

Research on the construction and application of intelligent English teaching mode in higher vocational colleges empowered by artificial intelligence technology

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ABSTRACT

Under the background of the accelerated development of global digital transformation, artificial intelligence technology has gradually been deeply integrated into the field of education, which has brought innovation opportunities for traditional teaching modes. As an important part of cultivating technical and skilled talents, English teaching in higher vocational education has long faced practical problems such as significant differences in students' foundations, single teaching methods, and insufficient support for personalized learning. The increasing maturity of artificial intelligence core technologies such as natural language processing, big data analysis and intelligent recommendation systems provides strong technical support for the intelligent upgrading of the English teaching scene in higher vocational colleges. This paper systematically discusses the application of artificial intelligence technology in the intelligent teaching mode of higher vocational English to provide theoretical reference and practical guidance for constructing adaptive and effective intelligent teaching programs.

KEYWORDS

Artificial Intelligence; higher vocational teaching; English teaching mode

In recent years, with the rapid development of artificial intelligence technology, it has gradually penetrated all social production and life fields. In this process, the particularity of English teaching in higher vocational colleges has become increasingly prominent, and the students' English level is quite different. The traditional "One-size-fits-all" teaching method makes it difficult to meet differentiated needs; the combination of teaching content and professional scene is insufficient, resulting in the lack of learning motivation; the form of classroom interaction is limited, and the personalized feedback mechanism is weak. These pain points directly affect the quality of teaching and the effective improvement of students' abilities. At the technical level, artificial intelligence technologies such as natural language processing, intelligent speech interaction and learning behavior analysis have made continuous breakthroughs, making their application in language teaching realistic and feasible. Compared with general higher education, vocational education emphasizes practicality and application, which makes the exploration of artificial intelligence technology enabling teaching more practical significance^[1]. From the perspective of the development of educational modernization, promoting the deep integration of artificial intelligence and vocational education is not only the inevitable trend of technology application but also the key path to solving the current teaching dilemma. In summary, the application of artificial intelligence technology in higher vocational English teaching is still in the exploratory stage. Against this background, it is necessary to explore the integration path of artificial intelligence technology and higher vocational English teaching; promoting the high-quality development of vocational education is of great significance.

1 Technical support of 1AI empowerment English teaching mode in higher vocational colleges

1.1 Natural language processing (NLP) and intelligent speech recognition

Natural Language Processing (NLP) and intelligent speech recognition are the core technologies of artificial intelligence-enabled language teaching, which can effectively improve the efficiency and interactivity of English teaching in higher vocational colleges. NLP technology can understand, analyze and generate natural language texts to assist students in grammar checking, sentence correction, machine translation and other tasks. The intelligent essay marking system based on deep learning can accurately identify learners' grammatical errors and provide correction suggestions so that teachers can be liberated from the complicated basic error screening in the feedback link. At the same time, combined with intelligent speech recognition technology, the system can analyze the learners' pronunciation accuracy in real-time and provide targeted exercise suggestions, which makes up for the lack of teachers' ability to cover all students in traditional listening and speaking teaching. In addition, NLP applications such as chatbots and intelligent question-answering systems can simulate real language communication scenarios to help students learn independently after class and improve their English expression ability^[2].

1.2 Learning data analysis and personalized recommendation algorithm

Learning Data Analysis and personalized recommendation algorithms are important technical support for artificial intelligence to support intelligent teaching modes. By collecting students' behavioral data at various learning stages (such as classroom interaction frequency, homework completion, test performance, etc.), the algorithm can accurately portray students' ability and adjust the teaching content accordingly, truly personalized teaching. For example, the adaptive learning system can dynamically adjust the difficulty of learning materials according to students' vocabulary mastery to avoid the problem that some students can not keep up with the progress because of their weak foundation under the "One-size-fits-all" teaching mode^[3]. At the same time, the intelligent recommendation engine driven by machine learning can analyze students' cognitive preferences and push English learning resources (such as business English dialogues, engineering and technology reading materials, etc.) suitable for their interests to enhance learning motivation further. The system can identify students' learning bottlenecks through continuous data iteration optimization, provide teachers with references for teaching focus optimization, and make English teaching more scientific and accurate.

2 The design of the teaching mode

Constructing an intelligent teaching mode of higher vocational English supported by artificial intelligence technology needs to systematically cover three key links before, during and after class. Relying on AI technology, this model can realize the intelligent push of teaching resources, the precise optimization of classroom interaction, and the personalized consolidation of after-class learning.

