

Research Article

A ML-Based Efficient Chinese Teaching Platform Design and Implementation

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With the development of emerging information technology, the online learning platform represented by “Internet + education” makes online learning a new way of learning. However, at present, most teaching platforms still cannot realize intelligent analysis and evaluation. This article mainly focuses on Chinese language teaching and designs a set of Chinese language teaching platform on the basis of fully studying the characteristics of Chinese language teaching and deep learning strategies. We tested the teaching platform through a series of experiments. A large number of test results show that the Chinese teaching platform designed in this article has a good performance in terms of participation and sense of acquisition, and about 79% of them scored above 3 points.

1. Introduction

With the rapid development of today’s information technology, the network has become an important tool for business people’s production, management, and life [1, 2]. Information dissemination on the Internet has the characteristics of widespread and rapid dissemination, so online education using the Internet is developing in the direction of standardization and dissemination [3, 4]. The rapid development of network technology and the continuous improvement of network transmission speed will provide excellent online education in international Chinese language education. At the same time, the use of online payment methods is becoming more and more popular, making it easier to cross-border and online sales [5, 6]. With the development of the mobile Internet in the past two years, the diversity of online learning forms has increased significantly, and many of the abovementioned favorable factors have provided an opportunity for the development of an online Chinese teaching platform [7, 8]. As the name suggests, online education is a teaching method based on the network. Through the network, students and teachers can carry out teaching activities even if they are thousands of miles apart. In addition, with the help of network courseware, students

can study anytime and anywhere, which really breaks the restrictions of time and space. For workplace people with busy work and uncertain learning time, network distance education is the most convenient way of learning.

Regarding the study of Chinese language teaching, some researchers now say that domestic and foreign universities, Confucius Institutes, and commercial education institutions mainly adopt traditional Chinese methods and teaching methods. The learning process lacks fun and entertainment, which seriously affects students’ enthusiasm for learning Chinese. Although some colleges and universities have taken online education as a supplementary method, the form and content of online education are far from being able to meet the modern education needs of international Chinese language education [9]. Some researchers also pointed out that insufficient teachers and uneven quality are the main problems that plague the international Chinese language education. Due to the slow development of Chinese education in our country, international Chinese language education has become a new theme. Its teacher training system and teacher accumulation are far inferior to other countries. The severe shortage of teachers is the main obstacle to the development of international Chinese language education [10]. Although some universities and training institutions

have adopted online teaching methods, most of them have problems such as backward network technology, difficulty in updating content, and insufficient appeal of online courses. However, with the rapid development of information technology, it is obvious that online platforms have advantages in international Chinese language education. There should be a lot of room for development [11]. In summary, the Chinese language learning platform is a big development trend, and it can make up for the shortcomings of offline education. With the rapid development of information technology, especially from the Internet to mobile Internet, a cross time and space way of life, work, and learning has been created, which has fundamentally changed the way of knowledge acquisition. Teaching and learning can be free from the restrictions of time, space, and place, and the channels of knowledge acquisition are flexible and diversified.

This work studies the Chinese teaching platform based on deep learning, analyzes the advantages of the Chinese teaching platform on the basis of literature data, designs the Chinese teaching platform based on deep learning, and then tests the designed platform. The results draw relevant conclusions.

2. Research on Chinese Language Teaching Platform

2.1. Advantages of Chinese Teaching Platform

- (1) The platform is an online interactive education website that enables teacher-student interaction. Compared with teaching other subjects, language education requires more people to participate, especially language teaching. Real-time communication is very important. Platform education solves the problem of delayed communication between teachers and students, so that students' wrong answers and results can be corrected in time. This can guide and strengthen students' self-control. For example, for international students, the most difficult tones in Chinese learning, many students still have inaccurate tones in the early stages of learning, even in the intermediate and advanced stages. On the online education platform, teachers can correct mistakes in time, remind students, and give pronunciation guidance.
- (2) Teachers impart knowledge faster and improve the accuracy of students' knowledge acquisition. Through real-time video communication between students and teachers, students can receive feedback from teachers in time and improve the accuracy of learning content. Example: if there is only the student's audio information, the teacher may know that the student's pronunciation is wrong, but it is difficult to give feedback to the student. Without the video communication on the online interactive platform, it is difficult for the student to correct the pronunciation in time. After presenting the learner's video images in real time, the teacher can further guide the learner by displaying the learner's mouth

