

Exploration on English Teaching Reform under the Combination of Big Data and Artificial Intelligence Technology

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Abstract: With the development and application of new technologies such as big data (BD) and artificial intelligence (AI), English teaching has shown a trend of intelligence, and the mutual interaction between educators and learners is becoming more and more serious in the classroom, which has significantly improved the quality of English teaching. This paper studied the construction of English teaching system under the combination of BD and AI technology, aiming to analyze the improvement of students' English level through experimental tests. Based on the findings of the experiment, it can be seen that the average satisfaction of teachers with the English teaching system under the combination of BD and AI technology was 91.73 points on average. The improvement of students' overall English scores was up to 26.3%, which showed that the worth of English teaching could be greatly enhanced with the combination of BD and AI.

Keywords: Big Data, Artificial Intelligence Technology, English Teaching, Teaching Reform

1. Introduction

With the fast advancement of information technology, the concept of education is gradually changing. Under the conventional teaching approach, the teacher is the main evangelist and the students are the passive receivers. In the field of education, especially the emerging technologies such as BD and AI, this traditional teaching method has undergone great changes. In an education system that combines AI and data science, students are the subject of independent learning, and the AI system relies on data science to provide personalized learning recommendations for students, thus maximizing the teaching effect.

In the field exploration of English teaching reform under the BD and AI technology, many scholars have started to carry out further research. Chen J explored the reform of English writing teaching methods in the era of BD and AI [1]. Qian R used intelligent thinking process to process, train and test the dataset, so as to obtain enough English expression output [2]. Although there are many evaluation studies on the combination of BD and AI applied to English teaching, there are still some shortcomings.

Only the organic combination of BD and AI can promote a deeper change in English teaching. This paper focused on the reform of English teaching by BD and AI technology, and discussed how to apply "BD" and "AI" technology to English teaching and its effects from the utilization of educational technology and educational theory [3-4]. Through the building of English teaching assessment and evaluation system to accurately grasp the students' learning situation and level improvement, this paper tests the improvement of assessment and evaluation under the combination of BD and AI, and learns that the improvement of English teaching is good after data analysis. It showed that the combination of the two technologies has a good effect on English teaching assessment.

2. Construction of an English Teaching Evaluation System

2.1 Shortcomings of Traditional English Teaching System

The shortcomings of the traditional English teaching system are shown in Figure 1.

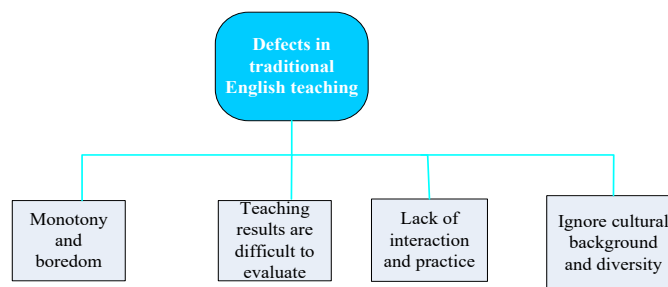


Figure 1: Defect Map of Traditional English Teaching System

The traditional English teaching system focuses on improving students' academic performance, but ignores the cultural background and diversity of English as a language. Such teaching methods lack of cultivating students' intercultural communication ability and fail to let students truly integrate into the English language environment. At the same time, most of the teaching scenes are carried out in the classroom. In the learning process, students only passively accept the teacher's explanation and demonstration, without the opportunity to practice by themselves or interact with their classmates, which has a certain impact on their learning interest and learning effect. Therefore, it makes the teaching lack of interaction and practice [5]. Students would feel monotonous and boring when they study in a closed space for a long time, which affects the quality of teaching, and it is difficult to effectively evaluate the teaching quality of teachers.

The current English teaching mode has seriously restricted the development of students' comprehensive ability to use English [6-7]. Based on this, a new way of thinking about the English teaching model is needed to turn this situation around. The teaching mode should change from pure language knowledge to student-centered, focusing on the cultivation of practical application ability, language communication ability, intercultural communication ability and self-learning ability. Based on this, this paper would construct an English teaching system under the combination of BD and AI technology to reform the existing teaching.

