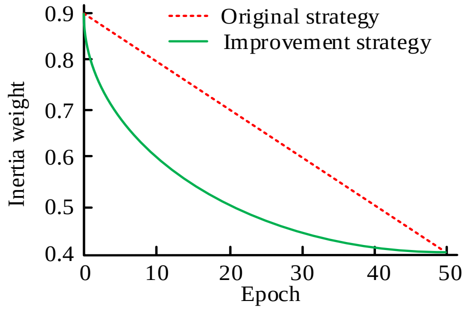

Fig. 1. Improved inertia weight adjustment strategy.

The study's better inertia weighting approach is nonlinearly reducing in Fig. 1. Under this strategy, the inertia weights are basically consistent with the convergence trend of the algorithm, which improves the convergence of DA. Based on the foregoing, IDA is created, used to optimise BPNN, and integrated with the preceeding materials to create an ET quality assessment model that uses IDA-BPNN in order to achieve intelligent evaluation of ET quality and increase ET efficacy.

IV. Performance Analysis of IDA-BPNN ELT Quality Assessment Model

To give a wise, scientific, and impartial evaluation of ET quality, the study suggests an IDA-BPNN ET quality assessment methodology. To create the experimental data set, the necessary index data were pulled from a university's education administration system with the leaders of the school's consent. The experimental data set was divided in a 7:3 manner. The two main cutting-edge algorithmic models used in the current intelligent evaluation of ELT quality are the BPNN model (IPSO-BPNN) based on Improved Particle Swarm Optimisation (PSO) and the BPNN model (GWO-BPNN) based on Grey Wolf Optimisation Algorithm (GWOA) optimisation. In IDA-BPNN, the number of iterations is 200, the learning factor is 0.3, the input layer is 4, the hidden layer is 20, and the output layer is 1. As a result, the effectiveness of the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models is contrasted. The effectiveness of the three common factors extracted based on the PCA method is first investigated using the gravel plot analysis, as shown in Fig. 2. The slope of the curve is greater in the first three common components, as seen in Fig. 2. While in the other public factors except the first three public factors, the slopes of the curves at their positions are smaller and the trends are flatter. The above results show that the three public factors extracted by the study can reflect the ET situation more accurately, comprehensively and effectively, which proves the validity of the public factors extracted by the study.

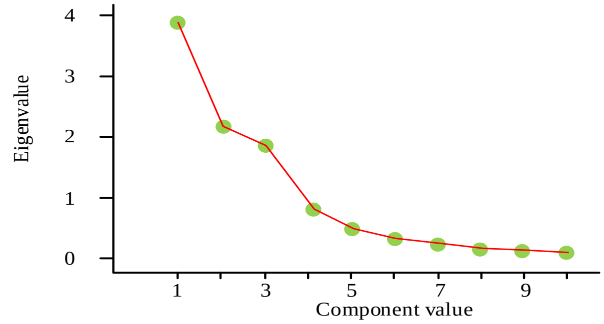

Fig. 2. Gravel diagram of common factors.

Fig. 3 displays the changes in error and loss values for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models on the training set. In Fig. 3, the error values and Loss values of the models are dropping, which suggests that the performance of the models is improving during the iterative learning process. The model has reached its optimal performance at this point. When a particular number of iterations is reached, the error and loss values of the model do not vary significantly. The error value of the IDA-BPNN model in Fig. 3(a) is 0.08, which is 0.02 and 0.03 greater than the error values of the IPSO-BPNN model and the GWO-BPNN model, respectively. The Loss value of the IDA-BPNN model in Fig. 3(b) is 0.3, which is 0.2 and 1.0 lower than the Loss values of the IPSO-BPNN model and GWO-BPNN model, respectively.

Fig. 4 displays the F1 value variations for the training and test. The F1 values for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models on the training set are displayed in Fig. 4(a). In comparison to the IPSO-BPNN model and the GWO-BPNN model, the F1 value of the IDA-BPNN model is 0.950, which is 0.005 and 0.007 higher, respectively. The F1 values for the test set for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models are displayed in Fig. 4(b). Models for the change of F1 values include the IDA-BPNN model, IPSO-BPNN model, and GWO-BPNN model. In comparison to the IPSO-BPNN model and the GWO-BPNN model, the F1 value of the IDA-BPNN model on the test set is 0.968, which is 0.006 and 0.008 higher, respectively.

