Research on Informatization Practice of Constructive English Learning Platform Based on RBF Algorithm

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Abstract. This article mainly explores the practical research of a constructive English learning platform based on RBF algorithm in the field of information technology. The platform uses RBF algorithm to provide personalized English learning services, enabling students to carry out Adaptive learning, inquiry research and creative thinking according to their own conditions. At the same time, the platform introduces a constructive teaching concept that is student-centered, emphasizing students' practice, exploration, and enlightenment, and emphasizing the effective transmission of knowledge and the comprehensive development of students. Through teacher guidance and technical support, students can freely choose and customize various learning resources in a student led mode, achieving efficient, accurate, and personalized learning outcomes. The actual use situation shows that the platform has a high level of information application, good educational effect, and intelligent characteristics, which has a positive promoting effect on the comprehensive improvement of English learning. Therefore, a constructive English learning platform based on RBF algorithm is a new type of information-based teaching method worth promoting, providing important reference for the innovative development of English education.

Keywords: English learning · RBF algorithm · Constructive · Platform informatization

1 Introduction

With the rapid development of globalization and internet technology, English, as the main language for international communication, has become a common language for people around the world. At the same time, English learning is becoming increasingly widespread globally, and learning forms are constantly being updated and improved. The traditional education model only emphasizes teachers' teaching and students' passive acceptance, which is difficult to meet the diverse, autonomous, proactive, and creative needs of today's students [1]. Therefore, improving the quality and effectiveness of English learning from different perspectives and levels is a common challenge and task faced by education departments and English learners.

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The development of information technology will promote educational reform and innovation. Building a lifelong education system needs to serve the entire society, provide convenient, fast, and rich information resources for learners, and promote the development of learning and a learning oriented society. In wireless communication and smartphones, with the popularity of mobile devices such as tablets, learning methods such as mobile learning, microlearning, and ubiquitous learning have rapidly entered people's daily lives [2]. People can learn easily, quickly, and concisely through mobile terminals, and this learning method is becoming increasingly popular. In the era of ubiquitous information, the vigorous development of wireless truly enables the dissemination of information anytime and anywhere. Micro learning is a combined and mobile learning method with the characteristics of socialized and situational learning. The content of microlearning resources is relatively small, and adjacent learning content can be loosely organized, making it very suitable for personalized learning for learners [3]. Traditional learning resources are developed in a single chapter or classroom, so their resource design model is different from the resource model of microlearning, which does not conform to the design characteristics of small modules, small resource granularity, and small knowledge points of microresources.

The above data fully demonstrates that English is an important tool, especially in the context of today's information society and economic globalization. College English, as one of the most important basic courses in universities, accounts for a large proportion of class schedule, but the learning effect is not ideal. The main problem is that some learners have put in a lot of effort, but the results are minimal. They feel that the more they learn, the less confident they become; More and more learners are able to complete their learning tasks, but their ability to use foreign languages in practical work and life is completely disproportionate to their exam scores; Most learners find it difficult to independently further improve their foreign language proficiency after leaving the classroom. How to learn and teach English well is a problem that learners and educators have been exploring [4].

Various teaching methods and means have been proposed to meet the different needs of English learning, such as individualized education and multimedia teaching, which have to some extent solved learning problems. However, there are still many problems with these teaching methods: limited learning resources, uncertain teaching effectiveness, and susceptibility to subjective emotions from learners; In addition, traditional teaching methods for English learning can easily generate significant stress and anxiety, making it difficult to truly improve language skills [5]. Therefore, more and more scholars and educators are exploring new ways and means of English learning and teaching, integrating constructive learning theories, innovative teaching concepts, and modern technological means to develop a more efficient and intelligent English learning method.

This study aims to address the new changes and problems faced by English learning today. Based on the RBF algorithm, a new constructive English learning platform is constructed, which can enable students to learn English more autonomously, conduct adaptive learning, exploratory research, and creative thinking based on their own learning needs and ability levels, thus achieving effective knowledge transfer and comprehensive development of students [6].

2 Related Work

2.1 Research Status at Home and Abroad

(1) Current research status abroad

As a global language, English has received a lot of attention and attention in the research and development of English learning platforms abroad. The current research status in foreign countries is mainly reflected in the following aspects:

1. Introducing artificial intelligence technology
   With the continuous progress and development of technology, artificial intelligence technology has been widely applied in the research and development of English learning platforms, such as intelligent assisted learning systems, artificial intelligence voice interactive learning systems, etc., which can provide a more efficient and intelligent learning experience.
2. Implement autonomous learning
   In order to meet the needs of learners for autonomous and flexible learning, some learning platforms have introduced autonomous learning models, which support learners' initiative and autonomy through humanized design, simple operation, and effective learning resources.
3. Emphasize student interaction and cooperation
   Learning English requires a real language environment, and communication and cooperation play a very important role in students' English learning. Some English learning platforms cultivate students' communication and cooperation abilities by simulating real communication environments.

