Innovative Ideas and Approaches for College English Teaching in the Era of Artificial Intelligence

Yuanzhi Liu[1,a,*], Huan Feng[1,b]

[1]School of Western Languages and Cultures, Harbin, Heilongjiang, 150001, China
[a]liuyuanzhi@hrbnu.edu.cn, [b]fairylandp@163.com
[*]Corresponding author

Abstract: College English public courses are often marginalized in university teaching: at the school management level, teachers and students often attach importance to professional courses and neglect public basic courses. The reduction of college English class hours, coupled with the relatively independent and free learning methods of college students, lack awareness of previewing and reviewing public courses that they do not value. College students from all over the country have varying levels of English proficiency. This study explored innovative ideas and paths for college English teaching in the era of artificial intelligence. The current college English public courses face challenges such as reduced class hours, low student attention, and uneven English proficiency. To address these issues, this article explored methods of using micro lessons and intelligent video technology to enhance teaching effectiveness, emphasizing the role of concise content and diverse forms of micro lessons in stimulating students' interest in learning. Furthermore, the design of a personalized teaching platform based on AI (artificial intelligence) technology was introduced in detail, providing personalized learning resource recommendations for students through user behavior analysis and recommendation algorithms. The experimental results showed that after applying the AI personalized recommendation platform, the average learning interest score of students increased to 4.2; the average learning time increased to 9.2 hours; the average comprehensive recommendation score reached 4.1. The AI personalized recommendation platform significantly improved students' learning interest and effectiveness. This article believed that the application of artificial intelligence in college English teaching can not only improve teaching efficiency, but also realize the personalized needs of students and promote the continuous improvement of educational quality.

1. Introduction

As smart education develops rapidly, English teachers at open universities are encountering profound changes brought about by digital and intelligent teaching environments. This transformation has put forward new requirements for the teaching philosophy, methods, and skills of teachers. In order to meet the personalized teaching needs of students and effectively support the

teaching practice and career growth of teachers in the digital age, teachers need to develop various abilities including multimodal teaching, AI technology, and personalized support. Continuous learning and professional growth of teachers are crucial for adapting to the new trend of smart education. Through professional development and skill enhancement, teachers can effectively adapt to the requirements of smart education and promote the quality development of open education.

This article explores the innovative ideas and paths of college English teaching in the era of AI. The structure of the article is as follows: firstly, in the introduction section, the development background of smart education and the new requirements for teachers are introduced; then, in the relevant research section, the current situation and challenges of English teaching innovation are summarized; next, in the methodology section, a detailed description is given of the design of an AI-based college English teaching model and personalized teaching platform, including system functions, user behavior analysis, and recommendation algorithms; finally, in the results and discussion section, the improvement of AI personalized teaching platform on student learning effectiveness is analyzed through experimental data, and the experimental findings are summarized to verify the application effect of AI technology in college English teaching.

2. Related Works

Experts in the field of education have long conducted specialized research on English teaching innovation. Murray N pointed out that the Chinese government values innovation in English teaching, but university English teachers in the southwestern region face constraints such as time pressure, lack of resources, and student abilities [1]. Su C explored a student-centered teaching method for business English reading from the perspective of ESA (Engage/Study/Activate) theory. He proposed innovative strategies such as scenario introduction goals, business culture knowledge, reading article analysis, practical activity design, and learning evaluation to cultivate students' self-learning and practical abilities, and enhance the level of business English reading teaching [2]. Zhang Y discussed the views and challenges of college English teachers in teaching critical thinking strategies, with a focus on improving students' critical thinking abilities. The experimental results showed that after receiving strategic guidance, students exhibited better critical thinking [3]. Abusamra A aimed to examine the role of community colleges in cultivating students' innovation and creative skills, targeting variables such as gender, age, and province. He suggested providing support for vocational colleges to enhance students' creativity and innovation abilities, including material and moral facilities, vocational courses, and policy management practices [4].