2.2 Orientation of English Teaching in the New Era

With the integration of BD and AI, the pertinence, intelligence and interactivity of English teaching would be further improved. Through BD mining, teachers are able to get a clear picture of their students' learning status and their individual needs, so as to develop appropriate teaching plans and personalized teaching schemes, so as to provide teachers with more personalized learning experience [8-9]. Meanwhile, students can get more immersive experience in English teaching and improve their interest and initiative in English teaching.

This paper focuses on collecting data related to students' performance in learning and using data science to analyze students' learning habits [10]. AI technology is used to design personalized teaching plans, and its defects are corrected and supplemented, so as to improve students' learning effect. The traditional English teaching evaluation method mainly evaluates students through teachers, but its evaluation standards are not uniform and the evaluation period is long. In the teaching mode that combines these two technologies, the AI system can automatically evaluate students based on their learning data and scores, which not only saves teachers' time, but also ensures the scientific and fair evaluation [11-12].

2.3 Trends in the Renovate of English Teaching System

The emergence of various cloud computing platforms suitable for English teaching has provided convenience for the development of intelligent English classroom, which has higher requirements for school infrastructure and requires teachers to keep improving. Through the innovation of teaching system, teachers conform to the development trend of AI and change from traditional knowledge transfer to positive learning attitudes, so that students can more actively explore new things and better carry out English teaching in a new environment [13]. The application of combined AI and data mining would bring about the following transformative trends. With the support of intelligent computing system and deep data mining, various teaching methods such as network teaching, mobile learning, virtual simulation and game learning are constantly innovating and developing. These two technologies provides new opportunities for its development. By using the above two technologies, students can improve their learning interest and participation in various teaching methods, such as network teaching,

mobile learning, virtual simulation and game learning [14]. In addition, through the organic combination of these two technologies, the application of English can be as a language in real life. Building an intelligent system of teaching content is also an indispensable part. AI technology can provide an effective method to improve the worth of English teaching and the level of English teaching in multiple links [15-16]. In the preparation of teaching resources, teachers can use AI technology to quickly collect and screen various excellent English teaching resources. In the course design, teachers can use AI technology to carry out personalized and differentiated teaching to meet the needs of different students. In the evaluation, teachers can use AI technology to evaluate students' learning outcomes, help students find their shortcomings and adjust their learning plans in time. In this increasingly obvious situation, the building of a smart English teaching system has become the trend of the times [17-18].

2.4 Establishment of an English Teaching System

The English teaching system constructed in this paper is divided into four parts: teaching objectives, teaching content, teaching skills and assessment. To establish an English teaching system, it needs to set up teaching objectives first. Only by determining the direction can one avoid detours and reduce the cost of trial and error. But the determination of the goal should not deviate from reality, too fanciful. English teaching objective module includes translation, grammar, vocabulary and other aspects of knowledge. The main intention is to meet the actual situation and needs of students, mobilize the enthusiasm of students to learn, cultivate the passion of students to learn, so that students have a gradual process in the learning experience. In terms of course content, the teaching content module not only includes all parts of the basic English course, but also involves various aspects such as culture, science and technology, speaking, listening and reading. The teaching content covers the whole aspect of English. In the teaching content, it should focus on interest and inspiration, combine the teaching content with the actual life and application situation as much as possible, and motivate students' curiosity in learning by setting problems. In addition, the teaching content should be graded according to the students' learning foundation and mastery level, so that students can adapt to the real English communication ability on the basis of English. The teaching system module includes the use of a multiplicity of teaching methods and strategies, such as situational teaching, project-based teaching, and the combination of diverse instructional aids such as multimedia teaching, network teaching and mobile learning. Students need to be actively involved in the teaching process and to keep up with the teacher and interact with other students. The assessment module includes the assessment standards and methods of the course, such as the formulation of assessment standards according to students' learning objectives, the development of feedback mechanisms, such as preview before class, review and discussion after class, and the timely arrangement of assessment methods in the form of reading, debating, writing and speaking tests. The smart teaching classroom established in this paper is shown in Figure 2.

