# Research on College English Education Data Analysis Method and Development Suggestions Based on Improved BP Neural Network Algorithm

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**Abstract.** How to explore a new way to adapt to the changes of the times in today's teaching environment has become an urgent problem to be solved. This paper first analyses the profound significance of College English teaching, and expounds the time value of English teaching through the world cultural exchange and the dissemination of Chinese thought. Then we propose an improved BP neural network algorithm to analyse college English education data, and analyse the current situation of college education and college English education. In particular, the new problems in the post epidemic period are analysed to pave the way for the innovation and exploration in the following text. Focusing on the Internet as a tool, this paper puts forward three suggestions: making full use of Internet resources, differentiated autonomous learning, improving the traditional assessment mechanism and paying attention to practical application. Through comprehensive analysis, it is concluded that the above suggestions can produce different gains in all aspects.

**Keywords:** College English education · Neural network algorithm · Data analysis · Educational innovation

## 1 Introduction

As a subject that runs through students' learning career, English plays a vital role in students' education. From the initial contact with English in primary school to the further cognition in junior high school, students' English achievement has always been an important indicator to measure their learning achievements [1]. At the university stage, there are great changes in the form and content of English learning, resulting in more difficulties in English teaching and learning. College English teaching will lay a foundation for students' future work or further research study. At the same time, exchange of technology and information and talent flow around the world are increasingly active, which also makes English, the world's common language, more and more important in the new era. Around the world, college students' English proficiency, as an important tool for cross-border and cross-cultural communication, has a direct or indirect impact on

students' future development prospects, their international vision and discipline development, and even their study abroad. Therefore, English education is the cornerstone of the path to cultivate compound talents for the country in the new era.

However, as everything is developing, English education is not unchanging [2, 3]. With the constant changes of the times, teaching mode is ranged from the original, one teacher with multiple classes, to the information-based teaching using multimedia equipment, and then to the teaching under the background of the Internet in the new era. Up to now, English education has been gradually adapted to the COVID-19 situation after two years' practice. It has become a profound answer to the question of how to do a good job in College English education to explore the innovative measures of English teaching in today's context and to establish an English teaching model that is more suitable for the post epidemic era.

## 2  The Profound Significance of College English Teaching

Culture is the basis for the inheritance of the Chinese nation and the prosperity of the country. Cultural exchanges between countries are becoming increasingly close. Without the inheritance and continuation of traditional culture, there will be no foundation for the great rejuvenation of the Chinese nation. In today's fierce competition among countries, cultural soft power has become a necessary means to expand international influence and improve international status. Since China is in the initial stage of rejuvenation, we need to find experience in the excellent traditional culture in the world history. Only through the interaction between English and Chinese can we really promote the international development of China. English education is an important bridge between the export of China's traditional culture and the import of foreign culture. It enables countries around the world to better understand and recognize Chinese culture, and also enables China to recognize and learn foreign excellent traditional culture. Through the ages, the development of economy, science and technology, politics and humanities between countries have been achieved through cultural communication, and foreign language teaching is exactly the important tool for cultural communication, an important channel for the country to extend its application to the outside world, and the cornerstone of China's economic development.

## 3  Analysis of College Education Data

### 3.1  Improved BP Neural Network Algorithm

Classical BP neural network searches for optimization through local search [4], so it is easy to fall into local optimization on the training set and cannot get the global optimization value. At the same time, the accuracy of BP neural network in the test set is usually low. To solve the above problems, this paper improves the global search ability by using the new activation function and adding inertia to the parameter update formula, and improves the performance of BP neural network on the test set by introducing regularization into the error function.

In this paper, the rectified linear unit is selected as the activation function.

$$f = \max\left(0, w^T x\right) \tag{1}$$

When the parameter moves, not only the gradient descent, but also the direction of the previous iteration is considered. Therefore, the introduction of inertia can jump out of the local optimal problem.

$$f = \max\left(0, w^T x\right) w_{ij}^{t+1}$$
$$= w_{ij}^t + \left[ \lambda v_{ij}^t - \eta \frac{\partial E}{\partial w_{ij}^t} \right] \tag{2}$$

Where, $v_{ij}^t f_1$ represents the direction in which $w_{ij}^t$ moved in the previous iteration.