Qian L used data mining techniques and Analytic Hierarchy Process to construct an evaluation index system for the quality of college English teaching, and established an evaluation model based on BP (Backpropagation) neural network. He verified the effectiveness of the method through simulation experiments and improved the accuracy of evaluation [5]. Gumartifa A indicated that middle school English teachers generally support and recognize the Problem-Based Learning (PBL) method, believing it to be beneficial and effective. The survey results showed that teachers are more inclined to choose PBL and believe that student performance has significantly improved [6]. Oktavia D conducted a study on the problems faced by primary school English teachers in their English teaching process. He used qualitative research methods to collect data through personal questionnaires and in-depth interviews. He explored two main topics, namely the difficulties encountered by teachers in teaching English skills to elementary school children and the strategies to be adopted [7]. Jie Z discussed the challenges language teachers face in utilizing mobile technology in advanced open distance learning. The research results showed that teachers believed that technological and teaching innovation are not the main challenges, but rather psychological anxiety, role expansion, and learning flexibility [8].

Shu J applied an online teaching model based on POA (Production-oriented approach) theory to enhance the effectiveness of English classroom teaching in vocational colleges and improve students' practical English learning abilities. The research results showed that this model significantly improved students' English practical ability, and stimulated their interest and enthusiasm [9]. Wang F by deeply analyzing the application of big data technology in the field of education and the current situation of English teaching mode [10]. Zhao W drew on the theory of legalization norms to explore the construction of rhetorical knowledge among English teachers in Chinese universities. He discovered different knowledge practice patterns through a sequential hybrid approach and revealed the impact of autonomy and semantic code conversion on teaching practice [11]. Song S pointed out that in the process of foreign language teaching in colleges and universities, there should be a high degree of cross-cultural awareness, understanding of internal and external factors affecting foreign language teaching in the context of cross-cultural communication, and cultivating English-speaking talents to meet the needs of internationalization [12]. Lubis M S A used phenomenological methods to analyze the process of curriculum reform in educational institutions and explored the role of government decision-makers in formulating strategic policies [13].

Deng J paid attention to how local college teachers improve their teaching ability by combining Internet technology to meet the needs of the development of the times. He explored how to use technology to improve teaching quality and promote the high-quality and in-depth development of national higher education by studying the intersection of the Internet and the teaching field [14]. Jiang L conducted a study on 166 English teachers in the context of Chinese EFL (English as a foreign language), exploring their intention and related factors towards flipped teaching. Research has found that teachers generally support flipped teaching, but there are individual differences in gender, university reputation, experience, and course type [15]. Existing research has shown that although there are positive explorations and attempts at English teaching innovation in various regions and educational fields in China, the research has also revealed various challenges and limitations. These include issues such as time pressure faced by teachers, insufficient resources, and differences in student learning abilities. They also involve the application of technology, the effectiveness of teaching strategies, and the impact of individual teacher characteristics on the level of support for innovative methods. Therefore, in the future, more in-depth research and more effective policy support are needed to promote the continuous improvement of English teaching quality and the widespread application of educational innovation.

3. Methods

3.1 Changes in College English Teaching Models under the Background of AI

The arrival of the era of AI education has given birth to AI products and their applications in educational work. Unlike traditional classroom teaching, AI provides teaching with the creation of an information sharing platform and stores massive teaching information and resources in the cloud. It can provide abundant teaching resources for teachers and students anytime and anywhere, and create a good teaching environment. AI-based college English teaching, such as cloud classrooms, campuses, and grading websites, has been popularized in nearly a thousand universities across the country and has achieved a one-stop service of teaching, learning evaluation, testing, and research. The platform has abundant learning resources, interesting learning content, and effective and practical teaching tools (supporting personal computers and mobile phones). In terms of teaching and learning, there has been a significant improvement in both student learning experience and teacher teaching effectiveness. It is worth mentioning that on the one hand, college English teachers, as collaborators, drivers, and transmitters of AI data and information, can fully utilize AI to