(2) Current research status in China

With the continuous improvement of China's information technology level and the widespread application of intelligent technology, English learning platforms have also received more and more attention and research in China, mainly manifested in the following aspects:

1. Online English learning
   With the rapid development of China's internet industry and the creation of ubiquitous learning environments, more and more netizens choose to learn English through online platforms. This web-based virtual education system provides more convenient, effective, and fast learning services for English learners [7].
2. Introducing artificial intelligence technology
   Similar to the situation abroad, AI technology is also increasingly applied in domestic English learning platforms, such as Machine translation, Natural language processing, speech recognition and other technologies, which make English learning platforms provide more intelligent and personalized learning services [8].
3. Emphasize the concept of constructive education
   At present, the concept of constructive education has received increasingly widespread attention and application in the domestic education system. It emphasizes students' participation in learning as the main body, and emphasizes students'

initiative, exploration, and creativity [9]. Some English learning platforms are also introducing such concepts to better unleash students' potential.

Overall, both domestic and foreign research on the informatization of English learning platforms has achieved certain results. Continuing research in areas such as artificial intelligence technology, autonomous learning, and constructive education concepts, we believe that there will be more innovative applications in the future to improve the effectiveness and experience of English learning for English learners.

2.2 Social Constructivism Theory

The technology has effectively expanded students' learning methods and ways. In addition to traditional reference books, training classes and other learning ways, students can on the Internet. At present, there are cultivation. By students can no longer require and for learning. Students scattered time segments to learn, which improves their learning efficiency [10]. However, there are still some problems in the current English platform:

(1) The content arrangement of the English learning is not targeted. The content and teaching mode of most English teaching platforms are relatively fixed, and the teaching process is implemented according to the ordinary syllabus, without considering the students' personalized situation. They also do not have the ability to analyze and research the students' learning situation and knowledge mastery.
(2) The topic selection of English learning platform does not have the intelligence and adaptability. The test paper grouping strategy is relatively backward, so students cannot organize the test questions according to their learning of English knowledge points and their usual practice, which leads to low efficiency of students' English learning [11].
(3) At present, most English teaching platforms provide different schools with unified English teaching functions, while the teaching management department of the school is unable to adjust the teaching strategies according to its own needs. Due to the lack of flexibility, it brings users the process.

The main of organizing teaching [12]. Teachers s with rich language materials and contexts, and outside school experience with their inside school experience. The combination of pictures, newspaper abstracts, personal life experiences and classroom teaching activities can provide students with an integrated feeling of living environment and learning. In this way, the students themselves construct the meaning, rather than make them accept the ready-made knowledge and directly reach the results [13]. The more students participate, the more they will have an independent feeling and experience. The more self-control students have, the more they will participate and have more internal motivation, so as to better promote their language development.

Taking students as the main body does not mean that teachers do nothing. The most important role of teachers is to provide students with an environment in which they can explore at the same time. The classroom should be full of all kinds of real opportunities that challenge students, and should give students the freedom to develop according to their own pace and development process designed by themselves. To make foreign language teaching educational, teachers must understand the individual learners, their

personal characteristics and personal needs [14]. Only when teachers fully understand the psychological mechanism of the whole learning and development process can they create a challenging classroom environment for students, thus promoting their learning and development [15].

Learning is a dynamic process, in which mistakes are inevitable and there will be solutions to problems. Learning is also a social interaction process, which should take place in the natural environment as much as possible, under the interaction and cooperation between peers.

3 Analysis of Constructive English Learning Platform Based on RBF Algorithm

3.1 RBF Algorithm

The RBF algorithm is an artificial neural network based on radial basis functions. Its basic idea is to construct a nonlinear model using a set of radial basis functions to achieve various tasks such as data classification, regression, and clustering. The Radial basis function refers to a function that maps the input space to a high-dimensional space, and can be represented by Gaussian function, polynomial function or inverse distance weight function. During the modeling process, the RBF algorithm trains model parameters based on calibration data, and classifies unknown data into corresponding categories or regresses to the objective function based on the model. Compared to other machine learning algorithms, RBF algorithm not only has high accuracy and adaptability, but also has fast computational speed, which can be widely applied in various practical applications in various fields.

