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The Current Situation and Exploration of a Path to Empowering Business English Teaching in Higher Vocational Education with AI Technologies



Abstract: - Objective: to explore the practical path of empowering Business English teaching in higher vocational colleges with AI technologies. Method: 100 students and 15 teachers majoring in Business English from local vocational colleges in 2022 were selected as the study subjects to investigate their understanding of AI technologies and professional teaching practices. Result: in the teaching of Business English in higher vocational education, AI technologies have not been applied sufficiently until now, and there is a lack of a complete system for their application. Conclusion: applying AI technologies to the teaching of Business English in higher vocational education is conducive to stimulating the learning enthusiasm of students majoring in Business English. In the application practice of AI technologies, it is necessary to clarify the application purpose in Business English teaching in higher vocational colleges, set up a standard application process in the teaching, and promote the deep integration of AI technologies and Business English teaching in higher vocational education.

Keywords: AI technology, vocational education, teaching of Business English

I. Introduction

Vocational education refers to providing learners with vocational skills that enable them to participate in educational activities necessary for specific social work [1]. During continuous adjustment of the national industrial structure, various industries have increasing demand for vocational talents, and vocational education, especially higher vocational education, takes a more and more important position. Compared with general higher education, higher vocational education shoulders the dual responsibility of popularizing higher education and cultivating skilled talents [2]. Meanwhile, China attaches great importance to the development of vocational education. The "Guidelines for the Reform and Construction of the Modern Vocational Education System" released in early 2023 emphasizes the importance of vocational education in education reform and innovation, economic and social development, supporting the reform of vocational education [3]. In the era of intelligence, the social environment faced by vocational education reform undergoes disruptive changes, and "accelerating education modernization" has become the leading concept for vocational education reform, especially higher vocational education reform. The educational modernization cannot be achieved without the support of information technology represented by AI [4]. However, the application space of AI technologies is narrow in the current higher vocational education environment, so it is imperative to adopt appropriate methods in expanding the application space. Nowadays, AI is integrated into all kinds of activities in various industries of society, also including foreign companies' negotiations and communication activities. The Business English Major in higher vocational colleges is the main battlefield for cultivating talents who can adapt to foreign business activities. It not only focuses on imparting basic English knowledge to vocational college students, but also needs to broaden their international perspective and enhance their ability to apply Business English in practice [5]. However, the current teaching of Business English in higher vocational education still stays at the level of knowledge transfer, failing to achieve the expected teaching objectives. By virtue of utilizing AI technologies, it is expected to drive the transformation from the traditional "knowledge classroom" to the "practical classroom", thus promoting the

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improvement of practical abilities of higher vocational college students majoring in Business English. Therefore, it is of great significance to explore the application of AI technologies in the teaching of Business English in higher vocational education.

AI technologies were relatively early applied in the education field of developed countries. In 1988, Rescigno initiates the concept of the "Smart Classroom", clarifying the application forms of AI technologies in the traditional classroom. In 2019, Lesgold MA proposed in a published book that intelligent machine systems provide a basis for curriculum reform in the era of AI, and it is necessary to re-consider the knowledge, skills and environment that students need for cultural and labor growth in this technology-enhanced era. In addition, it also provides basic insights into school operations, machine learning, complex training and evaluation [6]. In 2020, Sonia SA and Richard P carried out a survey from a student perspective to explore the application significance of AI technologies in education, concluding that AI technologies can be applied to create a good learning environment and cultivate students' higher-level thinking habits [7]. In 2023, Ali MS, Julia V and Elham S, et al. explored the opportunities and challenges of applying AI in dental education, concluding that AI can automatically evaluate students' understanding ability in real-time based on facial recognition, enhance the educational experience, and provide sufficient reference for exploring students' potential [8]. The studies on the application of AI technologies in the field of education start relatively late in China. In 2019, Zhang Jiajie and Dong Yan proposed in their article "Exploration of Application and Practice of New Interaction Mechanisms in College English Teaching" that interactive English teaching has always been an English teaching concept, and a new type of interaction mechanism - human-computer interaction – that can be created through many intelligent means to increase intelligence and personalization English teaching [9]. In 2022, Jin Liang and Yang Jinsong proposed in their paper "Exploration of the Transformation of Higher Vocational Curriculum Structure under the Background of AI Empowering Education - Taking Foreign Language Courses as an Example" that under the background of AI technologies empowering education, the structure of higher vocational education courses has undergone a transformation, the connection between professional knowledge, information literacy and vocational skills become closer, and the classroom teaching has transformed into a model organically integrating online and offline teaching, on campus and off campus teaching [10]. In 2023, Gu Ya proposed in "A Review of School Education in the Era of AI: Using Critical Pedagogy as a Method" that AI revolutionary, disruptive and quite uncertain. From the perspective of critical education, AI technologies will inevitably become a structural factor for schools and society [11].