effectively improve teaching methods, enhance teaching targeting, and achieve personalized teaching to realize the individual needs of students; on the other hand, AI should play its role, demonstrate its application value, and demonstrate its advantages based on the teaching and learning needs of teachers and students. Therefore, the two influence each other and complement each other. As an important product of the Internet era, AI education is very important for teachers. It enriches teaching methods and contents, stimulates students' interest in learning, and ultimately improves teaching quality. From this, it can be seen that only through collaborative development of AI can the value of AI be truly reflected. Therefore, it cannot be mistaken that the emergence of AI completely replaces teachers in the future.

3.2 Design of Personalized Teaching Platform Based on AI

(1) System functional structure design

The design of system functional structure in the personalized teaching platform based on AI technology in this study is the foundation for achieving personalized teaching goals. This design adopts a layered architecture strategy to ensure the scalability and modularity of the system, thereby adapting to constantly changing teaching needs and technological advancements. The specific structure is as follows: the client layer provides an interactive interface for teachers, students, and academic administrators, supporting access to the system through a browser. The design focus of this layer is to provide a concise and intuitive user interface, allowing users to easily access personalized learning content and teaching resources, while also supporting interaction and communication between users.

(2) User behavior analysis

This module collects student learning activity data through the user behavior analysis subsystem, including learning duration, frequency, preferred content types, etc. These data are processed through feature engineering and transformed into input vectors that can be analyzed by machine learning algorithms. The calculation of user similarity uses the cosine similarity algorithm:

$$similarity(u,v) = \frac{\vec{u} \cdot \vec{v}}{\|\vec{u}\|\|\vec{v}\|} \tag{1}$$

Among them, $\vec{u}$ and $\vec{v}$ represent the feature vectors of 2 users respectively, and $\|\vec{u}\|$ and $\|\vec{v}\|$ are the moduli of the vectors.

(3) AI recommendation algorithm

In the AI recommendation algorithm section of this study, the platform adopts a hybrid recommendation model, combined with collaborative filtering and content-based recommendation strategies [16-17]. The score calculation formula for the mixed model is as follows:

$$score(u,i) = \alpha \cdot CF_{sorre}(u,i) + (1-\alpha) \cdot CB_{score}(u,i) \tag{2}$$

Among them, $CF_{score}(u,i)$ is the recommendation score calculated by the collaborative filtering algorithm based on user similarity; $CB_{score}(u,i)$ is a recommendation score based on content similarity; α is an adjustment parameter used to balance the influence of two recommendation strategies [18-19].

(4) Detailed explanation of collaborative filtering algorithm:

Collaborative filtering algorithms can be divided into two main types: user-based collaborative filtering and item-based collaborative filtering. Collaborative filtering based on users recommends content with similar interests by calculating the similarity between users. The specific calculation can use cosine similarity or Pearson correlation coefficient. For example, the similarity $similarity(u,v)$ between users u and v can be calculated based on their behavioral data [20].

(5) Detailed explanation of content-based recommendation strategies:

Content-based recommendation strategies focus on analyzing the characteristics of the project (content) itself and user preferences, and then recommending new content that is similar to what users previously liked. This method typically requires feature extraction and representation of content, such as using text analysis, image feature extraction, or other domain specific methods. The recommendation score can be calculated based on the similarity of these content features.

4. Results and Discussion

4.1 Experimental Preparation

During the experiment, a personalized teaching platform based on AI is used as the main tool. Firstly, data on student learning behavior, including learning duration, frequency, preferred content types, etc., are collected and transformed into input vectors for machine learning algorithms to analyze through feature engineering. Subsequently, the cosine similarity algorithm is used to calculate the similarity between users, and personalized learning recommendations are generated for each student based on collaborative filtering and content similarity recommendation strategies. In the experiment, the parameter α of the recommendation algorithm is adjusted to balance the influence of the two recommendation strategies, and the learning effects of students under AI personalized recommendation platform and traditional conditions are compared. Through these steps, the potential of AI in improving teaching effectiveness in college English education is evaluated, as well as its impact on student learning behavior and outcomes.

