WILEY | Hindawi

Research Article

Design, Implementation, and Evaluation of Online English Learning Platforms

Jie Li [ORCID]

School of International Studies, Zhengzhou University, Zhengzhou, 450001 Henan, China

Correspondence should be addressed to Jie Li; karenli@zzu.edu.cn

With the rapid development of internet technology, various online learning platforms have emerged. The combination of the internet and education is an inevitable trend, and smart online learning platforms based on neural network become popular. This paper introduces how to design online English learning platforms through a neural network. It proposes the construction of a universally designed online English learning platform and the design of an online English learning platform server development architecture. Then, the implementation of online English learning platforms is discussed. Evaluation of the platforms is also very important, which is conducted through two questionnaire surveys. The first survey is general and the second one is more specific. Results of both surveys show that the learners' demand for online English learning platforms is still growing, especially among the young learners. In addition, this paper reports the results of the feasibility analysis and performance test of online English learning platforms: (1) The well-designed online English learning platform has relatively complete functions and meets the needs of both students and teachers. It includes a series of functional modules such as students' registration, analysis of students' profile, courseware and learning resources management, test management, test score analysis, interactive discussion, online monitor and feedback. (2) There are no major defects in the implementation of the online English learning platform in this experiment. (3) The reliability and security of the online English learning platform are relatively high.

1. Introduction

Online learning platform is also known as E-learning platform, online teaching platform, or learning management system. An online learning platform is a web-based access and a software system that provides comprehensive services for distance teaching and learning through two-way multimedia communication networks. It greatly facilitates course preparation, information transmission, and teacher-student interaction. As a supplement to the traditional teaching model, the online learning platform should be open, intelligent, and interactive, which is convenient for teachers to "teach" and students to "learn." At the same time, it should be able to provide a quick and effective feedback to both teachers and students.

The traditional English learning model in China mainly has 3 problems. First, it focuses on the process of "teachers' teaching" and ignores "students' learning." Second, due to the lack of English language environment, English learning is not effective after class. Thirdly, large amount of tedious homework makes students lose interest in English learning. In the past two decades, internet technology developed quickly in China and brought a lot of changes to education. One obvious change is adaptive learning. Online learning platforms can better meet the needs of learners of different ages and different learning goals. The smartly designed platforms pay attention to the individual differences of learners and develop learning materials that conform to their cognition and proficiency. During the COVID-19 pandemic, teachers can share teaching content and teaching procedures through public online learning platforms, so as to achieve the effect of teaching without going out. Compared with the conventional teaching model, online learning platforms can improve students' ability to use resources, thereby enhancing their learning autonomy.

Effective English teaching depends on good teaching design, and the design of an English learning platform is not merely the matter of IT professionals. English teachers' teaching design concepts are important factors to be counted. Tseng et al. made a research on how 6 English teachers formulate various forms of English teaching design concepts, while considering the impact of online platform teaching within 14 weeks. Through the quantitative analysis of the 6 teachers' discussion and the interview, it was found that the discussion obviously represented their different preferences of the teaching content. In addition, two factors that affect teachers' online platform teaching were discovered: technical issues related to the quality of online lessons and students' role [1]. Bollegala believes that scaling feature value is an important step in the construction of many network learning platforms. Different features have different value ranges, and some form of feature scaling is often required to ensure that accurate classifiers are learned. However, feature scaling is a preprocessing task before learning. If only a few training examples are observed, it may not be possible to accurately determine the value range of the feature in the initial stage of learning platform construction. Next, the distribution of data will change over time, which makes any feature scaling performed in the preprocessing step seem not enough to keep up with the times. Bollegala proposes a simple but effective method to dynamically scale features during training, so as to quickly adapt to any changes in the data stream, and compares the proposed dynamic feature scaling method with a more complex method that uses several benchmark data sets for classification. This method is more complicated and has many processes, which may lead to a high error rate [2]. Anshari et al. propose that the use of online learning resources from multiple channels in learning activities is expected to transform from traditional learning-centric content expansion to a collaborative learning center that emphasizes universal learning anytime and anywhere. When compiling big data, cloud computing and Semantic Web can be integrated into online learning resources, thus providing a wide range of knowledge acquisition and enriching users' learning experience. In traditional learning practices, students are regarded as recipients of information and knowledge. However, nowadays, students participate in the learning process, which plays an active role in the creation, extraction, and improvement of collaborative learning platforms for online learning resources and knowledge sharing and distribution. Anshari et al. believe that popularized knowledge can meet the needs of integrating cloud computing, big data, Web 2.0, and Semantic Web. Popularized knowledge redefines the added value, type, quantity, and speed of online learning resources and network learning platforms. There is considerable flexibility in adoption, knowledge acquisition, and technology implementation. This research has strong operability but high cost, which is not conducive to popularization [3].

The innovations of this paper are as follows: (1) it proposes the use of neural networks to construct an online English learning platform, (2) it proposes the construction of a universally designed online English learning platform, and (3) it proposes the design of an online English learning platform server development architecture.

2. Design of Online English Learning Platforms

2.1. Constructing Online English Learning Platforms through Neural Network. As far as English teaching is concerned, instructional design is extremely important. The online leaning platform is based on artificial intelligence technology, knowledge mining technology, and neuron network technology. After learning all kinds of information about students, the platform is designed according to a comprehensive analysis of students' interests, knowledge structure, preferences, learning status, and adaptability of courseware resources, and then, the purposeful step-by-step training is conducted according to the students' level and learning ability [4, 5]. At the same time, the platform provides a step-by-step interactive teaching mode through the machine memory function, to track and evaluate students' learning [6]. For teachers, such a platform not only provides the functions of the traditional online English teaching system such as course arrangement, courseware production, examination arrangement, question answering, and homework guidance, but also provides the feedback of students' adaptability and learning progress. Tracking and evaluation have achieved the purpose of humanization, intelligence, and personalization [7].