According to a summary of the studies on the application of AI technologies in the field of education by domestic and foreign scholars, foreign scholars conducted studies on the application of AI technologies in education early, and educational practice experience on AI becomes more and more abundant with the widespread application of AI technologies in the classroom. Studies on the AI classroom started relatively late in China. The concepts of AI involved in theory and practice are mostly based on education, and there is a lack of targeted and systematic studies. Therefore, it is necessary to explore the AI education channels for Business English Major in domestic higher vocational colleges based on the summary of previous experiences.

II. Study Method

2.1 Literature method

The keywords such as "AI Technology", "AI in Business English Teaching", and "Business English Teaching" were selected to search for relevant literature on AI empowerment education at home and abroad on the websites such as China National Knowledge Infrastructure, China VIP Network, and university libraries. Moreover, according to the theme, the paper analyzes the connotation and theory of AI technologies and explores the current study status of the application of AI technologies in higher vocational Business English teaching, providing ideas for the design of subsequent surveys.

2.2 Questionnaire method

A questionnaire method was adopted to understand students' views on the empowerment of AI technologies in business English education. The respondents of this survey were from local higher vocational colleges, which offer Business English Major. The survey targets included sophomores and professional teachers. 100 students

participated in the survey, with 55% male and 45% female. A questionnaire was designed on the basis of previous study results and the integration of AI technologies, as shown in Table 1.

Table 1 Questionnaire

No.	Questions	Options
1	How do you evaluate your foundation in Business English?	A. Master insufficient professional vocabulary and lack of confidence B. Master some professional vocabulary and have average confidence. C. Familiar with professional vocabulary and has strong confidence
2	How do you think the Business English classroom supported by AI technologies will be helpful to you? (Multiple options)	A. Arouse interests in learning B. Enhance teacher-student and student’s interaction C. Understand personal achievements and change learning methods
3	Are you willing to cooperate with teachers to use AI technologies for professional learning?	A. Yes B. No C. No effect
4	How is the application of AI technologies by teachers in the Business English classroom?	A. Always B. Not frequent C. Seldom

A total of 100 questionnaires were distributed and collected, of which 95 were valid, with the effective rate of 95%.

2.3 Interview method

This interview focuses on teaching professionals in vocational Business English Major, including 15 teachers, aiming at exploring their current understanding of the empowerment of AI technologies in Business English education.

The statistics of teacher information are shown in Table 2.

Table 2 Statistics on Teacher Information

Survey content	Classification and proportion	
Age	25-45 years old (60.00%)	Over 45 years old (40.00%)
Education background	Bachelor’s degree and below (53.33%)	Master’s degree or above (46.67%)
Teaching experience	Less than five years (20.00%)	Over five years (80%)
Gender	Male (46.67%)	Female (53.33%)
Education type	Normal education (46.67%)	non normal education (53.33%)

According to Table 2, the proportion of female teachers in the survey is higher, with the majority of teachers (80%) having more than five years of teaching experience, and more than half of teachers (53.33%) graduating from non-normal universities. A teacher interview form was designed by referring the literature to inquire about the current application status of AI in higher vocational Business English education. The interview content is shown in Table 3.