4.2 Experimental Results

Table 1: Examples of student learning behavior data

Student ID	Study Duration (Hours)	Study Frequency (Times/Week)	Preferred Content Type	Interest in Learning (1-5)
1	10	5	Reading Comprehension	4
2	8	4	Speaking Practice	3
3	6	3	Writing Practice	5
4	12	6	Listening Practice	4
5	9	4	Grammar Explanation	4

Analyzing the learning behavior data of students in Table 1 shows that there are certain differences in learning duration and frequency among students. For example, Student 1 and Student 4 have relatively longer learning hours, at 10 and 12 hours respectively, while Student 2 and Student 3 have slightly fewer, at 8 and 6 hours respectively. Students also have preferences for different types of learning content, such as reading comprehension, oral practice, writing practice, etc.

Table 2: Examples of user feature vectors

User ID	Feature Vector (Illustrative)
1	[0.2, 0.4, 0.6, 0.8, 0.3]
2	[0.1, 0.3, 0.7, 0.5, 0.2]
3	[0.5, 0.5, 0.5, 0.5, 0.5]
4	[0.8, 0.2, 0.9, 0.1, 0.4]
5	[0.3, 0.6, 0.4, 0.7, 0.6]

As shown in Table 2, the user feature vectors are processed through feature engineering and used to calculate the similarity between users. Each student's feature vector reflects their preferences and performance in multiple learning dimensions. For example, in Figure 1, the feature vectors of User 1 and User 2 have a high similarity, while the feature vectors of User 3 are evenly distributed across all dimensions.
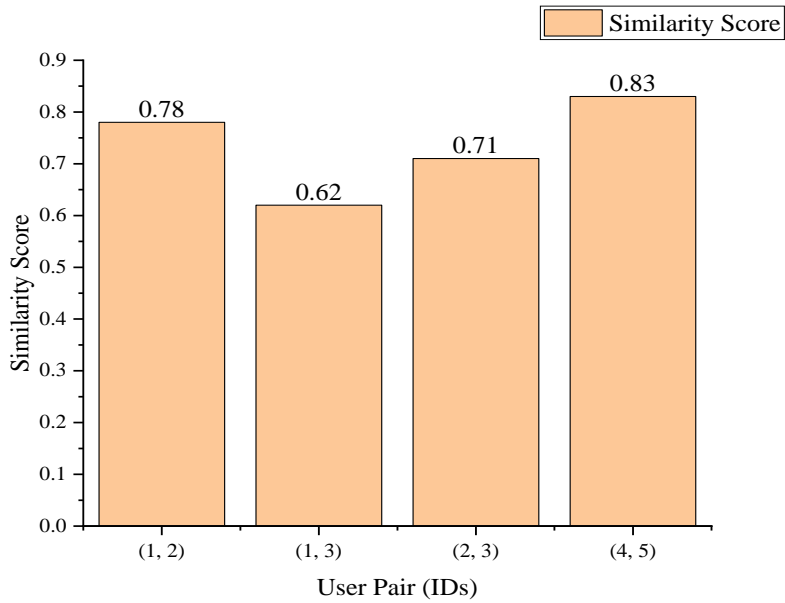

