Design and Development of English Learning Platform Information System

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Abstract. Information technology is more and more widely used in the education industry, and the development of network technology enables students to realize distance self-learning. There are many kinds of English teaching platforms based on the Internet, which provide knowledge point learning, online testing and other functions. However, from the current situation, there are some problems such as weak pertinence, lack of self adaptability in the selection strategy of test questions, and insufficient analysis ability. The informatization of constructive English learning platform based on RBF algorithm is a new system for English Teaching in the form of interactive games. This is an online game. Players can learn English by playing and interacting. The game consists of multiple levels, each level has its own challenge set, designed by experts. The player starts at the first level and then moves to the next level with his or her further development.

Keywords: English learning platform · RBF algorithm · Constructive · promotion of information technology

1 Introduction

Under the influence of the continuous improvement of social economy, culture and the application level of science and information technology, the development process of college English education and teaching in China is also advancing. With the advent of the Internet + era, information technology is affecting the traditional education and teaching mode, and promoting the deep integration of information technology and college English course teaching. Based on the analysis of the development and current situation of college English teaching mode, this paper explores and innovates college English teaching mode with the ismart information platform as the starting point, with a view to improving the quality of college English teaching.

With the advent of the Internet era, educational informatization has been widely used in the education sector, promoting the development of domestic higher education. As far as college English is concerned, the traditional English teaching mode cannot meet the actual needs of today's college students. Colleges and universities should take information technology as a starting point. Taking the ISmart English learning information platform as an example, it makes full use of the self-study mode of college English based

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on the network architecture to innovate college English teaching, meet the actual needs of students' learning, and enable students to comprehensively develop their abilities at the level of English learning.The development and use of the English learning platform software system is mainly to meet the needs of college students in English learning, so that students can learn English independently. The functions provided by the current English learning platform are basically the same, mainly including the explanation of English knowledge points, the after-school test of various parts, the comprehensive online test and scoring, the statistics of English scores, and the arrangement of learning plans. In the actual use process, students use the functions of the English teaching platform by registering and logging in to the system, and learn relevant knowledge points according to the corresponding teaching plan, learn their own knowledge through testing, and reasonably arrange learning and review plans [1].

On this basis, it is necessary to ensure that the hardware facilities for the digital language experiment can be built well. In addition, the corresponding software and information resources should be used for assistance, so that the professional language learning function can be realized. As for the teaching process in the classroom, the use of digital language laboratory can also easily achieve more professional language learning functions, such as some oral ability, listening ability, reading ability and writing ability teaching, which can play a vital role in the future practice work, and even use this platform to facilitate the sharing of resources. In addition, we can also establish online classrooms. Because online classrooms are basically not limited by space and time, most of them are mainly composed of students' independent learning platforms and related distance education. In the classroom, teachers and students only need to have computers that can access the Internet, and then log in to their respective terminals, which can realize the actual role of online classrooms, At the same time, the use of this model can also greatly reduce the investment of the school in the network classroom, and also reduce the practical difficulty of management and maintenance to a certain extent.

Although the current English learning platform system can meet the use needs to a certain extent, there are still many problems, the most prominent problem is the choice of English test questions. In general English learning platforms, some of the test questions are organized in a fixed mode. According to the current learning content, the type and content of the test questions are fixed; Some platforms adopt the question bank design mode, which classifies the test questions according to different types and contents, and extracts them according to certain rules when generating test papers [2]. As students have different learning abilities, different levels of knowledge, and different requirements for the difficulty and content organization of the test questions, it is obvious that the test papers generated by the fixed mode can not meet the needs of students. However, due to the lack of relevant strategic guidance, the test paper generation method based on the question bank cannot be adjusted according to the specific learning situation of students [3].

2 Related Work

2.1 Main Contents of Constructivism Teaching Thought

As a new epistemology, constructivism is the product of integrating many disciplines. Piaget pointed out that learning is generated through the interaction between learners and learning objects; The process of learning is the process of interaction between them. His view has formed the basic teaching thought of constructivism. Based on the research materials of Constructivism at home and abroad, this paper summarizes constructivism from the perspective of knowledge, learning and teaching [4]. The constructivist teaching idea is shown in Fig. 1 below.