2.1 Before class

AI empowerment in the pre-class stage mainly focuses on the push of adaptive learning content and the formulation of personalized preview tasks. Through the intelligent learning platform, teachers can push preview materials processed by NLP technology to students, such as reading articles with automatic text analysis, intelligent graded vocabulary, etc. The system automatically adjusts the difficulty of the materials according to the student's past learning performance to ensure that they meet the individual's cognitive level. At the same time, intelligent speech recognition technology can provide students with pronunciation practice functions, so that students can complete the accuracy training of words and sentences independently, and detect their shortcomings through instant feedback. Moreover, the AI-driven learning analysis engine can predict the difficulties that students may encounter in the formal classroom, and feed relevant information back to teachers in advance, so that teachers can adjust their teaching strategies in the lesson preparation. The intelligent support in this stage not only helps students master the basic knowledge before class but also lays a solid foundation for classroom interaction.

2.2 In class

In the core stage of the smart classroom, AI technology optimizes the learning experience mainly through intelligent voice interaction, real-time data analysis and dynamic teaching adjustment. At the beginning of the class, the teacher can use the AI phonetic aids to do quick listening exercises. The system can immediately assess the students' listening comprehension level and automatically generate short intensive exercises to compensate for shortcomings. When explaining key grammatical structures or vocabulary, teachers can present dynamic semantic analysis with the help of intelligent projection or interactive whiteboard to help students understand language rules more intuitively. During group discussions or oral exercises, the NLP-based dialogue system provides real-time assessment of language accuracy and immediate advice on word choice and grammatical fluency^[4]. At the same time, the classroom behavior analysis algorithm can monitor students' concentration and participation in real-time. When the system detects that some students are distracted, it can intelligently prompt teachers to adjust teaching methods, such as the increase of interactive questions and answers or the temporary switching of teaching forms to optimize the pace of class and improve the overall teaching efficiency.

2.3 After class

The after-school learning stage aims to strengthen classroom knowledge and make up for individual knowledge gaps. The application of AI technology in this link is mainly reflected in three aspects: personalized homework layout, intelligent evaluation and expansion of learning resources recommendation. By analyzing data from classroom interactions and students' responses, the intelligent assessment system can automatically generate consolidation exercises for each

student, avoiding the problem of "Over-practice" or "Under-practice" caused by traditional unified assignments. Writing and speaking tasks can be submitted to the AI correction system, which can identify grammatical and lexical errors through NLP technology and provide optimization suggestions for syntactic diversity and logical coherence; students can get more detailed feedback than traditional manual marking^[5]. At the same time, based on students' learning interests and career needs, the AI recommendation algorithm will actively push additional English learning resources, such as professional English short videos, industry-related listening materials or cross-cultural communication cases, to help students improve their English application ability in a real pragmatic environment.

3 Teaching practice and effect analysis

3.1 Experimental design

This study uses the quasi-experimental research method to select two parallel classes in a higher vocational college as the experimental objects. The experimental group (20 people) adopted the intelligent teaching mode supported by AI, and the control group (20) followed the traditional teaching mode. The two groups' teaching hours, teaching materials and syllabuses were completely consistent. The experimental period was one month (4 weeks), and the teaching schedule was as follows:

Table 1 experimental design

Teaching	Experimental Group (AI empowerment)	Control Group (traditional teaching)
Before class	Push preview material (adaptive graded Reading + intelligent voice repeat)	The teacher asks you to read the textbook by yourself
In class	Interactive AI Q & A + real-time voice evaluation	Teacher's lecture + Blackboard PPT
After class	AI personalized exercises + automatic feedback	Unified Homework + manual correction

The experiment's premise is to ensure that there is no significant difference in the English level of the two groups of students when they enter the school (verified by the entrance test results) and that the two groups are taught by the same teacher and assessed with the same test questions. The experimental variables mainly focus on the application of AI technology, and the dependent variables are measured through three dimensions: final grade, classroom participation and learning interest survey.

3.2 Data collection

In order to ensure the comprehensiveness and objectivity of the research data, this experiment collects data through multi-dimensional channels, as follows:

Academic achievement data: standardized test scores (including listening, speaking, reading and writing) before and after the experiment were used to compare the ability improvement of the two groups of students.

Learning behavior data:

Before class: Completion rate of preview, average study time, distribution of errors recorded by AI platform.

In class: Number of classroom interactions, voice assessment scores, and attention monitoring records.

After class: Completion rate of assignments recommended by AI, frequency of error correction, and length of self-paced learning.

3.3 Validation

After a semester of experiments, the AI empowerment model has shown significant advantages, and the key indicators are verified as follows:

The results show that the experimental group is superior to the control group in all language skills, and the

Table 2 Comparison of academic performance

Test items	Experimental group (average score)	Control Group (mean score)	Magnitude of increase
Listening comprehension	85.2	78.6	0.084
Oral expression	82.5	74.3	0.11
Oral expression	88.1	80.9	0.089
Writing ability	83.7	76.2	0.098
Overall results	84.9	77.5	0.096

improvement in oral expression is the most significant (+ 11%), indicating that the intelligent speech evaluation function of AI has a prominent role in oral training.