A neural network is a complex network system formed by the extensive connection of many simple neurons. It maps a large number of basic characteristics of human brain functions and is an extremely complex network system [8, 9]. Neural networks have distributed storage, large-scale parallelism and processing, self-adaptation, self-organization, and self-learning capabilities and are especially suitable for dealing with fuzzy and inaccurate information processing-related problems that need to consider many factors and conditions at the same time [10]. A neural network is composed of neuron models, and this information processing network composed of many neurons has a parallel distributed structure [11]. Each neuron has a single output and can also be connected to other neurons. It has many output connection methods, and one connection method has a connection right [12]. The meridian cell is the basic unit of the neural network, which imitates the biological neuron. The characteristics of the neuron determine the overall characteristics of the neural network in a certain program [13]. The interconnections between many simple neurons form a neural network. Input $x_1, x_2, \cdots, x_n$ represents the n inputs of the neuron, expressed as a vector X in column $n \times 1$ as

$$X = [x_1, x_2, \cdots, x_n]^T. \tag{1}$$

Using the first relevant neuron to process the input signal, the summing unit can complete the weighted summation of the input signal. The following relationship exists:

$$\text{net} = \sum_{k-1}^{n} x_k w_{i,k} + b. \tag{2}$$

Neural network algorithms are usually divided into convolutional neural networks, recurrent neural networks, and multilayer feedforward neural networks. Here, only the use of multilayer feedforward neural networks or BP neural networks for English network learning platform design is explained [14]. Suppose the number of input neural units in the BP neural network is n, the number of hidden layer neural units is q, the number of output layer neural units is m, the nth neural unit of the input layer is A_n, and the qth neural unit of the hidden layer is C_q, The mth neural unit of the output layer is B_m, $A = A_1, \cdots, A_i, \cdots A_n$ is the output vector, $C = C_1, \cdots, C_i, \cdots C_n$ is the output vector of the hidden layer, $B = B_1, \cdots, B_i, \cdots B_n$ is the output vector of the output layer, R is the weight matrix from the input layer to the hidden layer, and S is the hidden layer to the output of the weight matrix of the layer [15, 16].

The hidden layer formula is

$$C_k = f(\text{net}_k), \quad k = 1, 2, \cdots, q, \tag{3}$$

$$\text{net}_k = \sum_{i=1}^{q} R_{ki} A_i, \quad k = 1, 2, \cdots, q. \tag{4}$$

The output layer formula is

$$B_j = f(\text{net}_j), \quad j = 1, 2, \cdots, m, \tag{5}$$

$$\text{net}_j = \sum_{k=1}^{q} S_{kj} C_k, \quad j = 12 = 1, 2, \cdots, m. \tag{6}$$

The actual output of the network is

$$B(n) = \left[S_m^1, S_m^2, \cdots, S_m^m \right]. \tag{7}$$

The expected output of the network is

$$d(n) = [d_1, d_1, \cdots, d_m]. \tag{8}$$

The error of repeating the process for the nth time is

$$e_m(n) = d_m(n) - B_m(n). \tag{9}$$

Define the error energy as

$$e(n) = \frac{1}{2} \sum_{m=1}^{m} e_m^2(n). \tag{10}$$

Randomly connect weights ω_{ji} and v_{ij}, threshold θ_i, and assignment γ_i to the BP neural network in $[-1, 1]$, provide network input, and divide a set of random sample data into input sample $P_k = (a_1^k, a_2^k, \cdots, a_n^k)$ and target sample $T_k = (s_1^k, s_2^k, \cdots, s_m^k)$, where n is the number of input layer nodes, and m is the number of nodes in the output layer [17]. After setting the initial weights, thresholds, training samples, and target samples of the neural network, the training can be carried out. During this process, the BP neural network will calculate the input s_j of each hidden layer unit and calculate the output

of each hidden layer unit b_j; the formula is expressed as

$$s_j = \sum \omega_{ji} a_i - \theta_i, \quad j = 1, 2, \cdots, m, \tag{11}$$

$$s_j = f(s_i), \quad j = 1, 2, \cdots, m. \tag{12}$$

2.2. RBF Algorithm in Neural Network. The neural network corresponding to the radial basis function (RBF) is composed of an input layer and a hidden layer plus an output layer, a total of three layers. The transformation function of the hidden layer is a kind of locally distributed nonnegative linear function with radial symmetric attenuation about the center point, which is usually a Gaussian function:

$$\zeta_j(x) = \exp\left(-\frac{\|X - C_j\|}{2\zeta_j^2} \right) (j = 1, 2 \cdots, h). \tag{13}$$

In the formula, ζ_j is the output of the jth unit of the hidden layer, X is the input vector, $\|\bullet\|$ is the normal form, C_j is the center of the jth Gaussian unit of the hidden layer, ζ_j is the width of the Gaussian function of the jth hidden layer borrowed point, in addition,

$$\|X - C_j\| = (X - C_j)^T (X - C_j). \tag{14}$$

The output of the network can be expressed as

$$y_k = \sum_{j=1}^{h} w_{kj} \zeta_j(x)(k = 1, 2, \cdots, m). \tag{15}$$

Written in matrix form:

$$Y = W\theta, \tag{16}$$

$$Y = [y_1, y_2, \cdots, y_m]^T, \tag{17}$$

$$W = [w_1, w_2, \cdots, w_m]^T, \tag{18}$$

$$w_k = [w_{k1}, w_{k2}, \cdots, w_{kn}]^T, \tag{19}$$

$$\zeta = [\zeta_1(x), \zeta_2(x), \cdots, \zeta_3(x)]^T. \tag{20}$$

In the formula, Y is the output vector, W is the weight matrix from the hidden layer to the output layer, and ζ is the output of the hidden layer.