shape and the learner's language map, comparing pronunciation and other methods. In addition, teachers can answer questions that arise during the learning process at any time. The difference of cultural background is a broad concept, which refers not only to the differences between different cultural circles but also to the differences between subcultures within the same cultural circle. Because, from the actual situation of cross-cultural communication, the differences in cultural background leads to communication errors, and the interpersonal communication between China and European and American countries is easy to cause conflicts.

- (3) Students can better understand Chinese culture. At home and abroad, students cannot really experience the elementary/advanced level of Chinese culture, but on the platform, they can experience Chinese culture through on-site painting and interaction with Chinese teachers and deepen their understanding of Chinese culture. Cross-cultural learners actively participate in Chinese learning and adhere to the laws of Chinese learning and the theory of actual language learning. Teachers introduce language and culture into the classroom to improve cross-cultural communication skills, so that students can better understand Chinese culture.
- (4) There can be better emotional communication between teachers and students, which helps to form a good teacher-student relationship. Through the online interactive education platform, teachers can express different expressions, such as happiness, likes, and discomfort, and convey their thoughts to students during the teaching process. Students can also actively participate in the teaching process, such as joking with the teacher in class. At the same time, students can convey satisfaction and confusion to teachers in real time through language and expression. "Through this interactive process, the emotional integration between teachers and students can be promoted, and a harmonious relationship between teachers and students can be built." After teachers and students understand each other, interaction can be further strengthened and communication will be more natural. Teacher-student relationship refers to the mutual relationship formed between teachers and students in the process of education and teaching, including their status, role, and attitude towards each other. It is a special social and interpersonal relationship. It is a multivariate and multilevel relationship system formed by teachers and students through direct communication activities of teaching and learning with their unique identity and status in order to achieve educational objectives.

2.2. Application of Deep Learning

2.2.1. Deep Learning Can Provide Real-Time Feedback on Educational Process Issues. In-detail learning allows you to extract, analyze, and evaluate student behavioral data in the

real-time learning process by tracking the details of real-time learning. Evaluate the learning process according to defined educational objectives, get an assessment of the value of the learning process, find learning problems based on the gap between the evaluation results and the objectives, and analyze the cause of the problem in a timely manner according to the evaluation indicators, and it provides feedback to students' evaluation-based learning conditions to avoid learning problems and improve learning outcomes. In the process of learning, many students are often confused about why there is always a gap with their learning goals, but they can always find a reason and not know what to do. Learning assessment analyzes and judges students' learning processes and outcomes, subdivides indicators, finds out which students' learning behaviors meet the criteria, analyzes gaps in learning goals, and describes various information about the learning process.

2.2.2. Thorough Learning Can Provide Students with Adaptive Educational Guidance. Traditional learning assessments focus only on learning outcomes, making it difficult to assess the learning process. The reason is that teachers do not have a clear understanding of each student's learning behavior during the learning process. Student teachers are mostly subjective in the learning evaluation process and have no way of recording the learning process and student psychological changes. In most cases, teachers do not teach students based on their abilities, but rely on their work and feedback to determine if they understand their knowledge. However, the results of modifying my homework and collecting feedback are very poor. Teachers can only take care of many students and it is difficult to guide the learning situation of each student. Deep learning can effectively solve this problem. The student learning process has data files that computers can process and analyze. Online learning assessments can be used as the basis for education. Especially in recent years, the development of big data is progressing very rapidly. Through learning assessments, students are provided with adaptive teaching guidance and real-time lesson preparation for student differences and abilities. Deep learning is the internal law and representation level of learning sample data. The information obtained in the learning process is very helpful to the interpretation of data such as text, image and sound. Its ultimate goal is to make the machine have the ability of analysis and learning like human beings, and be able to recognize characters, images, sounds and other data.