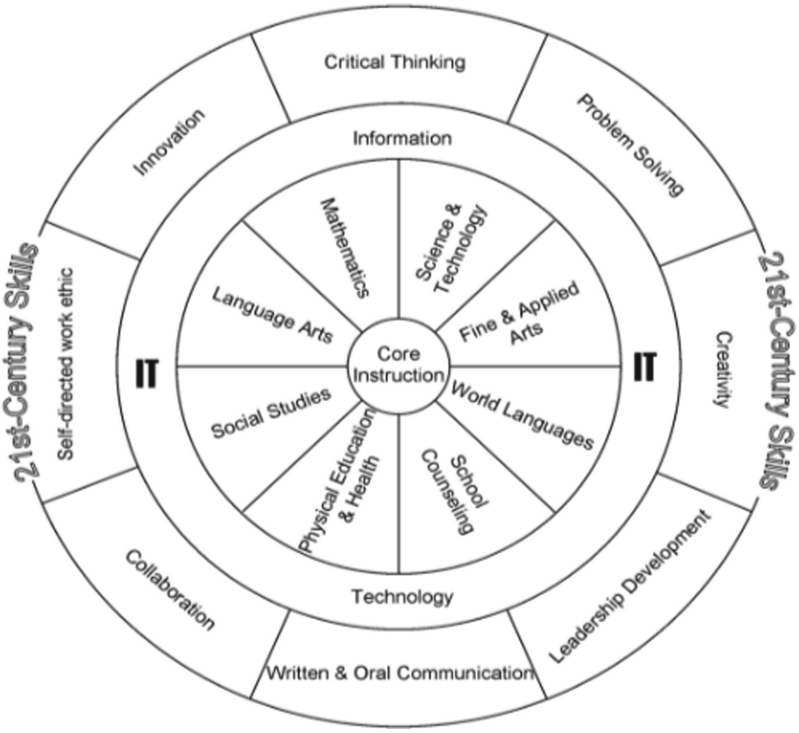

Fig. 1. Constructivist teaching thought

(1) The construction of knowledge depends on the existing experience and knowledge of individuals

The German philosopher Kant believes that all our knowledge starts from experience. Constructivism holds that, first, knowledge is not an objective reflection of the external world, nor is it an abstract symbol for transmitting information, but a subjective understanding of the external world formed by the subject and an absolute representation of reality; Secondly, in the process of solving specific problems,

knowledge cannot be used accurately and flexibly, and must be expanded and reorganized on the basis of the original knowledge according to the situation of specific problems; Third, the formation of new knowledge is inseparable from the learners' own knowledge experience and learning situation. The real understanding cannot be separated from the learners and their own experience. Knowledge comes from a certain situation. The understanding obtained from the situation, the learners and the learners' existing experience is not real understanding. Such understanding is passive, static and duplicative [5]. The existing experience and learning situation are unified organisms that interact with each other and promote the establishment of a new knowledge system.

(2) Learning is a process in which individuals actively process and recombine and acquire new knowledge

Constructivism holds that learning is not a process in which teachers simply impart knowledge to students, but a process in which students form their own knowledge. Learning is a process of students' active construction of meaning, not a process of passive indoctrination. The process is to build old knowledge into new ideas or concepts, and then cycle back and forth. Learning is not as passive as the "stimulus response" described by behaviorism. Instead, it combines one's previous experience and understanding, selects and processes with purpose, and thus obtains a new understanding of the external world [6]. The English autonomous learning platform is shown in Fig. 2 below.

Fig. 2. English autonomous learning platform

The external world has no collateral meanings, which are established through the interaction between old experiences and new external stimuli. The process of learning is that each learner re encodes, re recognizes and re constructs his own understanding of the external world based on the original cognitive experience; There are two main

concepts in the development of cognitive structure of learning, assimilation and adaptation. Assimilation is a quantitative change of cognitive structure, and adaptation is a qualitative change of cognitive structure. Adaptation refers to the conflict between learners' existing cognitive structure and new external information, which leads to the adaptation or change of the original cognitive structure, thus forming a new cognitive structure. Through interaction, cognition is constantly expanded and adjusted, which is the way and process of human cognitive development. Learning is a two-way process of interaction between new and old knowledge and experience, that is, a dynamic process of interaction between learners and learning environment, rather than simply adding, storing and extracting information [7].

2.2 RBF Algorithm

RBF algorithm is called radial basis function, which is a neural network composed of local adjustment neurons. It generally has a five layer network model, as shown in Fig. 3.