In order to improve the accuracy of BP neural network on the test set, this paper adds regularization to the error function of BP neural network. The new error function is:

$$E_i^{'} = E_i + \lambda \frac{1}{2} \|w_i\|_2 \tag{3}$$

Where

$$\|w_i\|_2 = (w_{i1})^2 + (w_{i2})^2 + \ldots \tag{4}$$

Before each parameter update, the parameter will be multiplied by a value less than 1, so that the weight of each update will be smaller.

### 3.2  Analysis of College Education Data Based on Neural Network Algorithm

This paper verifies the improved BP neural network algorithm based on the data of four English courses in a college in China. The course types and qualification rates are shown in Table 1.

The results shown in Fig. 1 can be obtained through simulation.

It can be seen from Fig. 1 that under different English courses, the method proposed in this paper has higher accuracy than the basic BP neural network method. This shows that the improvement scheme proposed in this paper is more suitable for English education data analysis.

**Table 1.**  Basic data.

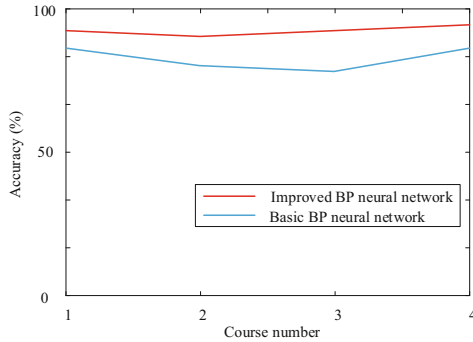| Course number and name | Course quantity | Time span | Qualified rate |
|---|---|---|---|
| 1: English history | 389560 | 3–5 weeks | 75%–79% |
| 2: Spoken English | 395240 | 3–5 weeks | 75%–77% |
| 3: Writing training | 351370 | 4–5weeks | 80%–83% |
| 4: Appreciation of English Literature | 357520 | 5–7 weeks | 81%–85% |

**Fig. 1.** Comparison of accuracy of different methods.

# 4   The Present Situation and Problems of College English Education

## 4.1   Current Situation of College Education

The initial purpose of establishing a university is to cultivate top-notch talents, but with the development of economy and education, the university has completed the transformation from elite education to mass education. At present, China has 1079 universities and 1184 higher vocational colleges, a total of 2263, which is very high in the world. All schools have a common goal, that is to cultivate qualified, socially needed, socially useful and time-honored talents. However, each university has its own unique discipline characteristics and academic style, and the objectives of training talents and school running ideas are also different. As a result, the students' demand for foreign language ability is different, and the English learning atmosphere and educational resource allocation are variable. Therefore, the English teaching level of each university is also uneven.

Due to the regional differences between different universities and the gap in the level of urban economic development, there is a large gap in educational resources and the overall level of teachers in different schools. For universities in developed cities, they not only enjoy higher education investment, but also are more likely to attract outstanding talents to participate in university construction, and their education level has made rapid progress. On the contrary, in economically underdeveloped areas, local urban education expenditure is often low, and universities can also obtain sufficient education funds. In addition, due to the relatively backward urban construction and the inability to attract high-level talents, the progress of college education is slow, and the improvement of students' level is facing many difficulties.

## 4.2   The Present Situation of College English Education

In terms of subjective initiative, students' attitudes and goals determine the results of English learning. Students' English education runs through their learning career. From the simple English Teaching in primary school to the improvement of grammar, tense, reading and composition in junior and senior high school, both of them take consolidating the basic knowledge of English as their main teaching objectives and contents.

However, there are great differences between College English learning and the former. If students do not change their ideas at the university stage, they think that English learning is still exam-oriented, just to pass the exam. Therefore, I am not interested in learning English and cannot learn independently. Secondly, for today's college students, most of the purpose of learning English is only to pass CET. The College English Test in China is a high-stakes standardized test to assess college students' English ability [5, 6]. Another important reason is that most students in China attach great importance to CET-4 and CET-6, and even some colleges or universities rule that students cannot graduate successfully without CET-4 certificate. At the same time, when college students are looking for jobs and taking the postgraduate entrance examination, the employer and the target school will also decide whether to hire or admit them with the standard of CET-4 and CET-6. To a large extent, the above points determine the starting point and attitude of students in learning English.