Fig. 5 displays the changes in recall values for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models on the training and test sets. Fig. 5(a) displays the Recall value changes for the training set for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models. On the training set, the IDA-BPNN model's Recall value is 0.948, which is 0.007 and 0.012 higher than the values for the IPSO-BPNN model and the GWO-BPNN model, respectively. Fig. 5(b) displays the Recall values for the test set for the IDA-BPNN, IPSO-BPNN, and GWO-BPNN models. Value shifts. The IDA-BPNN model has a Recall value of 0.966 on the test set, which is 0.011 and 0.014 higher than the corresponding values for the IPSO-BPNN model and the GWO-BPNN model, respectively.

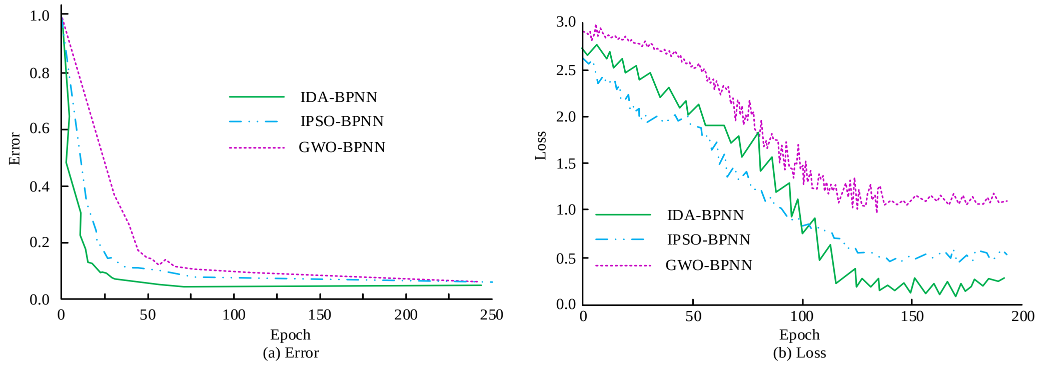

Fig. 3. Changes in model error and loss values.

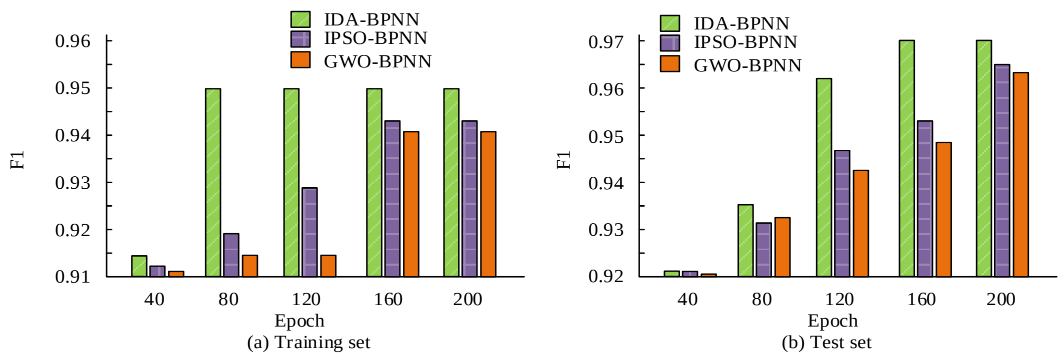

Fig. 4. Change in F1 value of the model.

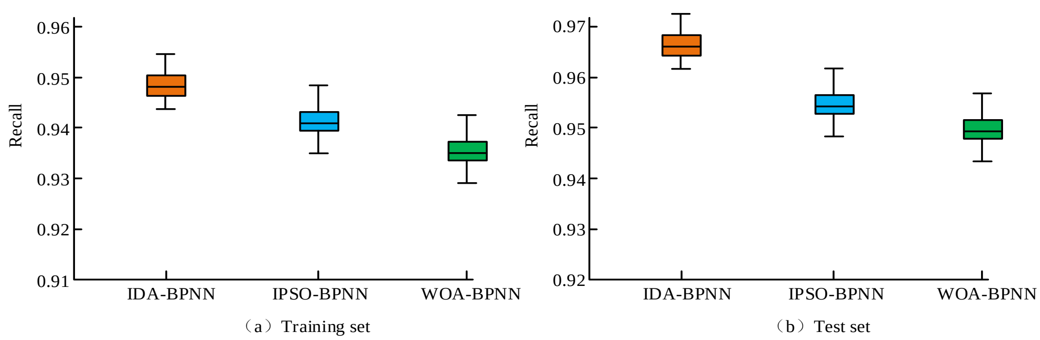

Fig. 5. Change in Recall value of the model.