2.3. Deep Learning Algorithm. As shown in Figure 1, compared with traditional methods, deep learning has many advantages. Deep learning can skip the process of extracting complex features, selecting features, and building models. It only needs to preprocess the initial data, adaptively export it through deep learning, train and test the data, and finally get a classification model [12]. The advantage of deep learning over traditional neural networks lies in the "depth" of the network. The deep grid with multiple hidden levels can transform the function from level to level. With the

continuous increase in the number of network nodes, not only can the potential information in big data be effectively detected, but the recognition accuracy has also improved. Compared with the traditional methods that require expert experience and manual feature extraction, the research value of troubleshooting problems that tend to be "big data" is higher.

Restricted Boltzmann machine (RBM) is an important element of DBN, which contains two levels: the visible plane h and the hidden layer v . Level h is used to receive training data, and level v is used to extract feature results. RBM satisfies important attributes, that is, the conditions between neurons are independent, that is, the neurons between the light layer and the hidden layer are connected to each other, but the two neurons are independent of each other. If a layer of neurons has a specific state, the state of the neurons in the associated grid is not affected by the states of other neurons in the layer. Due to this feature, RBM does not have to calculate only one neuron at a time during training, but calculates the entire layer of neurons at the same time. This improves the parallelism of the algorithm and improves the computing performance from the algorithm level. The complete RBM structure: the upper and lower layers represent hidden and visible layers, and each neuron represents a dimensional vector. After the initial "low-level" feature representation is gradually transformed into "high-level" feature representation through multilayer processing, complex classification and other learning tasks can be completed with the "simple model." Thus, deep learning can be understood as "feature learning" or "representation learning."

3. Design of Chinese Teaching Platform Based on Deep Learning

3.1. Web Design. The first impression of learners of online education platforms is the web design of the platform, and students tend to prefer simple and intuitive websites. In addition, the summary page uses a lot of FLASH to slow down the opening speed of the page, and it must be downloaded locally before the animation and images can be executed. Large images and animations will slow down the speed of the website. Since the screen resolution is only 72 dpi, usually an image of about 100 K can meet the demand. Therefore, compressing the image size as much as possible while ensuring the image quality is an effective way to speed up the page loading speed. In addition, it is recommended to use flash memory cautiously for websites because animation not only takes a long time to load but also slows down the opening speed of the website and cannot be recognized by search engines, which is not good for later website optimization. In addition, there are other resources to consume, especially some special effects written in JS code. For example, for the most popular add-ons, navigation bars, and image player add-ons, the code is simplified, but consumes a lot of server resources, reducing the page loading speed. Finally, you need to control the scrolling of the pictures on the website. If you do not control the number of scrolling images, the speed of the website will also slow