In terms of school education, due to the uneven level of student selection in major universities, there are differences in the level and ability of students cultivated by College English education in China. Students' personal level is divided into two extremes: students who have graduated from junior college and students who have studied abroad. The vast majority of students enrolled in colleges and universities are at an excellent level in all subjects and have a good foundation in English learning. After a short time of English study, they can pass CET-4 and CET-6. Students studying abroad in high school generally have a higher comprehensive level of foreign language than other students. At the same time, it is necessary to realize that there are still many students who upgraded from junior college to undergraduate, and their proportion of passing CET-4 at one time is very low. Even after four years of College English study, the cumulative passing rate of CET-4 is not optimistic. It is true that the level of students is uneven, but the final level of students can be improved through the curriculum arrangement and reasonable allocation of resources.

In terms of educational theory, the current ideas and theories have not made good changes to adapt to China's national conditions. With the wave of economic globalization and China's accession to the WTO, English ability has gradually become an important indicator of a person's working ability, so English education has gradually been paid more attention to. In our country's English education, most of them guide college students to learn English through books, and test their learning results with exams. In China's higher education, there is a lack of historical inheritance of English education, there is no integration into China's actual situation and traditional educational ideas, and the important educational methods inherited by China's tradition are ignored. Therefore, the theoretical system of English education is from quoting a large number of existing foreign educational theories unchanged. However, such educational theories will mislead students to a great extent, reduce their enthusiasm for learning, and hinder the development of College English education in China. On the other hand, China is a vast country with different levels of economic development. This determines that all regions cannot share a set of educational theories, and the educational reform is not simply "copying homework". Therefore, in order to better promote the development of English education in China, it is necessary to integrate the analysis of local economy

and educational resource level in detail, and actively "localize" foreign educational theories, so as to adapt to local conditions, better meeting the educational needs of different regions in China.

### 4.3 Problems in College English Education During the Epidemic Period

For English Teaching in the epidemic period, it is inevitable to use electronic equipment. However, considering the development of the times, people of all ages are more or less dependent on mobile phones, computers and other electronic devices. The rich types of mobile phone applications have deepened this dependence. Students' self-control ability is generally low. Even though most platforms design anti addiction systems for teenagers, they will still be difficult to extricate themselves from the wonderful online world. Therefore, it is a difficult problem to reasonably and scientifically convert students' addiction to electronic devices into practical and efficient online learning. Timely and appropriate psychological interventions for college students should be implemented to reduce the psychological harm caused by COVID-19 epidemic [7]. Especially in economically backward and geographically remote areas, these areas either do not have sufficient funds to carry out education reform, or are far away from the information source, and advanced education keys cannot be delivered in time. As a result, some universities and teachers are relatively backward in thinking and concepts, and it is difficult to correctly guide students to develop in a positive and healthy learning direction, and it is difficult to correct students' wrong learning habits. In addition, the current English teaching is mainly written application, while the training of students' oral use is relatively lacking. Although many teachers have realized the importance of oral English, the students' oral English level is still low due to the lack of appropriate teaching conditions and the lack of effective guidance in the examination process. Even if it is transformed into online teaching courses, the essence understanding of English teachers about teaching remains unchanged. In addition, in the process of online teaching, English teachers are difficult to supervise all students without face-to-face direct interaction, and fail to mobilize students' enthusiasm for learning. Teachers' authority is ignored to a certain extent. This makes it easier for students to be distracted in the network environment of good and bad, which can not guarantee the actual teaching quality of English course online teaching.

## 5    Characteristics of English Teaching in the Internet Age

English teaching during the epidemic is closely related to the Internet. For teaching under the Internet, it is superior to traditional teaching in all aspects. In general, four characteristics can be summed up in College English Teaching in the Internet age.

The first feature is the change in the structure of teachers and students. In the traditional offline English teaching, the structure of teachers and students is a "one to many" relationship, that is, the teacher is the center of English teaching. Classroom design, teaching process and student evaluation are often led by teachers. However, under the network teaching integrating the Internet mode, the structure of teachers and students has been changed, building a "many to many" relationship. Everyone can choose the course content according to their own interests and hobbies. Under that circumstance,

students can receive more attention and attention, improve the pleasure in the learning process, form negative feedback, and improve the overall level.

The second feature is that the resource allocation is more flexible and efficient. With abundant Internet resources, College English teaching can make it easier for students to obtain high-quality English learning resources and more listening and speaking practice opportunities. In addition, the excellent educational resources of the Internet have the characteristic of diversity and convenience, which can be accessed by students anytime and anywhere, making the allocation of learning resources more reasonable and efficient.