Table 3 Content of Teacher Interviews

No.	Interview content
1	Are you willing to apply AI technology in higher vocational Business English teaching?
2	What AI technologies would you use to conduct Business English teaching?

- 3 What are the factors that currently hinder your application of AI technologies in teaching Business English?
- 4 Do you have suggestions for the application of AI technologies in professional teaching?

According to Table 3, a face-to-face conversation with the teacher was carried out to inquire about the application of AI in Business English teaching, with recoding the key information.

III. Result Analysis

3.1 Foundation of Business English Students

According to the summary of survey results, the foundation of students majoring in Business English is shown in Figure 1.

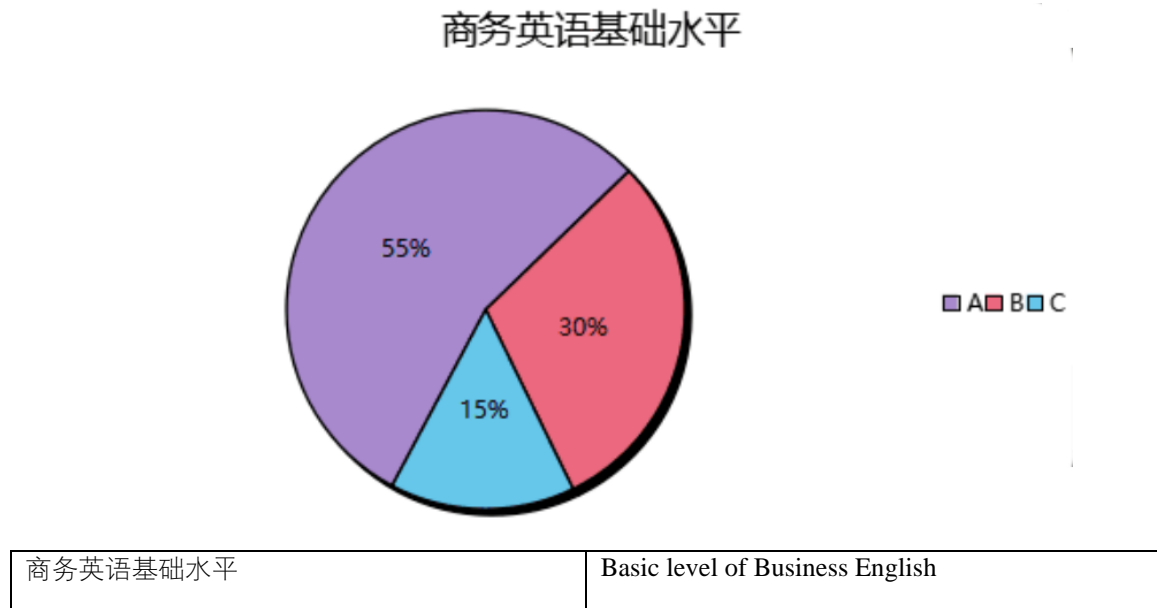
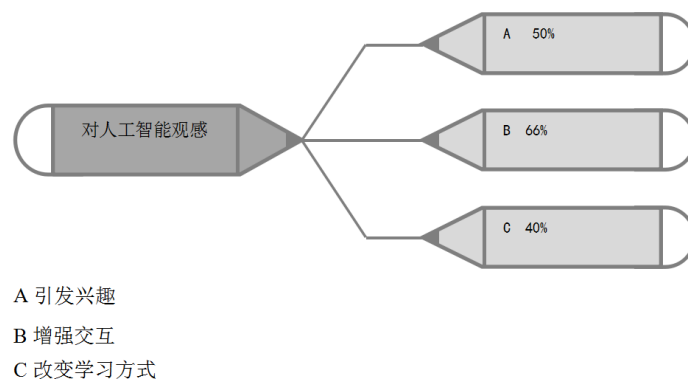


Figure 1 Fundamentals of Business English for Students

It can be concluded from Figure 1 that there were significant differences in the foundation of Business English students. 55% of the surveyed students chose option A, indicating that more than half of them believed that they mastered insufficient professional vocabulary and lacked confidence. Students who chose option B account for 30% of the total survey population, while those who chose option C only account for 15%. Most students believed that their foundation was weak, and they lacked confidence in learning.