2.3. Universally Designed Online English Learning Platforms

(1) Universal design

The concept of universal design comes from manufacturing, which emphasizes the uniqueness of each individual, and proposes that when designing and producing products, it is possible to consider the various problems that various users may face, while trying to prevent individuals from feeling unfairly treated [18]. Among the seven basic principles of universal design, equal usability is the most critical principle. The other six principles are all supplementary explanations

for equal usability, which means that products based on the universal design concept must adapt to users who have different knowledge background, technical levels, physical conditions, and different levels of proficiency [19]. The concept of "universal" broadens the designer's thinking and vision, lets the designer consider expanding the design applicability of the product as much as possible to meet the needs of more people, helps the product reach a higher utilization rate, and extends the use time limit of the product. At the same time, it can reduce the waste of resources and bring more far-reaching significance [20].

(2) Application of universal design in building online English learning platforms

According to the purpose of English teaching, applying the concept of universal design to construct an online English learning platform should meet the following goals: operability—the platform should be user-friendly and can meet the physiological characteristics and operating habits of various learners at the same time; recognizablity—the information conveyed by the platform is easy for learners to understand and can accurately provide feedback information in various ways; correctability—the platform can correct or avoid user misoperation and assist learners when they are in doubt of operation; safety and comfort—learners should have a smooth and comfortable experience when using the product, which allows them to use the product for a long time without excessive eye fatigue; pleasure—learners enjoy both physical and mental pleasure when using the platform, and they are willing to use for a long time. Dylan Sung once investigated Taiwanese university students' perceptions and feedbacks regarding an online English learning platform. Results show that when the user interface is not intuitive and the experience is not smooth, students hold a fairly negative attitude toward the use of the online platform. Therefore, the design of online English learning platforms is crucial, which requires close cooperation between technicians and teachers who understand students' needs, collect their response to the platform from time to time, and give objective feedback to technicians to perfect the interface and functions of the learning platform.

2.4. The Server-Side Development Architecture of Online English Learning Platforms. The advantage of the three-tier architecture is that its clients are unified as browsers, and there is no need to install the client, and the client's request will be sent through the browser. After receiving the request, the web server performs corresponding data processing. During this period, the web server also exchanges data with the background server. Finally, the web server sends the processed data result back to the browser. In this structure, all user interfaces are implemented through the browser, and only a relatively small amount of transaction logic will be implemented in the front stage, and most of the transaction logic will be implemented on the server side, thus turning the client/server model into three parts: the database system, application server, and client browser. In the choice of database server software, you can choose the currently popular MySQL database server. It is an open source software and provides powerful database service support functions, following standard SQL syntax. Compared with commercial server software such as Oracle and SQL server, using MySQL saves software development costs while the system performance is not affected. At the application server level, developers may choose common components provided by various vendors and free software developers to save development time and, at the same time, modify and upgrade certain component functions according to their specific needs. The development of all application function components follows and supports standard network protocols such as the TCP/IP protocol, HTTP protocol, and SSL protocol. Under the premise of ensuring system performance, it saves a lot of development time, and the application scope and compatibility of the system are obtained. It is fully guaranteed. In this way, after the system development is completed, the user only needs to access the system for work or use the functions provided by the system on a computer with ordinary browser software installed. The development cost can be controlled as far as possible under the premise of ensuring system performance. There are also many choices in system development languages and development tools. For example, development languages include Java, PHP, JavaScript, Ajax, and HTML; development tools that can be used include Dreamweaver, Eclipse, and Flash; database management tools include MyAdmin.

In summary, the technical elements in the design of online English learning platforms are shown in Figure 1.

3. Implementation of Online English Learning Platforms

The subject of self-study is the learner, so after logging in as a learner, he/she can enter the system. The learner's information is initialized by the administrator in the early stage, but it can be modified after logging in. Before formally starting independent learning, the learner should first select a class. The learning module will adapt to learners who are at different levels and with different schedules, and the teachers will be different on each level of learning. Therefore, for most autonomous online English learning platforms, learners should first proceed to the class. After entering the class, learners make a choice of learning resources and courses. The online system will help the teacher track each learner's learning status and learning process. Since this system is a self-learning platform, the learning resources should be diversified and can be provided to students of different levels for self-learning. Learning resources consist of English reading, writing, listening, speaking and translation, so that learners can strengthen their English proficiency in a targeted manner. The courses in the platform are generally maintained by the administrator, and teachers also have certain permissions to add, delete, and update course content. After completing the course selection, learners can start learning independently. In the process of independent learning, when one part of the learning content is completed, learners' learning condition will be uploaded to the database, so through this platform teachers get students' learning data in time.
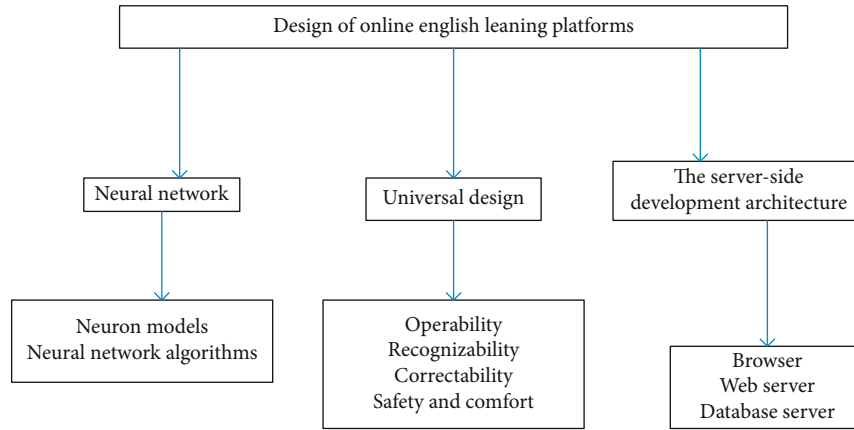
Figure 1: Technical elements in the design of online English learning platforms.