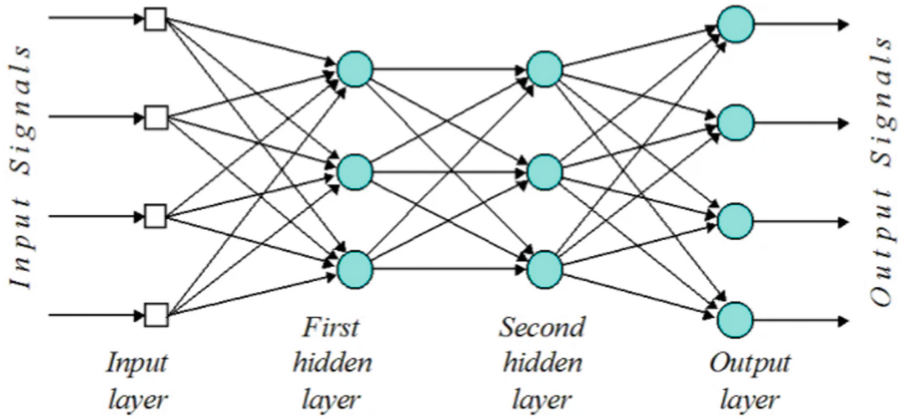

Fig. 3. Structure diagram of RBF algorithm neural network

The model of the constructive English learning platform based on RBF algorithm mainly refers to the idea of RBF algorithm in the design of the constructive English learning platform, and fully reflects the algorithm in the process of coding. On the implementation level of the model algorithm, it can meet the needs of teachers and students. The RBF algorithm can solve the quantitative indicators of English teaching. Especially on the level of teachers, how the teaching effect can be optimized under different teaching hours, teaching methods and teaching content configuration. For students, the algorithm mainly solves the learning results under different learning states and task progress.

RBF network is a kind of feedforward network. Its basic structure is three layers: input layer, hidden layer and output layer. The working principle is that when the network input layer receives the signal, the hidden layer neurons respond to the input, and the response characteristics are radially symmetric. The farther the input is from the neural node,

the lower the activation degree of the corresponding node is. The Euclidean distance between the input vector and the node data center is used as the independent variable of the radial basis activation function. The basis function calculates the dependent variable according to the independent variable, and the dependent variable is linearly weighted to form the final output. The basis function of hidden layer nodes generally adopts Gaussian function, whose common formula is:

$$\phi_i(\|x - c_i\|) = \exp(-\frac{1}{2\sigma_i^2}\|x - c_i\|^2) \tag{1}$$

For a network with m hidden layer nodes, P total number of samples, and 1 input and n output for each sample, the output form is:

$$y_J = \sum_{i=1}^{m} w_y \exp(-\frac{1}{2\sigma_i^2}\|x_p - c_i\|^2) \tag{2}$$

where, $x_p = (x_1^p, x_2^p, \cdots, x_l^p)^T$ is the p-th input sample vector, $j = 1,2,\cdots,np = 1,2,\cdots,P$, $i = 1,2,\cdots,m$ represents each node of RBF network hidden layer, c is the center of hidden layer node, w_y is the weight value from hidden layer to output layer, y_J Indicates the width of the hidden layer node, x_p which is the output value of the corresponding jth output layer node.

$$v_{\bar{y}}^{k+1} = \omega v_{\bar{y}}^k + c_1 r_1 (p_{\bar{y}}^k - x_{\bar{y}}^k) + c_2 r_2 (p_{\bar{y}}^k - x_{\bar{y}}^k) \tag{3}$$

$$x_y^{k+1} = x_y^k + v_y^{k+1} \tag{4}$$

According to Formula 2, in order to obtain the network output value, the following three parameters need to be determined:

(1) the node center of each hidden layer (the center of Gaussian function) c_i;
(2) Output weight w_i of each node;
(3) Node width of each hidden layer (variance of Gaussian function) σ_i;

Common learning algorithms for determining RBF network parameters include orthogonal least squares algorithm, gradient descent training algorithm and self-organizing learning algorithm.

Orthogonal least squares method can determine the number of hidden layer nodes while obtaining the output weight value, and can control the range of learning error. However, this method is to obtain the data center directly from the sample. Whether the constructed network can reflect the correct relationship between input and output needs further study. Moreover, it cannot directly calculate the appropriate node width, and reduce the error by continuously increasing the number of neurons [7], It may lead to too many nodes in the hidden layer of the network and affect the generalization ability of the network.

The gradient descent training algorithm modifies the network parameters by minimizing the objective function. The learning step size of the algorithm is usually set according to experience. The change of the step size will have a great impact on the output of the network. Moreover, because the error surface of the network objective

function is relatively complex, the final solution of the weight value is often close to the initial weight point on the surface, which will slow down the network convergence speed and easily fall into local minimum.