The signal transmits information to the through the input, and the hidden layer uses a Gaussian function to perform a nonlinear mapping of the transmitted information. The hidden layer transmits the processed information, which summation of the information and outputs the result. The structure of the is shown in Fig. 1.

The membership function, whose mathematical expression is Eq. (1).

$$y_{kn}(X_k) = \sum_{i=1}^{l} w_{in}\varphi(X_k, t_i), n = 1, 2, \ldots, N \tag{1}$$

Tohe second, reduced to hidden layers, with the first and fifth layers being input and output layers, respectively.

When the base function is a Gaussian function, it can be expressed as follows:

$$\varphi(X_k, t_i) = G(\|X_k - t_i\|) = \exp(-\frac{1}{{\sigma_i}^2}\|X_k - t_i\|^2) = \exp\left(-\frac{1}{{\sigma_i}^2}\sum_{m=1}^{M} x_{km} - t_{im})^2\right) \tag{2}$$

where, $t_i = [t_{i1}, t_{i2}, t_{im}, t_{iM}]$ is the center; σ_I is the accepted domain width.

The influence of the structure of neural networks on generalization ability is mainly manifested in:

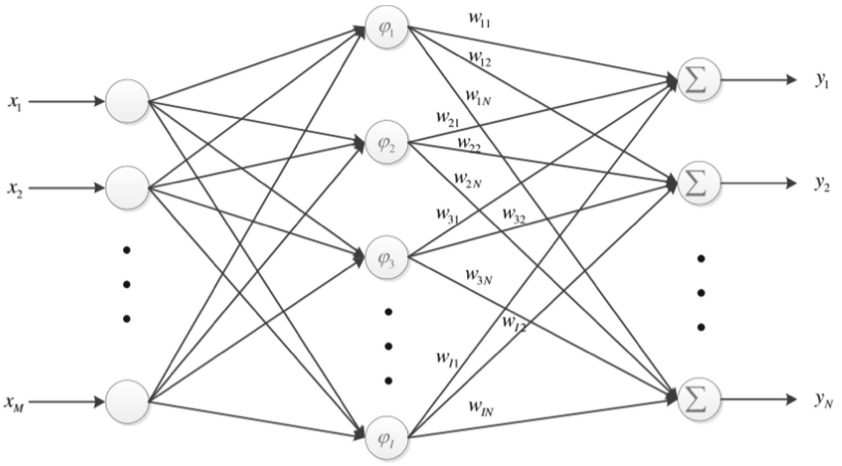

Fig. 1. RBF algorithm structure diagram

(1) Overfitting

If there are too many neurons in the structure (that is, selecting a structure that is too large), the benefits of training are: insensitive to initial values, small training errors, and fast learning speed. At the same time, there are drawbacks: Due to the large degree of freedom, only the training samples are remembered during training, and the neural network itself may be meaningless. In addition, due to the existence of errors, noise or random characteristics are also learned during training, so what is learned is not a true systematic law.

(2) Over training

On the contrary, if there are too few neurons in the neural network structure (that is, if the selected neural network structure is too small), it will be found during training that the training error is large and the decline is slow. Such neural networks are difficult to train because they tend to fall into local minima. If you test its generalization ability while training, you will find that initially. This condition is called overtraining.

The research results show that the generalization error curve is related to many factors, such as learning algorithms, initial value selection, and training conditions. Therefore, it is difficult to determine the minimum generalization error. Through fitting and over training phenomena, we can know that the size of training errors is not enough to become a criterion for evaluating the quality of neural network training. In order to avoid over fitting or over training, the following methods are adopted in practical applications:

(1) The data is divided into two parts, the other for testing generalization errors.

(2) The application of pruning technology, that is, the structure of neural networks is initially large, and during the training process, connections with small weights are gradually eliminated, resulting in a properly structured neural network.

3.2 System Design Objectives

The main difference between the English learning platform studied in this topic and the traditional English learning platform lies in the introduction of the project response theory. Through the construction of the topic selection strategy model, the relatively accurate assessment of students' abilities is achieved, and on this basis, students are guided to learn in the next step. In addition, this English learning platform is student-centered and analyzes students' learning status and test scores. The main design objectives of the system include:

(1) Design and develop a personalized English learning platform. The platform can recommend the content of the next step according to the actual situation of different learners, so that the content can adapt to the students' actual mastery of English knowledge, so that students with different learning abilities can receive targeted teaching. Be able to carry out intensive training for students' mistakes, so as to improve their knowledge structure. Display students' history learning track and history learning situation, so that students can master their current learning situation; It can diagnose students' learning conditions based on data analysis, so that students can more accurately evaluate their mastery of knowledge.
(2) Design and develop an English learning platform that can reflect the project response theory. The construction of the question bank in the English learning platform, as well as the daily exercises and examinations, should reflect the relevant requirements of the item response theory. The difficulty, differentiation and other parameters should be set for the questions in the question bank, so that the topic selection strategy can play a better role. Based on the item response theory, the selected questions are adjusted according to the students' actual ability value, so as to evaluate the students' English level and ability more accurately.
(3) Design and develop a complete English learning platform. This English learning platform should be able to provide students, teachers, teaching administrators, system administrators, etc. with the functions they need. These functions should cover the whole process of English learning, without the need to support the system with a third-party platform. In general, the system should be able to provide students with all kinds of English learning resources and guidance, as well as exercises, exams, etc., can provide teachers with the release of teaching resources, as well as the construction of question bank, can provide teaching managers with the function of setting topic selection strategies, and can provide system managers with the function of parameter configuration and user management. At the communication functions for users of different roles.

The characteristic of microlearning resources is brevity, and when using mobile platforms for microlearning, learners' time is relatively dispersed. The place where microlearning is conducted is not a traditional classroom, so it may be greatly influenced by external factors. Micro learning based on mobile devices is very different from traditional learning methods. Traditional learning resources are designed as a whole based on a book, and the capacity of learning resources is large. Such resource granularity is not suitable for new learning methods of microlearning. Therefore, when conducting resource redevelopment and design, we should first select resources suitable for micro

learning from existing course resources. Then, the granularity of re sources should be reduced. Resources should be divided based on their minimum granularity and then integrated to form knowledge blocks. Each knowledge block should be independent and related to each other, and the knowledge block is the smallest and most basic learning module, as shown in Fig. 2.

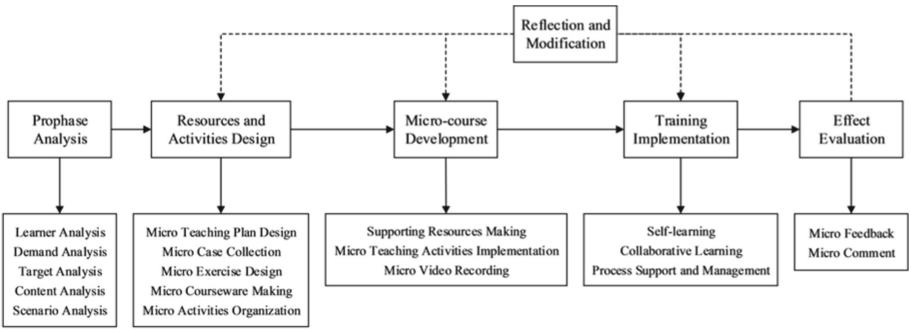

Fig. 2. Constructive English learning mode

4 Informatization Practice of Constructive English Learning Platform Based on RBF Algorithm

4.1 Structure of English Learning Platform

The network topology of the learning platform is shown in Fig. 3.

The English learning platform based on RBF algorithm mainly consists of the following three parts: front-end interaction interface, back-end data processing, and learning