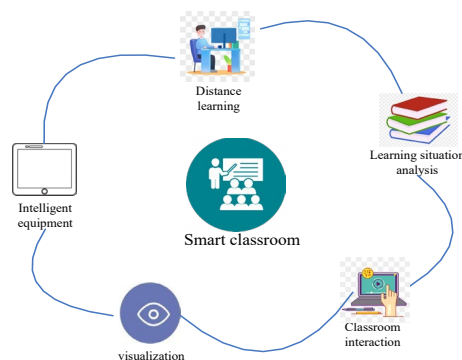


Figure 2: Smart Teaching Classroom

The English teaching structure under the organic combination of BD and AI is divided into three parts: before teaching, in teaching and after teaching. Before teaching, teachers release tasks and students preview before class. Then the students check their own self-study; finally, record what one don't understand and ask questions when the teacher teaches. In teaching, teachers collect students' perplexity and give corresponding solutions. Then the students are helped to reinforce what they have learned through during class quizzes. After teaching, homework is assigned for the knowledge points that students feel are difficult, and personalized learning recommendations are given. Through these

three stages, students can well integrate what they have learned in class. The English teaching system diagram of this paper is shown in Figure 3 below.

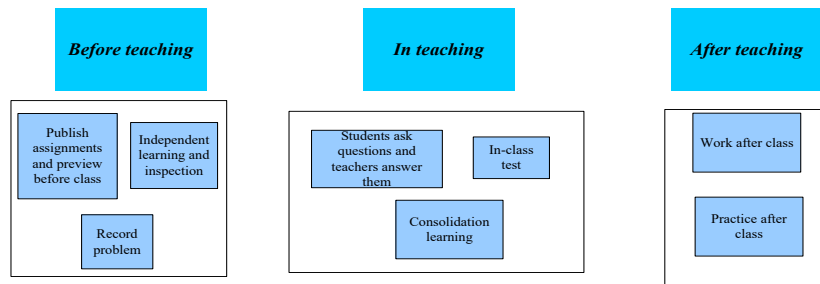


Figure 3: Teaching System Structure Diagram

2.5 English Teaching Evaluation Algorithms and Fundamentals of Mathematics

The English teaching assessment and evaluation in this paper is put into effect under the combination of BD and AI, and K-means algorithm is used to analyze the collected data [19-20]. K-means algorithm is an unsupervised learning algorithm, which is used to divide the dataset into K different groups or clusters. Based on distance measurement, the community is clustered into K clusters to minimize the sum of square errors within all clusters. The corresponding mathematical formula is as follows:

$$\min A = \sum(\sum \|\alpha_i - \beta_j\|^2) \quad \text{S. u. } k = \{1, 2, \dots, K\}, \alpha_i \in C_k \quad (1)$$

Among them, α_i represents the i -th sample, and β_j represents the center point of the j -th cluster; $\|\alpha_i - \beta_j\|^2$ represents the square of the Euclidean distance, and C_k represents all samples in the k -th cluster.

The average value also plays an undeniable role in student performance. It is commonly used to describe the overall level of students in the entire class. By comparing the average scores of students taught by different time periods and teachers, effective evaluation of teaching effectiveness can be achieved. By analyzing the average and distribution of students' grades, combined with AI technology, personalized teaching plans can be formulated accordingly. The corresponding mathematical formula for the average value is as follows:

$$\bar{x} = \frac{1}{m} \sum_{j=1}^m X_j \quad (2)$$

Among them, \bar{x} represents the average value; m represents the number of data; X_j represents the j -th data value.

Standard deviation is used to measure the discreteness of learning outcomes. If the standard deviation is small, it indicates that the student's learning performance is more concentrated; if the standard deviation is too small, it indicates that the student's learning performance is more dispersed. The mathematical formula for standard deviation is as follows:

$$u = \sqrt{\frac{1}{\alpha-1} \sum_{l=1}^{\alpha} (x_l - \bar{x})^2} \quad (3)$$

Among them, u represents the standard deviation; α represents the number of data; v_l represents the l -th data value.

3. Simulation Experiment of English Teaching Evaluation System

Based on the combination of these two technologies, the English evaluation system constructed in this paper can more accurately map the students' learning situation of absorbing knowledge. This paper would also randomly select 15 teachers in the school to conduct a questionnaire survey to investigate these teachers' satisfaction with the English teaching system in this paper, as shown in Figure 4.