Table 1: Questionnaire composition.

Item		Quantity	Percentage
Total number of questionnaires		200	100%
Total number of valid questionnaires		187	93.5%
Total invalid questionnaires		13	6.5%
Male questionnaire	Effective	90	92.8%
	Invalid	7	7.2%
Female questionnaire	Effective	97	94.2%
	Invalid	6	5.8%

After completing the self-study, learners can take a self-test to make a self-judgment of the learning effect. The system will continue to store and update each learner's data, so that the teacher can make corresponding responses. In order to adjust the content of learning, the administrator retains the highest authority for the maintenance of the most tested content. After the completion of the self-test, learners may choose whether to enter the community for further study and discussion or not according to their own interests. They can ask questions in the community, and other learners or teachers online will discuss and answer them accordingly. Finally, learners exit the self-learning platform. This is the operation process of an English online learning platform.

4. Evaluation of Online English Learning Platforms

4.1. Learners' Response to Online English Learning Platforms. In order to know learners' response to the online English learning platform, questionnaire survey should be conducted. A questionnaire is a set of questions for obtaining statistically useful or personal information from individuals, which is a very useful tool in social science and empirical studies. In this research, first an online questionnaire (20 questions) is distributed to students of different kinds of schools (middle school, high school, college, and university) and adult learners who like to learn English in 15 provinces of China. The questionnaire is divided into two parts. The first part includes questions about the conditions of students' use of mobile terminal equipment, students' English learning preferences, and online uploads and downloads of learning resources. The second part of the questionnaire is mainly about the teaching and learning effects of online learning platforms. Participants' satisfaction of online learning is measured by a 5-point Likert scale, and their written feedback is also collected. After the survey, the reliability of the questionnaire is tested. That is to say, 6 weeks later, the same questionnaire survey is conducted again, and the correlation coefficients of the results of the two surveys are calculated by SPSS 22.0 statistical software [21]. Results show that 73% of participants accept the way of learning English through online learning platforms, and they give positive comments on the online platforms they have used. As to learning effects, 57% of participants show satisfaction.

Then, another questionnaire survey is made among 200 university students (97 boys and 103 girls) who are required to use online English learning platforms in their study. There are 200 questionnaires in total.

(1) The composition of the questionnaire is statistically analyzed and drawn into statistical charts, as shown in Table 1 and Figure 2

It can be seen from the chart that 187 valid questionnaires and 13 invalid questionnaires are collected, and the questionnaire validity rate is 93.5%. Regardless of the effectiveness of the overall questionnaire or the effectiveness of the male and female questionnaires, the questionnaire is highly effective and can be used for reference.

(2) The questionnaire covers five aspects: listening, speaking, reading, writing, and teaching design. The questions are related to students' specific expectation and demand for the online English learning platform when they get access to it. The results of the survey are shown in Table 2

Among the 187 valid questionnaires, students pay most attention to the improvement of oral English, which really reflects the students' demand and the present condition of
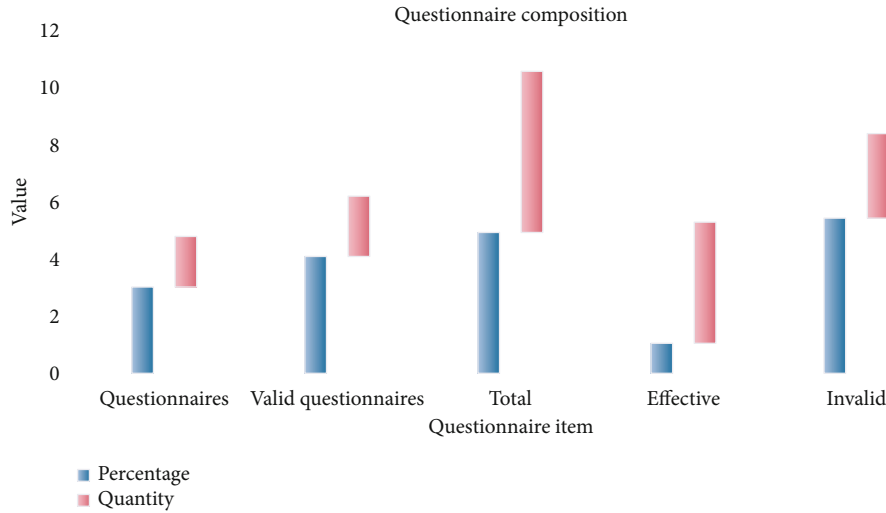
Figure 2: Questionnaire composition.

Table 2: Learners' demand for the platform.

Item	Number of students	Percentage
English listening	36	19.25%
Oral English	41	21.93%
English reading	39	20.86%
English writing	37	19.79%
English teaching design	34	18.17%

Table 3: Learners' interest in English online learning platforms.