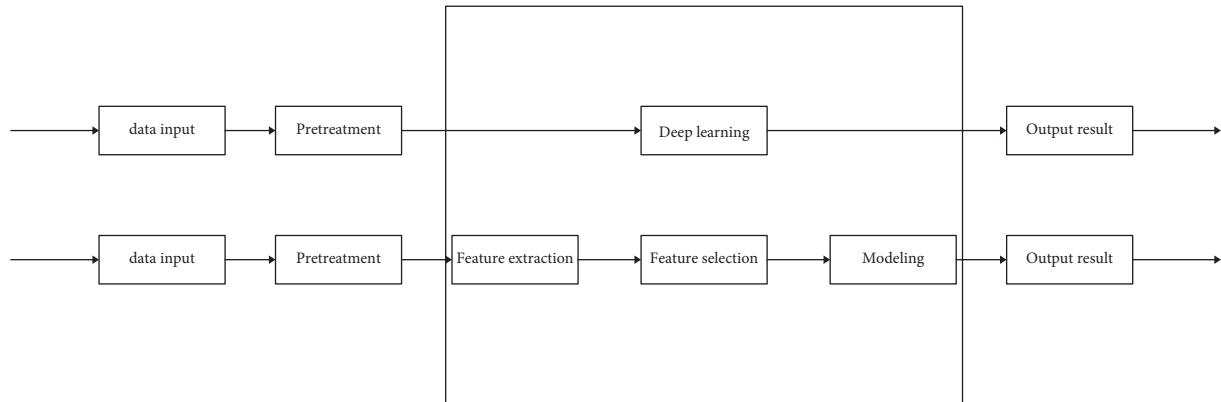


FIGURE 1: Deep learning algorithm flow.

down. Therefore, this article will mainly focus on simplified pictures, without inserting flash videos to reduce the amount of text and focus on functionality. Deep learning emphasizes the depth of model structure. The importance of feature learning is clarified. In other words, the feature representation of the sample in the original space is transformed into a new feature space through layer-by-layer feature transformation, so that it is easier to classify or predict. Design and establish an appropriate number of neuron computing nodes and multilayer computing hierarchy, select the appropriate input layer and output layer, and establish the functional relationship from input to output through network learning and optimization.

3.2. Teaching System

3.2.1. Differentiated Courses. Modern education pays more and more attention to mobilizing students' willingness to learn and emphasizes students everywhere. Therefore, online Chinese as a foreign language course also needs to strengthen the content of the course and change the teaching method that was full of ducks in the past. The platform designed in this article is applicable to various nationalities. Most netizens have free time to learn Chinese. Therefore, students have different understandings and needs of Chinese design courses, from the simpler to the deeper. Compared with traditional classroom students, there is less time to strengthen the initial shortcomings, and the range of network users is wider. Therefore, the user's time is more precious. The course designer provides them with different courses that must be designed.

3.2.2. Preclass Evaluation and Selection System. Making a personalized learning plan is the most important part of the platform. The preclass assessment of the platform requires both "people" and "machines" to cope with different situations and save human resources at the same time. For students with unclear learning goals, websites and apps provide self-evaluation tests and recommend suitable learning courses to students based on the results of the evaluation. The evaluation is mainly related to "comprehensive courses" at different levels. For students with clear

learning goals, this website provides online course guidance. First, check the learner's learning level in the video and then design a complete learning plan according to the learner's requirements. For example, you can also provide "comprehensive courses." After creating a learning plan, learners can make their own choices based on the courses purchased, time, and teacher's course selection system on the site. This is to help teachers prepare better. The course requires students to choose a specific time period to attend the class. For example, if a student starts class at 19:00 on Sunday and chooses a class before 05:00 on Sunday, he will complete the class two hours in advance, and the class selection system will be automatically closed. The setting of selecting courses and taking classes can expand students' knowledge and skills, develop students' interests and specialties, cultivate students' personality, promote teachers' professional growth, and promote the formation of school characteristics and the diversification of school running modes.

3.2.3. Homework and Feedback. A complete education system should include all steps before and after class, even in online classrooms. Homework helps students integrate the knowledge they have learned in class and can also prepare for the next lesson. As the learning time of the online platform is "fragmented," the tasks should not be too heavy, so as not to put pressure on the students. Unlike traditional classrooms, school homework on the network platform can be selected from a complete database, such as video homework, audio homework, and simulated exam homework, and can be delivered quickly and easily. Offline APP ensures that individuals can learn anytime anywhere. After-class feedback can be divided into two parts: the teacher fills in the part (required) and the student fills in the part (optional).

3.3. Teaching Mode

3.3.1. Online Real-Time Education. In the past few years, online real-time education has been a slow but very stable way of education. Compared with traditional classrooms, its shortcoming is weaker interaction; but compared with real-time offline education, there are some interactions that can

reduce students' loneliness. The purpose of the distance education system is to realize an efficient teaching method of individualized and individualized teaching, which is a revolution to the traditional teaching mode. It breaks through the limitations of traditional "face-to-face" teaching and provides knowledge seekers with an innovative way of learning with time dispersion, free arrangement of learning, resource sharing, vast territory, and interaction.