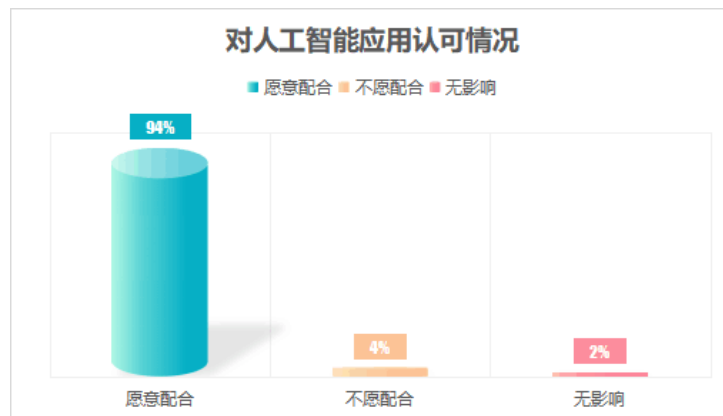
对人工智能观感	Perception of artificial intelligence
引发兴趣	Arouse interest

增强交互	Enhance interaction
改变学习方式	Change learning methods

3.2 Student perceptions of AI

According to Figure 2, 60% of the vocational college students believed that AI can stimulate their interest in learning Business English, 40% believed that applying AI in the Business English classroom can promote interaction between teachers and students, and 50% believed that the application can help them understand their Business English learning outcomes and adjust their learning methods. In summary, the interviewed students majoring in Business English all recognize the multiple advantages of AI technologies in Business English teaching. According to Figure 3, 94% of the students were willing to cooperate with teachers in applying AI technologies in the Business English classroom, 4% were unwilling to cooperate with due to concerns about the safety of AI technologies, and 2% believed that whether or not to use AI technologies had no influence on individuals.

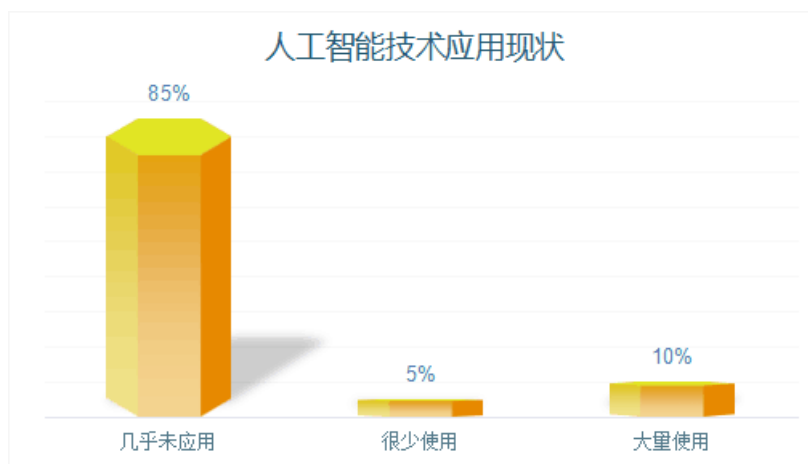
Figure 3 Recognition of AI application in Business English teaching among higher vocational college students



对人工智能应用认可情况	Recognition of AI applications
愿意配合	Willing to cooperate
不愿配合	Unwilling to cooperate
无影响	No effect

3.3 Current application status of AI technologies

The application of AI technologies by teachers in the Business English classroom is shown in Figure 4.