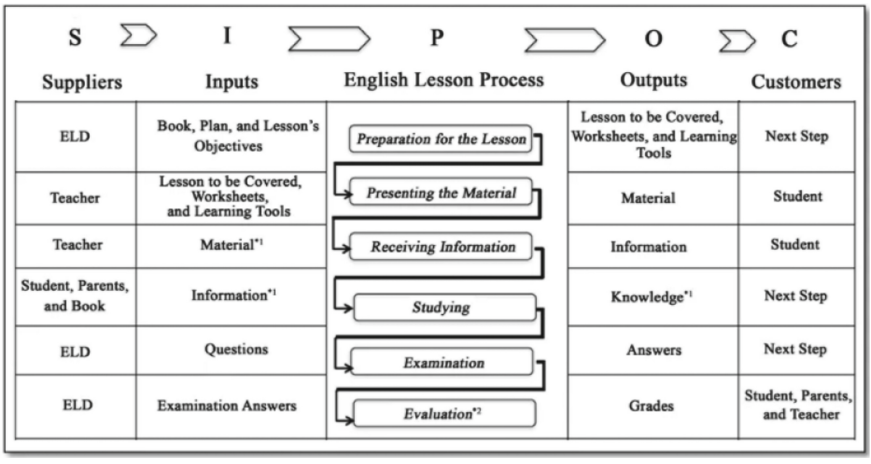

Fig. 3. Structure of English learning platform

model. Among them, the front-end interactive interface is used to collect user learning data and feedback information, including learners' personal information, learning goals, learning progress, etc. After collecting learning data, the backend data processing and learning model use RBF algorithm to train and construct the learning model, while optimizing the learning model to improve the learning effectiveness of learners. Specifically, the learning model includes an input layer, a hidden layer and an output layer. The input layer is used to receive the learner's input data. The hidden layer is composed of multiple Radial basis function, which are mainly used to achieve nonlinear transformation and classification. The output layer is the result of classification or prediction. Based on the learning situation of learners, the system can realize Adaptive learning and personalized teaching. The entire system should also have data storage and management functions to ensure the stability and sustainability of platform learning outcomes. Through the collaborative work of the above components, an English learning platform based on RBF algorithm can meet the diverse and personalized learning needs of learners and achieve sustainable development.

4.2 Model Implementation

The algorithm model mainly examines the performance of students in the National English Test Band 4 and Band 6. Thereby calculating the optimal total score of the

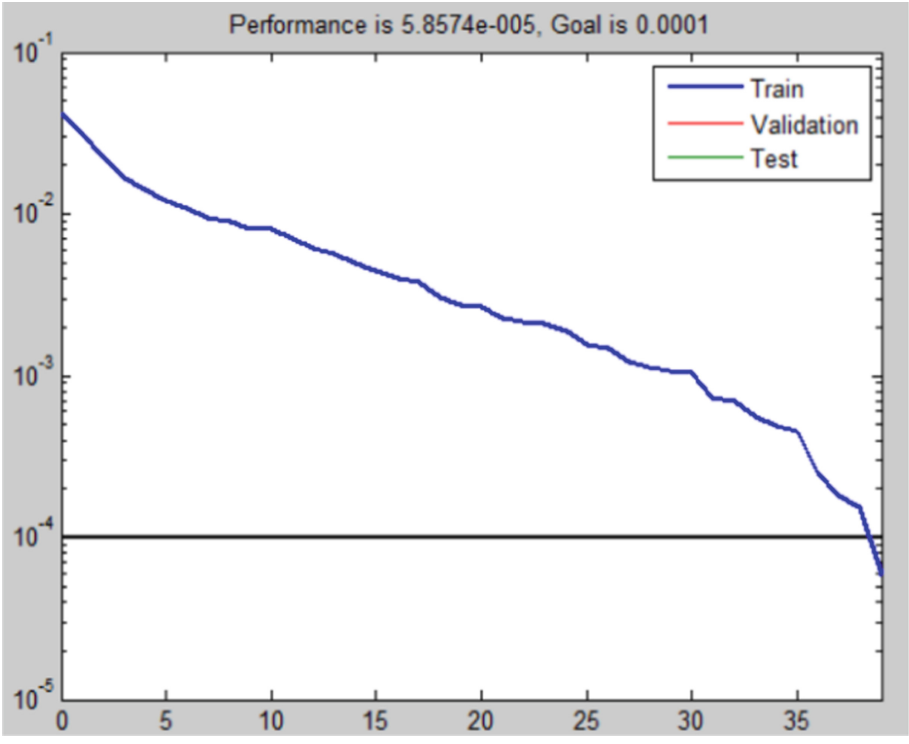

Fig. 4 Simulation experiment results

English Test Band 4 and Band 6, and comparing the proportion of time spent, as shown in Fig. 4.

RBF neural networks have many advantages, such as simple structure, good classification performance, fast learning speed, strong generalization ability. Therefore, they have received more and more attention and applications in many fields. In this paper, is applied to the practical the informatization of constructive English learning. Based on the shortcomings of traditional RBF neural network algorithm in terms of convergence speed, an algorithm is proposed to achieve faster convergence speed and higher prediction accuracy, providing a theoretical guide for the rapid development of English teaching in the future.

5 Conclusion

As the communication between English learning platform providers and users is not smooth, the platform system generally only aims at the problems of a certain school user. It has built a web-based communication platform, and established a three-level management and use system of system administrators, school administrators, and students, so that the English learning platform can provide services for students in different schools. In terms of the work of the paper, it first analyzes the problems existing in the current English learning platform, mainly due to the lack of support from intelligent theories and methods, which leads to the inability to improve students' learning efficiency. Then the system needs analysis, from the user analysis of the system should have the main functions, and analysis of the system performance requirements. The is designed, and each functional module is designed in detail. The emphasis is to introduce RBF algorithm, design the test question selection strategy, use programming language to realize the functions, and carry out the test.

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