3.3.2. Nonlinear Real-Time Education. Nonlinear real-time teaching is a teaching method that needs to be recorded in advance and consumes a lot of time and energy in the preparation phase. A complete education plan and process need to be developed before recording. Offline education is more suitable for students with a high degree of autonomy. This is due to the lack of interaction between teachers and students. Students cannot ask questions or get effective answers in time while watching videos. The learning effect is greatly reduced, and the motivation to learn is also reduced.

Therefore, this site not only provides video lectures but also offline video lectures. The site's educational video resources allow learners to download and site applications at the same time. Students can watch or download videos on the website anytime, anywhere through the video tutorial application.

3.4. Deep Learning Module. The model mainly uses three modules to extract knowledge points for learners: diagnosis module, prediction module, and early warning module. The judgment part mainly uses the indicators of online teaching activities to judge the knowledge points of learners. The student data of the diagnostic unit can also be saved to the school case library. The prediction module mainly uses case-based reasoning technology (CBR), which compares the new student with the school's case library to predict the new student's mastery of knowledge points. If you want to make an early warning, you must add an early warning model on the basis of these two models to warn new students about their online mastery of knowledge. The detailed information between the detection unit and the early warning model is as follows.

3.4.1. Diagnosis Unit

- (1) The test question knowledge table enters the association table, which describes the detailed information of the knowledge points that can be tested for each test question. Collect data about student e-learning tests. These data are mainly used to form a student case library to lay a solid foundation for the prediction module.
- (2) Establish a knowledge diagnosis model based on the knowledge table of test questions and test data
- (3) Combine the knowledge diagnosis model with data testing to judge the learner's knowledge advantage

- (4) Analyze the problem of knowledge acquisition based on the degree of knowledge possession, self-cognition characteristics, and domain knowledge base
- (5) Record complete data

3.4.2. Forecast Part

- (1) Collect learner's knowledge in the diagnosis part of the student case library to make predictions
- (2) Determine the prediction algorithm based on the student case library, student model, knowledge structure analysis, and test question analysis library. The platform uses predictive algorithms to calculate whether an early warning is needed.
- (3) The presentation of early warning information presenting early warning information to knowledge-poor students and presenting learning status to knowledge-rich students. Students can demonstrate their knowledge in many forms.

3.4.3. Early Warning Unit

- (1) Early warning information, triggering early warning information, is divided into three categories: teachers and managers, systems, and students
- (2) Personalized recommendations and personalized resource recommendations. There are two ways. One is manual intervention by teachers or principals, and the other is adaptive system intervention. Training data refer to the data used to train the data mining model in the process of data mining. The selection of training data generally has the following requirements: the data sample is as large as possible, the data are diversified, and the data sample quality is high.
- (3) Promote personalized resources and suggestions to students

4. Platform Test

4.1. Response Time Test. The response time of the platform is tested. Through simultaneous operation of login and course selection by different users, the response time of the platform is recorded. The data results are given in Table 1.

It can be seen from Figure 2 that the average response time of the platform designed in this study is 2 s during login, and the average response time of course selection is 4 s. It can be seen that the response time of the platform is relatively short.

4.2. Algorithm Test. This article tests the deep learning algorithm. The prediction results of the deep learning algorithm and other algorithms on the dataset "Climate Model Simulation Crashes Dataset" are given in Table 2.

The definitions of precision and recall are given in the following equations.

TABLE 1: Response time test.