Not accept	Male	4
	Female	9
Does not care	Male	17
	Female	15
Interested	Male	26
	Female	37
Very interested	Male	38
	Female	41

college English teaching—limited time and opportunity for students to practice oral English on class, so they want to get more practice through online learning platforms. Dylan Sung's investigation showed that if the online English learning platform did not have the functionality for users to improve speaking skills, this is a major weakness. Several newly designed platforms have virtual communities where learners may talk to each other or talk to their teachers with the help of the audio facilities on their computers or mobile phones. With the development of artificial intelligence, an intelligent oral English robot coach can be designed and embedded into the network learning platform. They can have dialogues with learners and correct their mistakes from time to time. Virtual reality technology makes online learning

environment as natural as the offline classroom setting, and even more interesting and attractive.

(3) Next is a statistical analysis of learners' interest in the English online learning platforms. As is known, the learners' interest in learning materials, teaching methods, and learning facilities will directly affect their initiative and enthusiasm in learning. Male and female students obviously have different attitudes toward English online learning platforms. Results are shown in Table 3 and Figure 3

It can be seen from the chart that the number of students who expressed "very interested" in the English online learning platform accounted for the largest proportion, followed by the proportion of more female learners than male learners in the four levels of interest. Usually, females enjoy learning English from childhood, so they may want to try different ways of English learning including using online platforms. The adaptive learning technology makes it possible for learners to learn different contents according to their preferences. Therefore, platform administrators should update the latest English learning materials in time and those materials should cover a wide range of topics so as to satisfy different learners' tastes.

(4) The frequency of learners using the online English learning platforms is also investigated, and the results are shown in Table 4 and Figure 4

As can be seen clearly from the figure, female students use online English learning platforms more frequently than male students. 55 female students use it more than three times a day, which is really a high percentage of using the platform. If the learning resources in the platform are abundant and they keep practice listening, speaking, reading and writing through the platform, they will make progress quickly. The reason why male students use less can still be explained by learning interest, since interest is one important
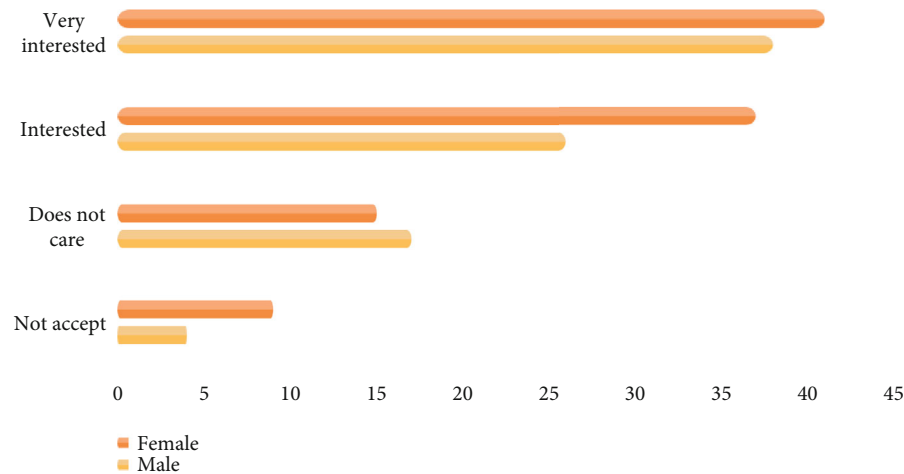
FIGURE 3: Learners' interest in English online learning platforms.

TABLE 4: The frequency of learners' use of online English learning platforms.

Frequency of usage	Number of male users	Number of female users
Three times a day or more	43	55
Once or twice a day	26	38
Four to six times a week	17	11
One to three times a week	4	3

learning motive. The design of online English learning platforms should better serve users and provide users with a convenient and complete learning environment.

4.2. Feasibility Analysis of Designing and Implementing Online English Learning Platforms. The purpose of the feasibility study is to determine whether a platform has development value and can be completed within a limited time with existing resources and technology. This paper discusses the design and development of an online English learning platform that is supported by the mobile phone and computer. The time for development (excluding prerequirement analysis and system testing work) is limited to two months. Such an English learning platform mainly provides users with a channel to learn daily English vocabulary and practice listening, reading, writing skills, and oral English. At present, the learners' demand for online English learning platforms or apps is still growing, especially among the young learners.

The online learning platform provides a good many network connection interfaces and tools and can easily filter the content of HTML files. In addition, a variety of additional development kits are provided for developers to use. By obtaining the HTML file content of a specific webpage and then using the document tool or string tool to filter and intercept the text content, the desired content can be obtained. In such a system, the function that needs to use web crawling content is mainly to pull the podcast list and get the podcast tags, complete original texts, and audios. The SQLite database provided by the platform is a lightweight and powerful database. The database operation process is roughly the same as that of the SQL server, so there is basically no difficulty. The content that needs to use data interaction in this system includes managing favorites and downloading tasks and thesaurus. At present, the development skills of the English network learning platform have become mature, and the development-related technical reference materials have been completed. The experience sharing of many developers has also provided instructive answers to the problems that may be encountered in the development process. Therefore, it is completely feasible to develop an English learning platform based on the system's own development capabilities.

This kind of English learning platform is oriented to computer and mobile phone users, with a friendly interface and clear prompts. It provides users with multiple personalized operations, and users can quickly understand how to use the application. Each module of the application supports touch screen operation, and users can conveniently use all the functions. Developers also try to fully consider the needs of users, solicit opinions during the needs analysis, and obtain suggestions for improvement through feedback during the testing phase.