Use the aforementioned model to evaluate the ET data in the university's educational system, analyse the disparities between the model's evaluation values and the actual values, and determine the model's evaluation correctness. Fig. 6 displays the evaluation accuracy of many models. As can be seen, the IDA-BPNN model outperformed the IPSO-BPNN model and the GWO-BPNN model in terms of assessment accuracy, with 98.96% on the test set, which is higher by 1.02% and 1.24%, respectively.

Fig. 7 illustrates how the MAE values of the IDA-BPNN model, IPSO-BPNN model, and GWO-BPNN model change on the test set after all models have been fully trained using the training set. It is clear that the MAE values of the models have been trending downward over the rounds. The IDA-BPNN model's MAE value after 40 iterations is 0.752, which is 0.048 and 0.097 less than that of the IPSO-BPNN model and the GWO-BPNN model, respectively. In conclusion, the IDA-BPNN ET QE model developed by the study has high evaluation accuracy and efficiency, can perform ET QE objectively and efficiently, and has favourable implications for the development of English professionals as well as for the growth of ET.

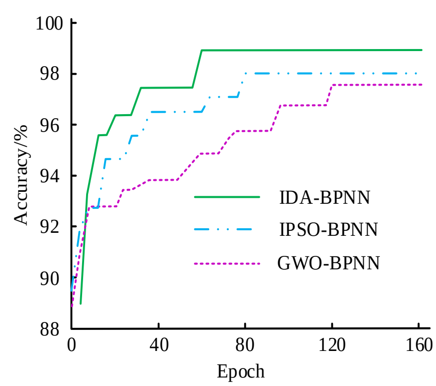

Fig. 6. Accuracy of ET QE.

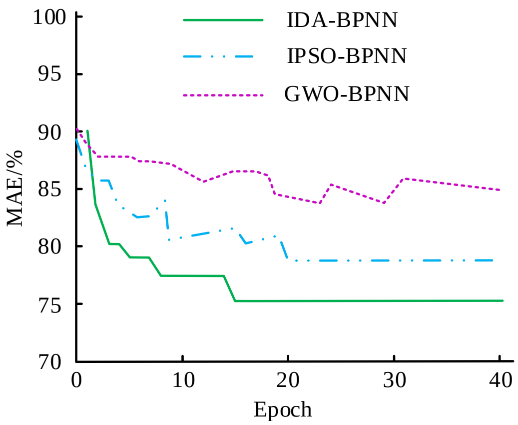

Fig. 7. Change in MAE value of the model.

V. Discussion

Among the first three common factors, the slope of the curve is relatively large, indicating that the three common factors extracted in the study can accurately, comprehensively, and effectively reflect the ET situation. The error value of the IDA-BPNN model is 0.08, which is 0.02 and 0.03 greater than the error values of the IPSO-BPNN model and GWO-BPNN model, respectively. The loss value of the IDA-BPNN model is 0.3, which is 0.2 and 1.0 lower than the loss values of the IPSO-BPNN model and GWO-BPNN model, respectively. The F1 values and recall rates of the IDA-BPNN model are 0.950 and 0.948 on the training set, and 0.968 and 0.966 on the test set. The evaluation accuracy of the IDA-BPNN model is 98.96% on the test set. All the data used in the experiment came from the same university, and the sample range is limited, which may lead to accidental factors in the experiment. Future research should expand the sample size to further enhance the credibility of the study.

VI. Conclusion

Teachers can recognise their own teaching weaknesses and enhance the quality of their ET by doing intelligent evaluations of it. To enhance the assessment of ET quality, the study created the IDA-BPNN ET QE model. In accordance with the experimental findings, the IDA-BPNN model's error value is 0.08, the Loss value is 0.3; the IPSO-BPNN model and the GWO-BPNN model, which have F1 values of 0.005 and 0.007, respectively, respectively, the F1 value on the training set is 0.950. On the training set, the Recall value of the IDA-BPNN model is 0.948; the F1 value on the test set is 0.968; On the test set, the evaluation accuracy of the IDA-BPNN model is 98.96%, which is higher than IPSO-BPNN model and GWO-BPNN model. The recall value of the IDA-BPNN model is 0.966, which is 0.011 and 0.014 higher than IPSO-BPNN model and GWO-BPNN model, respectively. At 40 iterations, the MAE value of the IDA-BPNN model is 0.752, which is 0.048 and 0.097 lower than the IPSO-BPNN model and the GWO-BPNN model, respectively. In conclusion, the research-built IDA-BPNN ET QE model has high assessment accuracy and efficiency, can evaluate the quality of ET objectively and efficiently, and promotes the development and reform of ET while having favourable effects on the training of English professionals. All the data used in the experiment came from the same university, and the sample range is limited, which may lead to accidental factors in the experiment. Future research should expand the sample size to further enhance the credibility of the study.