	Log in	Elective
100	1.0	2.1
200	1.3	3.5
300	1.5	4.4
400	2.3	5.2
500	2.4	5.5

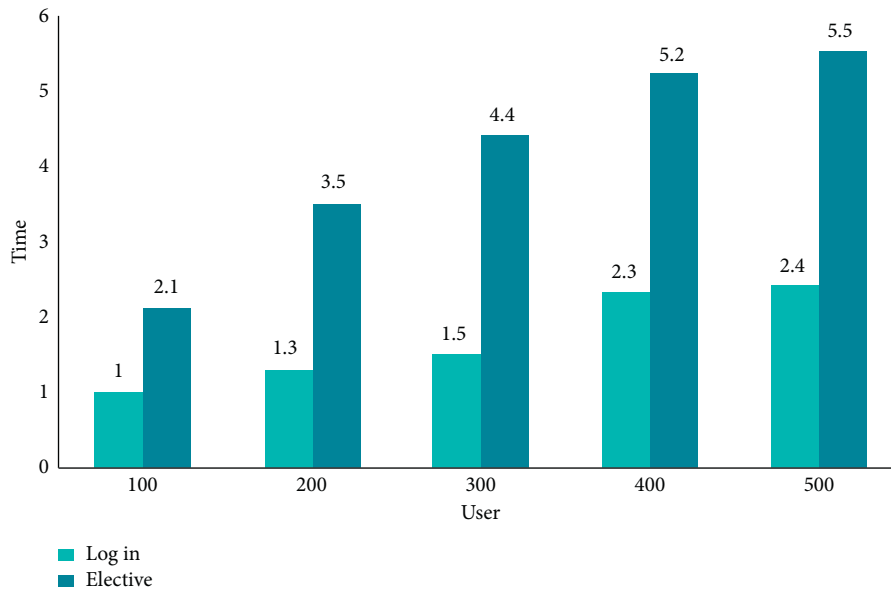


FIGURE 2: Response time test.

TABLE 2: Algorithm test.

Algorithm	Accuracy (p) (%)	Recall rate (r) (%)	F1 value (%)	Correct rate (a) (%)
KNN (optimal)	95.42	98.76	97.21	94.56
3-Layer BP neural network	92.1	83.33	89.23	77.78
LR classifier	97.63	98.91	98.33	96.67
Multilayer neural network (optimal)	96.75	96.56	96.54	93.47
K mean	88.13	36.31	51.34	36.85
Deep learning SDAE	98.88	100	99.26	98.89

$$P = \frac{TP}{TP + FP}, \quad (1)$$

$$R = \frac{TP}{TP + FN}, \quad (2)$$

where TP is the total number of positive classes predicted by the positive class, FN is the total number of positive classes predicted by the positive class, and FP is the total number of positive classes predicted by the negative class.

It can be seen from Figure 3 that compared with other algorithms, the value of the deep learning algorithm is higher overall. However, since there are only 450 training samples and only 18 input dimensions, the advantages of deep learning are still unclear. It is suitable for processing a large

amount of data, and it is difficult to use a small set of low-dimensional samples.

4.3. Evaluation of the Use of the Platform. Based on the above teaching design concept and design process, we used the Zoom platform to conduct a 48-class remote online teaching practice. After the practice is completed, a questionnaire survey will be issued to the practitioners to collect the results of the practice. The survey results are given in Table 3.

It can be seen from Figure 4 that the overall evaluation of the product is good, and the scores of students' sense of participation and sense of acquisition are above 3 points, which show that the learning platform designed this time is more humane.