The self-organizing learning algorithm first uses the k-means clustering algorithm to cluster the input vector to obtain the data center [8]. The width of hidden layer nodes is determined by calculating the distance between each cluster center through empirical formula, and then uses the least mean square error method, the pseudo-inverse method or the supervised learning gradient method to obtain the weight value. However, using these methods to solve the weight value is easily limited by the local minimum value, There may be data morbidity.

3 Constructive English Teaching Mode and Classification

3.1 English Autonomous Learning

Scholars at home and abroad generally believe that autonomous learning means that students dominate their own learning. Autonomous learning has better subjective initiative, learning feedback and self-regulation. Many foreign scholars have summarized autonomous learning into four key points, namely, comprehensiveness, ability, environment and responsibility. Autonomous learning mode can be divided into two types, mainly based on the teaching place, including classroom autonomous learning and Extracurricular Autonomous Learning [9]. Extracurricular self-regulated learning is the common pre class preparation, post class review, self selection of reference books, etc. this kind of learning mode requires students to complete their learning independently without the help of external forces. However, autonomous learning in the classroom is often influenced by teachers and can cooperate with teachers to obtain better learning results. And English autonomous learning is that students make English learning plans according to their own learning goals and carry out self-monitoring, so as to achieve good English learning results. Its theoretical basis is mainly constructivism, humanism and cognitivism based on modern educational psychology [10]. These three aspects are implemented by students' emotion, cognition and environment in learning English. The integration of the three theories provides the basic theory for the high-quality education concept.

1. Promote students' independent learning and personalized learning. The establishment and application of the constructivist English digital network teaching platform, the content provided to students should be selected according to the students' own language foundation and learning progress, which can completely avoid the disadvantages of independent learning in the traditional field to a certain extent. For example, in the course of learning in the classroom, if we can not master the knowledge points skillfully within a certain time at that time, we can obtain all the learning materials by copying what the teacher said in the classroom, and seek the corresponding rescue through online answering questions. Therefore, in the face of the current social situation, the teaching platform should highlight the practical role of English language learning, fully mobilize students' enthusiasm for learning, and create a good English language learning environment and atmosphere for students.

2. Assist in the development of constructive English teaching. The construction of the digital network teaching platform of Constructive English provides modern teaching methods and models for the teaching of Constructive English [11]. With the multimedia equipment and network environment at the present stage, the teaching activities of the network course of Constructive English become vivid and interesting through the corresponding pictures, audio and video materials. Presenting such teaching content in front of students is more conducive to improving students' interest in learning and the current teaching environment and atmosphere. The key is to provide rich teaching resources and content in this huge information resource platform.
3. Promote the effective integration of constructive English teaching resources. The establishment of the constructivist English digital network teaching platform can effectively record the communication activities between students and teachers. In terms of teaching resources, it also includes various versions of teaching materials, such as materials related to English special tests, teachers' daily teaching plans and important learning materials of listening, speaking, reading and writing content in the courseware. The learning materials include pictures, texts and videos [12], This platform is actually the effective integration of various forms of data. Therefore, the construction of the constructivist English digital network teaching resource platform is conducive to the collection and classification of various learning materials, and then store them in this huge data library, which is conducive to students to find the information they need in the first time.

3.2 Constructive Teaching

In the activities of English learning, the constructive teaching mode is mainly a double main mode with students as the main body and teachers as the leading one. It combines the two perspectives of teaching and learning, uses advanced teaching concepts, combines information technology and multimedia technology to improve the students' abilities in listening, speaking, reading and writing. The object of constructive instructional design consists of learning environment, learning activities Media transmission consists of three aspects: [13]. Designing learning activities is to combine learning tools and learning resources with each other, and rely on network resources as the carrier, so that students can experience learning contents and evaluate their own learning achievements in the process of learning, and use the learning tools of multimedia technology to turn boring and boring English learning contents into rich and colorful video and animation materials, which are reflected in vision and hearing [14]. The open English teaching platform is conducive to students' independent learning after class A networked communication environment is also conducive to communication with teachers and reflects the dominant function of teachers. Therefore, a constructive English teaching platform is of positive significance for improving students' English autonomous learning ability.

3.3 Key Technologies

The key technologies involved in the development of the constructive English learning software platform in this paper are as follows:

(1) Http protocol is adopted for network communication between client and server, and JSON protocol is adopted for data transmission and exchange. JSON (JavaScript 0bject Notation) is a lightweight data exchange format, which is based on a subset of JavaScript. JSON uses a completely language-independent text format, but also uses a syntax format similar to C language. These features make JSON easy to read and write, and also easy to machine parse and generate [15]. At present, JSON has become the standard data exchange language in smart phone programs, Therefore, this paper uses JSON protocol for data transmission.
(2) For the English voice files used in the software, the storage method we adopt is to convert the voice files into binary data and store them in the local mobile phone database (the database is SQLite); When in use, the voice data file is read from the database, placed in a temporary folder, and then played by the player. The advantage of this is that compared with file management, using relational database can better organize and manage files (such as file retrieval, transmission, etc.).