The third feature is the improvement of autonomy. Compared with the traditional English teaching mode, the network teaching mode can not only give students more choices, including teachers, teaching speed, teaching style and learning schedule. At the same time, it can also stimulate students' subjective performance in learning. Through students' independent learning arrangements, students' English learning level can be improved.

The fourth feature is that it can transform the traditional teaching thinking. The traditional English learning model can be improved by relying on the sharing and open characteristics of the Internet. The network platform can open learning resources. Platform users such as we media such as Tiktok and Kwai share educational resources by shooting simple and simple short videos. Media platforms that can upload long videos, such as Bilibili, Weibo and other software, also have free teaching videos, as well as professional online learning software, such as MOOC, Tencent classroom and other professional online course platforms. Most MOOCs scored highly on organisation and presentation of course material [8]. Learners can use fragmented time to learn, so that learning enthusiasts can take the initiative to obtain learning resources suitable for themselves.

## 6  Innovative Exploration of English Education in the Post Epidemic Period

### 6.1  Improve the Traditional Assessment Mechanism and Pay Attention to Practical Application

The traditional assessment mechanism of College English education is single, which pays too much attention to the examination results, and takes it as a standard to measure students' learning level, thus ignoring the more important practical application ability. Online courses in the post epidemic period make this defect worse, and it is more difficult for students to obtain the opportunity of practical application. Therefore, colleges and universities can use Internet resources to improve the learning system, and use the scoring mechanism of each platform to achieve feedback on reading, listening, speaking and writing. In the reading-based test, the oral and writing skills are ignored by teachers in English teaching process, which is also a weak link in the English assessment. A sound assessment mechanism can be established with the help of various existing resources on the Internet. For example, students can upload oral and listening content or write articles by themselves. First, it is essential to make a general judgment through the algorithm mechanism of each platform, and then analyse the specific content through the teacher,

and feedback the results to students through various applications. Teachers can also conduct periodic assessment through the platform to test the learning effect of students. We can grasp the learning problems and defects of students in each stage via the platform algorithm. According to these feedbacks, teachers can adjust the teaching plan, which can greatly improve the teaching efficiency.

## 6.2    Differentiated Autonomous Learning

Online teaching mostly takes large classes as the main teaching mode, and the learning ability and knowledge acceptance ability of each student are uneven. Then the final test scores are different, which has an impact on the cultivation of students' Comprehensive English ability and the planning of teachers' curriculum design. In order to make up for the differences caused by personal factors, the differentiated teaching of online courses can be used. Through the multi-channel feedback mechanism in the Internet, according to the machine analysis and students' independent narration, we can find the disadvantages and deficiencies in each unit and each online class for students' learning, so as to check and make up the holes, and assign different learning arrangements to different students. Students with the same level of learning will be grouped into a group. The students in each group will make full use of their time after class to discuss and study, and adjust their learning methods and time independently. This can not only reinforce and consolidate students' learning achievements, but also improve students' learning initiative and enthusiasm. English communication between groups can also improve students' practical application ability.

## 6.3    Make Full Use of Internet Resources

The Internet is rich in resources, which can bring more exciting content to the online course during the epidemic period. Students usually think that textbooks and their supporting ppt are outdated and cannot introduce students into classroom teaching. Therefore, students can tell what they are interested in before and after class. Students of the same age are easily attracted by this content and will enter the classroom teaching more quickly. Teachers can also integrate the above contents, guide them to the main body of this online course, and screen out relatively new materials related to textbooks for teaching. This not only meets the requirements of the combination of English teaching and Internet in the new era, but also is more suitable for students' learning and can improve students' Comprehensive English ability. Teachers can not only select high-quality English learning content with entertainment, but also connect them with professional content and current hot topics to better broaden students' horizons. English Teaching in Colleges and universities in the new era should not be confined to classroom learning. Colleges and universities should also establish more personalized foreign language databases, providing rich foreign language literature, excellent film and television works. In addition to the above learning resources, some experience sharing and exchange should also be included to help students improve their self-study ability. The combination with the Internet can also be reflected in the online interaction between teachers and students. Timely teaching feedback can not only provide students with learning convenience, but also shorten the distance between teachers and students.

## 7 Conclusions

Based on the analysis of the importance of English teaching and the significance of College English teaching, this paper proposes a method of College English data analysis based on improved BP neural network algorithm, and discusses the current situation and existing problems of English education. In view of the existing problems, this paper gives suggestions for future development from three aspects: assessment mechanism, learning methods and the use of the Internet.

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