This kind of English online learning platform does not violate national laws and regulations and will not infringe the rights and interests of others. It is developed under an open source system, and its development tools, reference materials, and launching do not contain any infringement.

In addition, this paper collects the information of some popular online English learning platforms among English learners in China, such as Youdao, Do not recite words, Baicizhan, and Scallop English. The details are shown in Table 5 and Figure 5.

Among the four well-known online English learning platforms/apps on the market, Youdao is the earliest one, and the number of downloads is significantly more than others. Youdao has complete functions, beautiful interface, and convenient design, which is very friendly to users. Once users like
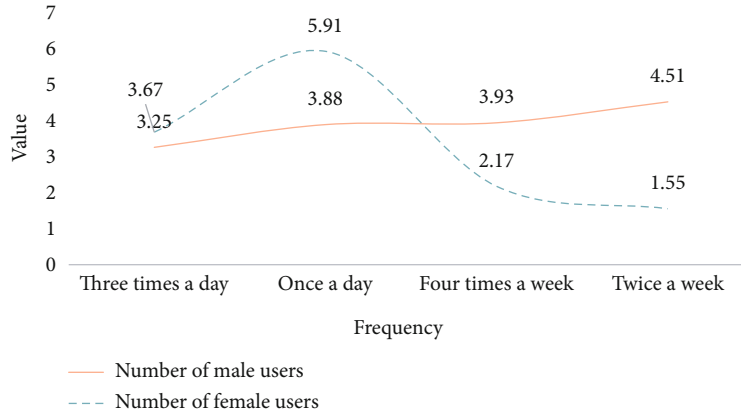
FIGURE 4: The frequency of learners' use of online English learning platforms.

TABLE 5: Popular online English learning platforms.

Name of the platform or app		Youdao	Do not recite words	Baicizhan	Scallop English
Time to market (year)		2007	2016	2014	2014
Downloads (unit: ten million)	Android	46.4	3.9	27.3	21.4
	iOS	39.5	4.7	22.6	15.2

FIGURE 5: Popular online English learning platforms.

one platform/app, they will keep using it for a long time and share it with friends. As a result, more users will download it and this platform/app will take up a large market share. Baicizhan is very popular among college students who want to have a large vocabulary. Baicizhan contains different types of learning activities that are designed to help learners remember English words actively, so this app is much more interesting than the traditional way of reciting English words. At present, Scallop English seems to be less known than Youdao and Baicizhan. However, its adaptive system is more trendy and will have greater influence in the near future.

4.3. Performance Test of Online English Learning Platforms. The concurrency, fault tolerance, real-time performance,

instantaneous peak value of the server, and the load of the system of the network learning platform should be tested. When testing the performance, you must choose a suitable place. The detailed information of the pressure situation in this scenario is shown in Table 6.

With the pressure in the testing process and on the basis of recording various information, the performance of an online English learning platform can be obtained and shown in Figures 6 and 7.

The buffer delay test is to test the data transmission speed in 4G environment. The previous functional test has proved that the system can play video files normally. In the text buffer experiment, a total of six smartphones with similar configurations is used. To perform video on demand, we record the different buffer delay time (in seconds) of each mobile phone for each on-demand. The experiment is carried out 10 times. The results are shown in Table 7 and Figure 8.

It can be seen from the results of function test and performance test that each performance index has reached the target requirements set by the school, and the online learning platform can be widely used to replace the existing teaching management system. According to the above analysis, the following conclusions can be drawn:

(1) The well-designed online English learning platform has relatively complete functions and meets the needs of both students and teachers. It includes a series of functional modules such as students' registration, analysis of students' profile, courseware and learning resources management, test management, test score analysis, interactive discussion, online monitor, and feedback

TABLE 6: Performance test.

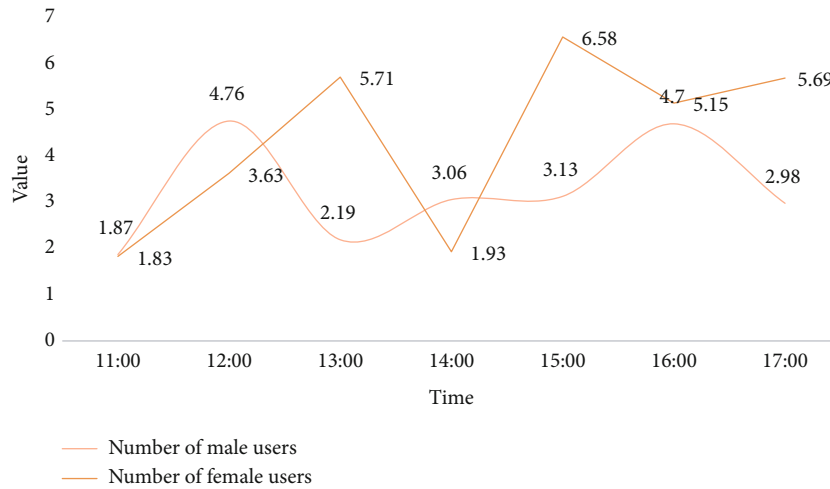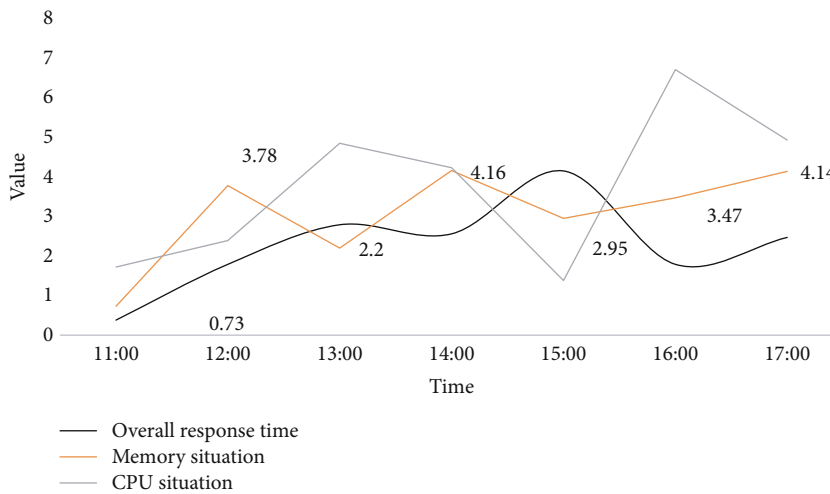| Serial number	1	2	3	4	5	6
Item	Total duration	Maximum number of runs	Total throughput	Average throughput	Total clicks	Average hits per second
Value	1 h 8 min 35 s	2,489	155,854,354	38,546,	15,634	3.878