Figure 1: Examples of user similarity calculation

According to the cosine similarity algorithm in Figure 1, the similarity score between users shows their degree of similarity in learning preferences and behaviors. For example, the similarity score between User 1 and User 2 is 0.78, indicating a significant degree of similarity in their learning behavior.
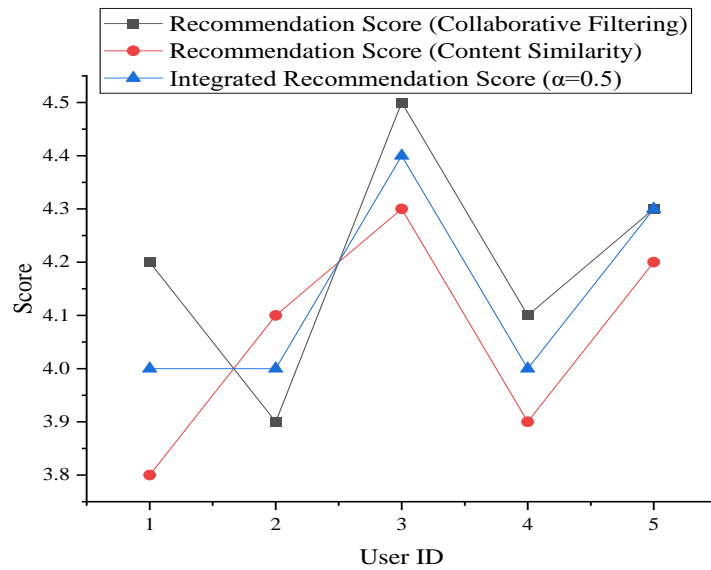

Figure 2: Examples of recommendation algorithm score

By combining collaborative filtering and content-based recommendation strategies, the platform calculates recommendation scores for each student. By adjusting the parameter α, the influence of

the two recommendation strategies is balanced. For example, User 1's recommendation score under collaborative filtering algorithm is 4.2; the content similarity-based recommendation is 3.8; the comprehensive recommendation score is 4.0, indicating that the system can effectively personalize learning resources, as shown in Figure 2.

Table 3: Summary of experimental results

Experimental Condition	Average Interest in Learning Score	Average Study Duration (Hours)	Average Recommendation Score
Baseline Condition (No AI)	3.6	8.5	-
AI Personalized Recommendation Platform Applied	4.2	9.2	4.1

In the experiment, the learning effects are compared between the basic conditions (without AI) and the application of AI personalized recommendation platforms. The results show that after applying the AI personalized recommendation platform, the average learning interest score of students increases to 4.2; the average learning time increases to 9.2 hours; the average comprehensive recommendation score reaches 4.1, indicating that the platform can effectively enhance students' learning enthusiasm and effectiveness. The above analysis indicates that personalized teaching platforms based on AI have a significant promoting effect in college English education, which can recommend suitable learning resources based on students' personalized needs and learning behaviors, and improve teaching efficiency and quality, as shown in Table 3.

5. Conclusions

As network technology develops, the Internet has been deeply involved in students' life, study and entertainment, and its characteristics of being free from time and place limitations are also conducive to the derivation of the English teaching classroom, so that students can acquire useful knowledge in the second classroom. For example, the teaching method of Internet plus+English+short videos enables students to learn the latest English courses without leaving home, so that English teaching is in line with international standards. This article studied the innovative concepts and paths of college English teaching in the era of AI. By applying micro courses and intelligent video technology, the design of personalized teaching platforms based on AI was explored. Research has shown that current university English teaching faces many challenges, such as reduced class hours, low student attention, and uneven English proficiency. Traditional teaching methods are difficult to meet the personalized needs of students and improve teaching effectiveness. By applying micro courses, this concise and diverse teaching method effectively stimulates students' interest in learning and improves the efficiency of classroom learning. Meanwhile, a personalized teaching platform based on AI technology provides targeted learning resource recommendations for students through user behavior analysis and recommendation algorithms. The experimental results show that students who use AI personalized recommendation platforms significantly improve their learning interest and effectiveness. This study indicates that the application of AI in college English teaching can significantly improve teaching efficiency and effectiveness, and meet the personalized learning needs of students. In the future, with the continuous progress of technology and the continuous innovation of teaching modes, AI can play a more important role in college English education, promoting further improvement of education quality. Therefore, universities should actively explore and apply AI technology, and continuously

improve and optimize teaching methods, in order to better serve the learning needs and growth of students.

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