The frequency of classroom interaction: The number of questions and answers in the experimental group was 40% higher than that in the control group, and the real-time feedback from AI significantly increased students' enthusiasm for participation.

Willingness to learn independently: 85% of the students in the AI group used the recommended resources after class, while only 55% were in the control group.

The students' interest in English learning (on a 5-point Likert scale) in the experimental group increased from 3.2 (before the experiment) to 4.1 (after the experiment), while that in the control group increased only slightly from 3.3 to 3.5. This indicates that AI personalized recommendations and immediate feedback can effectively improve students' learning motivation.

The experiment proves that the AI-empowered English teaching model in higher vocational colleges is superior to the traditional teaching method in academic performance, classroom participation and autonomous learning ability. It shows that it has high application value in the reform of English teaching in higher vocational colleges.

4 The optimization path of intelligent teaching mode

4.1 Adaptive improvement of teaching strategies

The optimization of teaching strategies driven by artificial intelligence technology needs to break through the one-way logic of "Technology adapting to education" and shift to the symbiotic model of "Educational needs defining technology." The core lies in the construction of a dynamic hierarchical instructional design framework. Based on the AI learning analysis system to generate students' ability profiles (covering language basis, cognitive style, and career orientation), the teaching objectives are decomposed into three levels: foundation enhancement, ability progression and vocational application. For example, for students with insufficient vocabulary, the system automatically pushes the high-frequency industry lexicon and contextualized memory training; for students with business English potential, the system opens the virtual negotiation scene simulation function. The dynamic generation mechanism of teaching content needs to deeply integrate professional scenes and use NLP technology to capture fundamental corpus, such as cross-border e-commerce customer service dialogues and engineering technical documents in real-time; through semantic reorganization and difficulty classification, it is transformed into teaching resources.

4.2 Digital transformation of teachers' role

The reconstruction of Teachers' roles is the key to implementing intelligent teaching mode, and its core task shifts from "Knowledge imparter" to "Learning ecological architect." First of all, teachers need to master the closed-loop ability of data interpretation and teaching decision-making: by analyzing the classroom participation heat map, error clustering report and other data provided by the AI system, teachers can accurately identify the weak points of the group (such as confusion of tenses and lack of linking skills), and adjust the pace and focus of teaching accordingly. Secondly, teachers should develop the skill of "Human-computer collaborative instructional design". In the teaching of writing, a three-step process can be designed: "AI initial comments on grammatical errors—teacher comments on logical structure—double-blind mutual comments to deepen understanding." In listening training, intelligent speech synthesis technology is used to generate dialogue audio with dialect features to guide students to analyze cultural differences in workplace communication.

4.3 Construction of students' autonomous learning ability

The cultivation of autonomous learning ability needs to break through the traditional "Task-driven" model and construct a three-dimensional empowerment system with metacognitive support, resource adaptation and community co-construction. Regarding metacognitive support, developing an intelligent learning navigation system based on students' learning trajectories and cognitive load data, dynamic generation of "Vocabulary memory prime time reminder", "Listening fatigue threshold warning," and other metacognitive prompts to help students scientifically plan the learning rhythm. The resource adaptation mechanism emphasizes the balance between "Precision supply" and "Self-exploration": AI recommendation engine not only pushes learning materials that are suitable for the current level of ability (such as CET-4 passer-oriented receiving business English resources), at the same time, the "Exploration mode" is set up to actively expose the industry cases that are moderately out of line to stimulate cognitive conflict and curiosity. The construction of a virtual learning community needs to be integrated into the gamification mechanism: students with similar AI matching levels form a "Customs-breaking group" to accumulate points in cross-border e-commerce dispute mediation, technical

document collaborative translation and other tasks; the system automatically unlocks higher-order learning permissions.

5 Conclusion

The AI-driven smart teaching model effectively solves the contradiction between large-scale and personalization in traditional teaching through accurate learning diagnosis, personalized resource adaptation and instant feedback mechanism. However, the realization of its value is restricted by three elements: First, teachers need to complete the role transformation from "Knowledge imparter" to "Learning designer," focusing on improving data interpretation and human-computer collaboration ability; Second, teachers must follow the principle of "Education leading and technology enabling," and be alert to the risk of teaching homogenization caused by algorithm bias; Third, it is necessary to construct a governance framework of "Ethical review, privacy protection and clear rights and responsibilities" to prevent the erosion of data abuse on the subjectivity of teachers and students.

About the Author

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