FIGURE 6: Online population test.

FIGURE 7: Overall response time, memory, and CUP test.

TABLE 7: Statistics of buffer delay test.

Number of experiments	1	2	3	4	5	6	7	8	9	10
User 1	1	0.9	1	0.9	0.85	1.2	1.1	1.1	0.85	1
User 2	1.2	0.8	1.1	1	0.7	1.1	1.5	1	0.85	1
User 3	1.1	0.85	1	0.9	0.8	1.3	1.1	0.9	0.85	1
User 4	1.2	0.85	1.1	1	0.9	0.7	0.75	0.8	0.85	1
User 5	1.1	1.2	1.1	1	0.95	0.9	0.8	0.7	0.05	1
User 6	1	1.1	1.05	1.2	1.25	1	0.85	0.8	0.85	1

(2) There are no major defects in the implementation of the present online English learning platform

(3) The reliability and security of the online English learning platform are relatively high

4.4. Impact of Online English Learning Platforms on Learner Performance. In order to know whether online English learning platforms are effective or not, a simple empirical research was made in a college. 60 students were selected randomly as participants from the freshmen who major in engineering. They were divided into the treatment group and control group randomly. There was no significant difference in English proficiency between the two groups, as a proficiency
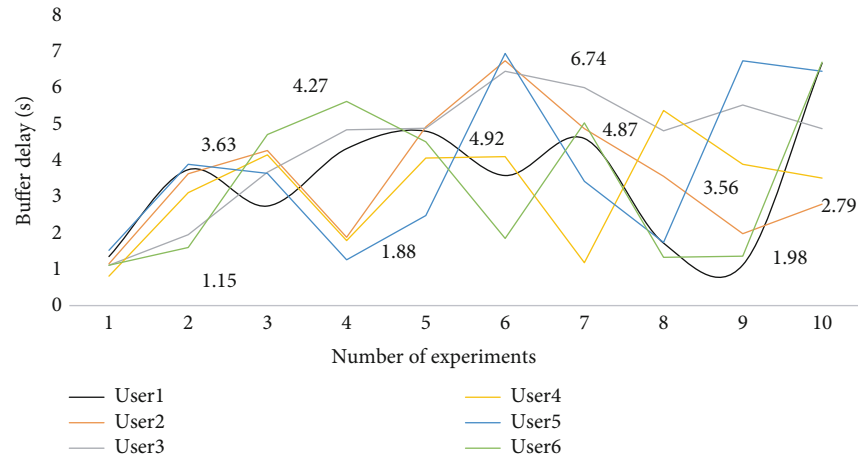
FIGURE 8: Results of the buffer delay test.

test of English was made shortly after they entered college. Participants were asked to fill in the blanks of 10 sentences after self-study, and the missing words for the blanks were in the text of their textbooks. For the treatment group, participants learned the text through the online learning platform, and for the control group, participants learned by themselves. After learning for 20 minutes, they began to fill in the blanks. The result showed that there was significant difference between the two groups. 21 participants of the treatment group got 10 correct answers, which accounted for 70% of the group number, while only 6 participants of the control group got 10 correct answers, which accounted for 20% of the group number. Furthermore, the average correct answers of the treatment group and control group were 7 and 4, respectively. Therefore, an online English learning platform is very effective for learners' self-study, which makes a good supplement for class teaching.

According to interviews among the participants, most of them like to learn online and can adapt to online learning. They find that online learning through platforms is sometimes more interesting and flexible, especially during the pandemic when schools are closed. Meanwhile, the resources provided by the online English learning platforms are much more abundant than those on class. Online learning is favored by students who have a strong learner autonomy.

5. Conclusion

Modern advancement is becoming prominent these days, and it also affects the way people studies. Online learning platforms transform the traditional learning model into the process of active knowledge construction. With the help of these platforms, learning becomes more flexible, and it is available for individual learners wherever they have computers, mobile phones, and internet access. Online learning platforms can better meet the needs of learners of different ages and different learning goals. The smartly designed platforms pay attention to the individual differences of learners and assign learning materials that conform to their interests, cognition, and level of learning. Teachers may share the excellent teaching content and teaching design through

online learning platforms to truly enjoy quality teaching without going out of the home. Compared with the conventional teaching model, online learning platforms can improve students' ability to use resources, thereby enhancing their learning autonomy.