VII. Fundings

The research is supported by Education Project Civil Aviation Adninistration of China: First Class Curri culum Construction of CAFUC (MHJY2022005).

References

[1] Erarslan A. English language teaching and learning during Covid-19: A global perspective on the first year. Journal of Educational Technology and Online Learning, 2021, 4(2): 349-367.

[2] Us Saqlain N, Shafqat A, Hassan A. Perception analysis of English language teachers about use of contextualized text for teaching ESP. the Asian ESP Journal, 2020, 16(5.1): 275-299.

[3] Ayu M, Pratiwi Z F. THE IMPLEMENTATION OF ONLINE LEARNING IN ENGLISH LANGUAGE TEACHING DURING PANDEMIC: THE TEACHERS VOICE. Journal of Research on Language Education, 2021, 2(2): 93-99.

[4] Song S, Xiong X, Wu X, Xue Z. Modeling the SOFC by BP neural network algorithm. International Journal of Hydrogen Energy, 2021, 46(38): 20065-20077.

[5] Chen Z. Research on internet security situation awareness prediction technology based on improved RBF neural network algorithm. journal of Computational and Cognitive Engineering, 2022, 1(3): 103-108.

[6] Turan Z, Akdag-Cimen B. Flipped classroom in English language teaching: a systematic review. Computer Assisted Language Learning, 2020, 33(5-6). 590-606.

[7] Ng C H. Communicative language teaching (CLT) through synchronous online teaching in English language preservice teacher education. International Journal of TESOL Studies, 2020, 2(2): 62-73.

[8] Hazaea A N, Bin-Hady W R A, Toujani M M. Emergency remote English language teaching in the Arab league countries: Challenges and remedies. computer- Assisted Language Learning Electronic Journal, 2021, 22(1): 201-222.

[9] Goodman B, Tastanbek S. Making the shift from a codeswitching to a translanguaging lens in English language teacher education. tesol quarterly, 2021, 55(1): 29-53.

[10] Tarrayo V N, Paz R M O, Gepila Jr E C. The shift to flexible learning amidst the pandemic: the case of English language teachers in a Philippine state university. Innovation in Language Learning and Teaching, 2023, 17(1): 130-143.

[11] Rose H, McKinley J, Galloway N. Global Englishes and language teaching: A review of pedagogical research. Language Teaching, 2021, 54(2): 157-189.

[12] Waluyo B, Apridayani A. Teachers' beliefs and classroom practices on the use of video in English language teaching. studies in English Language and Education, 2021, 8(2): 726-744.

[13] Block D, Moncada-Comas B. English-medium instruction in higher education and the ELT gaze: STEM lecturers' self-positioning as NOT International Journal of Bilingual Education and Bilingualism, 2022, 25(2): 401-417.

[14] Chen L, Jagota V, Kumar A. RETRACTED ARTICLE: Research on optimization of scientific research performance management based on BP neural network. International Journal of System Assurance Engineering and Management, 2023, 14(1): 489-489.

[15] Li X, Wang J, Yang C. Risk prediction in financial management of listed companies based on optimized BP neural network under digital economy. neural Computing and Applications, 2023, 35(3): 2045-2058.

[16] Li Y W, Cao K. Establishment and application of intelligent city building information model based on BP neural network model. computer Communications, 2020, 153: 382-389.

[17] Wu Y, Gao R, Yang J. Prediction of coal and gas outburst: a method based on the BP neural network optimized by GASA. process Safety and Environmental Protection, 2020, 133: 64-72.

[18] Tang S, Yu F. Construction and verification of retinal vessel segmentation algorithm for color fundus image under BP neural network model. the Journal of Supercomputing, 2021, 77: 3870-3884.

[19] Wang L, Bi X. Risk assessment of knowledge fusion in an innovation ecosystem based on a GA-BP neural network. Cognitive Systems Research, 2021, 66. 201-210.

[20] Yan C, Li M, Liu W, Qi M. Improved adaptive genetic algorithm for the vehicle Insurance Fraud Identification Model based on a BP Neural Network. Theoretical Computer Science, 2020, 817: 12-23.

[21] Zhang D, Lou S. The application research of neural network and BP algorithm in stock price pattern classification and prediction. future Generation Computer Systems, 2021, 115: 872-879.

[22] Lu C, He B, Zhang R. Evaluation of English interpretation teaching quality based on GA optimized RBF neural network. journal of Intelligent & Fuzzy Systems, 2021, 40(2): 3185-3192. Fuzzy Systems, 2021, 40(2): 3185-3192.