At present, the constructive English learning software platform has been put into use. In order to better understand the students' use of the software, we have made a questionnaire survey. The survey results show that the proportion of students' satisfaction and satisfaction is about 71%, which shows that our constructive English learning software platform has been recognized by most students, and 19% think that the software platform needs further improvement [16], There are two main points that need to be improved: first, we hope that the resources of the server's Constructive English software platform will be richer and the update speed will be faster; Second, I hope that the constructivist English software platform can not only be used for English speaking and listening practice, but also be used for English practice in terms of words, reading, etc.

4 Constructive English Learning Platform Based on RBF Algorithm

The network topology of the constructive English learning platform based on RBF algorithm is shown in Fig. 4.

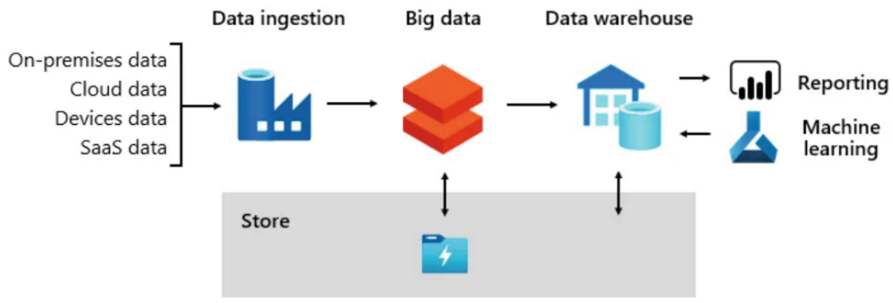

Fig. 4. Network topology

The distributed network topology is adopted to support different identity permissions according to the user levels of teachers, students and administrators. Meanwhile, the corresponding services are slightly different. The constructive English learning platform is mainly composed of auxiliary training, autonomous learning, audio-visual training and other modules [17]. The composition of each module needs the support of the background question bank, which is supported by the SQL Server database, so as to realize the automatic management of system integration and implement the overall scheme of data solution.

The system uses the struts 2, spring and Hibernate frameworks of Java EE to implement the various functional modules of the platform, including the presentation layer, business logic layer, service layer and data persistence layer. The presentation layer is the interactive interface between the system platform and the user. The result of its development is a web-based page that can be accessed by browser software. It mainly includes four components: student learning, teacher management, teaching management and system management. It is responsible for obtaining user instructions and data and displaying the processing results; The business logic layer is to build a business logic implementation component according to the design requirements of the system functional modules [18]. The result of its development is a software component, which is used to receive user data and instructions from the presentation layer, process them according to the actual application requirements, and return the processing results to the presentation layer; The service layer provides basic functions for the business logic layer. Each relatively independent functional component is deployed in this layer. These components are more universal than the business logic component. Multiple service components can be combined to complete components with a certain business logic function. In the service layer of the English learning platform, the service components include authentication service, topic selection strategy service, error handling service, statistical analysis service, etc.; The data persistence layer mainly develops and deploys software components related to the data persistence application [19]. The data involved in the English learning platform is stored in the relational database. The components in the data layer mainly complete the data access and management of various types of relational databases. According to the requirements of the upper functional components, various database management systems are operated to provide data services for the platform.

The main function of the platform database is the English learning courseware question bank, which includes listening multiple-choice questions, single-choice questions, judgment questions, reading comprehension, cloze, error correction questions, and blank filling questions [20]. The information list of the database contains test question type information, test question knowledge point information, test question domain information, test question grammar information, multimedia file information, test question answer information, and so on.

5 Conclusion

Information technology is more and more widely used in the education industry, and the development of network technology enables students to realize distance self-learning. There are many kinds of English teaching platforms based on the Internet, which provide

knowledge point learning, online testing and other functions. However, from the current situation, there are some problems, such as weak universality, lack of self adaptability in the selection strategy of test questions, and lack of display of user learning. In view of the problems existing in the English learning platform at present, the project response theory is introduced into the design and development of the platform system, and the student users are taken as the center to provide them with all-round services, so as to improve the intelligence, adaptability and personalization of the system.

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