This paper discusses the design, implementation, and evaluation of online English learning platforms. In the stage of design, neural network, universal design, and the server-side development architecture may be employed. Of course, there are still other types of technology to be applied. The implementation of online learning platforms is related to easy usability and operability. A good platform should be user-friendly, bringing convenience to both students and teachers. The evaluation of online learning platforms is made empirically and technically. Through questionnaire, data analysis, and case study, students' responses to online English learning platforms are shown clearly—most of them believe online English learning platforms are beneficial to their study. In addition, performance test of this study shows that the reliability and security of the online English learning platform are relatively high. However, this paper has limitations due to the number of participants and conditions of tests. More and more attention is paid to the inquiry of online learning platforms, and future research will be directed towards this aspect.

Data Availability

No data were used to support this study.

Conflicts of Interest

There are no potential competing interests in our paper.

Acknowledgments

References

[1] J. J. Tseng, Y. S. Cheng, and H. N. Yeh, "How pre-service English teachers enact TPACK in the context of web-conferencing teaching: a design thinking approach," *Computers & Education*, vol. 128, pp. 171–182, 2019.

[2] D. Bollegala, "Dynamic feature scaling for online learning of binary classifiers," *Knowledge Based Systems*, vol. 2012, no. 1, pp. 53–58, 2017.

[3] M. Anshari, Y. Alas, and L. S. Guan, "Developing online learning resources: big data, social networks, and cloud computing to support pervasive knowledge," *Education & Information Technologies*, vol. 21, no. 6, pp. 1663–1677, 2016.

[4] A. M. Korhonen, S. Ruhalahti, and M. Veermans, "The online learning process and scaffolding in student teachers' personal learning environments," *Education and Information Technologies*, vol. 24, no. 1, pp. 755–779, 2019.

[5] Z. Q. Tang, H. L. Heung, K. Y. Tong, and Z. Li, "A probabilistic model-based online learning optimal control algorithm for soft pneumatic actuators," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 1437–1444, 2020.

[6] A. J. Prunuske, L. Henn, A. M. Brearley, and J. Prunuske, "A randomized crossover design to assess learning impact and student preference for active and passive online learning modules," *Medical Science Educator*, vol. 26, no. 1, pp. 135–141, 2016.

[7] J. Djan and B. George, "Standardization or localization: a study of online learning Programmes by tertiary institutions in Ghana," *European Journal of Contemporary Education*, vol. 4, no. 184, pp. 430–437, 2016.

[8] A. Bellocchi, K. A. Mills, and S. M. Ritchie, "Emotional experiences of preservice science teachers in online learning: the formation, disruption and maintenance of social bonds," *Cultural Studies of Science Education*, vol. 11, no. 3, pp. 629–652, 2016.

[9] N. W. Tsai, "Assessment of students' learning behavior and academic misconduct in a student-pulled online learning and student-governed testing environment: a case study," *Journal of Education for Business*, vol. 91, no. 7, pp. 1–6, 2016.

[10] M. King, M. Forsey, and M. Pegrum, "Southern agency and digital education: an ethnography of open online learning in Dili Timor-Leste," *Learning Media and Technology*, vol. 44, no. 3, pp. 1–16, 2019.

[11] R. Vanoostveen, F. Desjardins, and S. Bullock, "Professional development learning environments (PDLEs) embedded in a collaborative online learning environment (COLE): moving towards a new conception of online professional learning," *Education and Information Technologies*, vol. 24, no. 2, pp. 1863–1900, 2019.

[12] F. Silva, L. Correia, and A. L. Christensen, "Evolutionary online learning in multirobot systems," *Ai Matters*, vol. 3, no. 1, pp. 23-24, 2016.

[13] R. Dixit and U. S. Bedi, "Online learning with inexact proximal online gradient descent algorithms," *IEEE Transactions on Signal Processing*, vol. 67, no. 5, pp. 1338–1352, 2019.

[14] R. A. Perkins, "Assessment and evaluation in online learning," *Library Technology Reports*, vol. 55, no. 4, pp. 31–34, 2019.

[15] S. Kim and S. K. Moon, "Sustainable platform identification for product family design," *Journal of Cleaner Production*, vol. 143, pp. 567–581, 2017.

[16] C. Xie, C. Schimpf, J. Chao, S. Nourian, and J. Massicotte, "Learning and teaching engineering design through modeling and simulation on a CAD platform," *Computer Applications in Engineering Education*, vol. 26, no. 4, pp. 824–840, 2018.

[17] J. Laakkonen and J. Parkkila, "Incorporating privacy into digital game platform design: the what, why, and how," *IEEE Security & Privacy*, vol. 14, no. 4, pp. 22–32, 2016.

[18] C. Bing-Er and X. Jian-Ning, "The platform design of space-based optical observations of space debris," *Chinese Astronomy and Astrophysics*, vol. 41, no. 1, pp. 109–124, 2016.

[19] H. Gürsoy, "Control system implementation on an FPGA platform," *IFAC-Papers OnLine*, vol. 49, no. 25, pp. 425–430, 2016.

[20] C. Yang, T. Wang, and Y. Chen, "Design and analysis of an omnidirectional and positioning tolerant AUV charging platform," *IET Power Electronics*, vol. 12, no. 8, pp. 2108–2117, 2019.

[21] M. M. Chingos, R. J. Griffiths, C. Mulhern, and R. R. Spies, "Interactive online learning on campus: comparing students' outcomes in hybrid and traditional courses in the university system of Maryland," *The Journal of Higher Education*, vol. 88, no. 2, pp. 210–233, 2017.