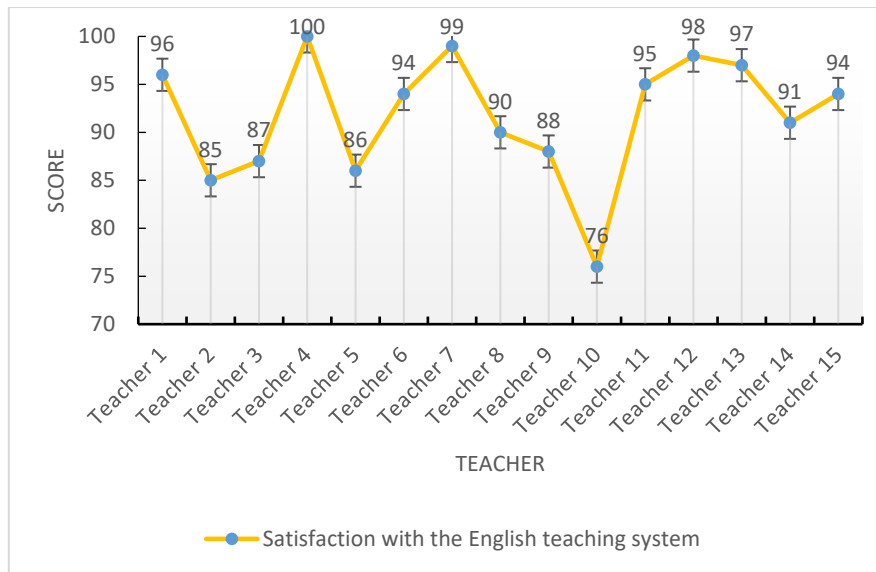


Figure 4: Satisfaction Chart of English Teaching System

As indicated by the responses obtained in the questionnaire survey illustrated in Figure 4, the following points can be obtained. The 15 people give the highest score of 100, the lowest score of 76, and the average score of 91.73 for the satisfaction of the English teaching system combined with the two technologies. Through the experimental results, it can be seen that the teachers' evaluation of the English teaching system in the article is relatively high.

This paper also tests the changes in learning scores of six classes before and after using the English teaching system based on BD and AI technology. By observing the changes in students' learning scores, it can be the most direct to know whether the English teaching system combined with the two technologies is effective for students' learning. The following figure 5 shows the results of the six classes before and after using the English teaching system.

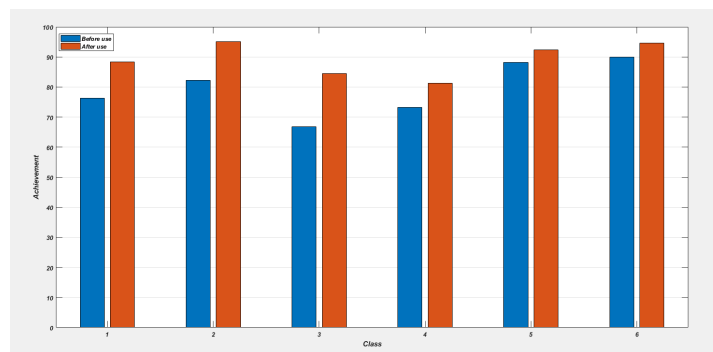


Figure 5: Changes in Students' Grades before and after Use

From the analysis in Figure 5, it can be seen that the performance of these six classes has been significantly improved after using the English teaching system under the combination of these two technologies. Among them, the class in the third group has the highest improvement rate of 26.3%, while the class in the fifth group has the lowest improvement rate of 4.7%. From the data in the graph, it can be seen that the English teaching system under the influence of BD and AI technology is of great help in improving students' academic performance.

4. Conclusion

The above comparative analysis of the positive role played by the combination of BD and AI technology in English teaching reform shows that the conclusion drawn is obvious. Essentially, the teaching mode of this paper enables students to get more high-quality education resources and better learning methods under the better, efficient and personalized teaching mode, and teachers can also provide more scientific, targeted and personalized guidance and help to students. Teachers can also provide more scientific, targeted, and personalized guidance and assistance to students. However,

currently, this English teaching model that combines BD and AI still faces many problems: firstly, AI technology is not yet stable enough, which has a significant impact on both teachers and students; what's more, there is a shortage of high-quality teaching data. In the future, it need to further promote the development of these two technologies and improve relevant educational theories and applications, so as to maximize the benefits of English teaching combined with BD and AI.

Acknowledgement

This work was supported by the College-level Teaching Reform Key Project of Nanchong Technical College, Research and Practice of Blended Teaching Mode based on Network Platform -- Taking English Pronunciation Course of Higher Vocational College as an example, Project No. : ncjgz2103.

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