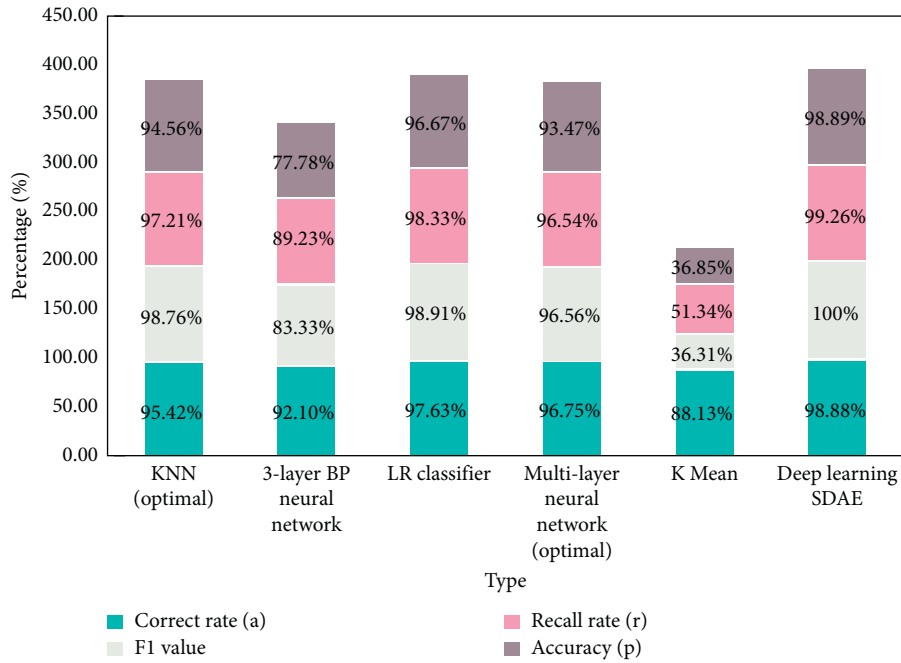


FIGURE 3: Algorithm test.

TABLE 3: Evaluation of the use of the platform.

	Participation (%)	Sense of gain (%)	Product quality (%)
1	10	8	9
2	12	13	14
3	34	33	35
4	44	46	41

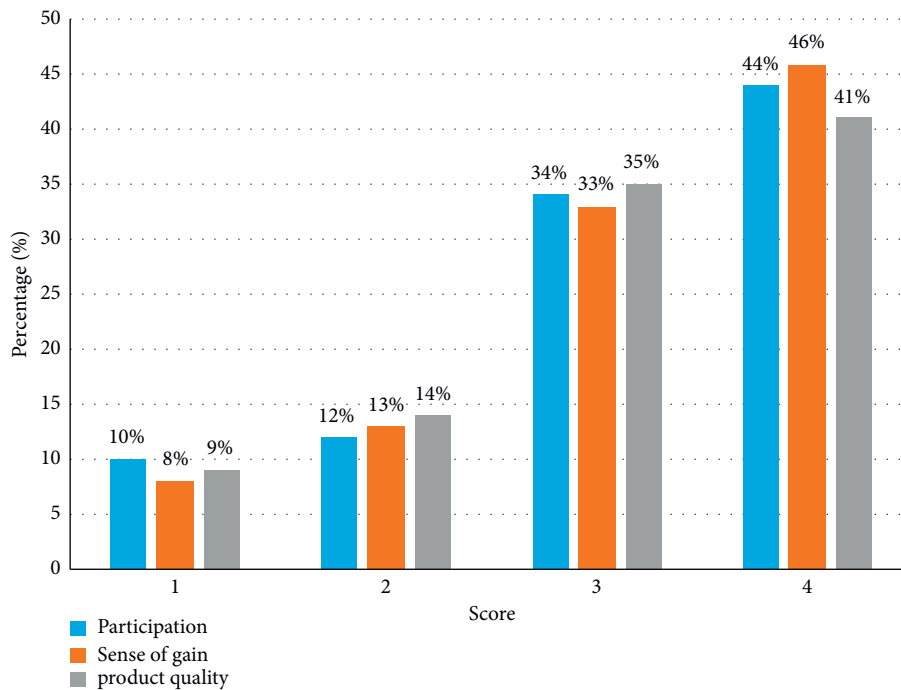


FIGURE 4: Evaluation of the use of the platform.

5. Conclusions

This work studies the Chinese teaching platform based on deep learning. After understanding the relevant theories, design the Chinese platform based on deep learning and then test the designed platform. The test results show that the overall evaluation of the platform designed in this study is better; the scores of students' sense of participation and sense of acquisition are mostly above 3 points.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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