人工智能技术应用现状	The current application status of AI technologies
几乎未应用	Seldom use

很少使用	Rarely use
大量使用	Extensive use

Figure 4 Current situation of AI technology application in the Business English classroom

According to Figure 4, 85% of the students believed that AI technologies were hardly applied in the Business English classroom, 10% felt that teachers rarely used AI technologies in Business English teaching, and only 5% believed that teachers extensively used AI technologies in Business English teaching. In summary, the current application of AI technologies is not enough to meet the learning demand of students.

3.4 Teacher interview results

The interview content was analyzed and summarized according to the interview survey with teachers majoring in Business English in higher vocational colleges. The conclusion is as follows:

Firstly, there is a small number of teachers willing to use AI technologies in teaching Business English, only accounting for 20.00% of the total.

Secondly, the available AI technologies in the current Business English teaching are relatively outdated and simple in varieties. The platforms that the Business English teachers are willing to use include Lanmo Cloud Classroom and Moodle.

Thirdly, there are many factors that hinder the application of AI technologies in Business English teaching. Teachers believe that the main factors hindering their application in Business English teaching contain weak hardware foundation, complex technical application programs, and unclear goals of applying AI in Business English teaching.

The perspective of teachers in providing suggestions has obvious limitation. As a branch of vocational education, higher vocational education has always been moving towards meeting the requirements of the labor market. However, in the implementation process, most teachers lack social surveys on the application of AI technologies, only provide suggestions based on their own experience, without considering whether it meets the requirements of students, which limits the effective application of AI technologies in professional teaching.

IV. Optimization Path

4.1 Clarify the goals of applying AI technologies in professional teaching.

Goal clarification is a prerequisite for the application of AI technologies in Business English teaching, and also the effect that teachers and students should realize after the phase of classroom education guidance and learning [12]. The basic goal of the Business English courses in higher vocational education is to help high school students enhance their business knowledge and business English using ability in accordance with their original English foundation, including the abilities of listening, speaking, reading, writing and translation, the ability to conduct business negotiations in English, and the ability to understand and apply business report genres, so as to lay a foundation for future employment. After clarification of the basic goals, it is available to determine the detailed goals of applying AI technologies in professional teaching through an analysis from the front-end [13]. The front-end analysis content involves analysis of teaching problems, analysis of vocational learning content, and analysis of learner characteristics. The analysis of teaching problems mainly refers to analyze the main problems in professional teaching and clarifying the demand for resources in teaching from a systematic perspective. A teaching problem analysis framework was designed on the basis of Table 2 on students' perceptions of AI in learning Business English and Table 3 on teacher interviews, as shown in Table 4.

Table 4 Analysis of front-end problems

No.	Analysis of front-end problems
1	Have students achieved their English learning goals during class?
2	Are students willing to use AI technologies to achieve their Business English learning goals?
3	What resources can support Business English teaching based on AI technologies?

4 Which aspect in Business English teaching can AI technologies take effect?

Based on a thorough analysis of front-end problems, teachers can analyze the content of Business English teaching. According to feedback from interviewed students and teachers, the main courses of Business English in higher vocational colleges include International Trade Practice, Comprehensive English, English Speaking, Foreign Trade Document Preparation, Cross-border E-commerce, Foreign Trade English Correspondence, and Business English Translation [14]. The core of vocational education is foreign trade practical ability, aiming at developing vocational core ability. Its emphasis is placed on the expansion of certificate content such as Foreign Trade Document Specialist, International Trade Salesperson Qualification Certificate, Documentary Specialist, Business English Level Certificate, and Primary School Teacher Qualification Certificate [15]. In the existing framework of professional teaching content, the characteristics and performance of higher vocational college students majoring in Business English were summarized by referring to the survey results in Table 2, as shown in Table 5.

Table 5 Characteristics of Business English Major in higher vocational colleges

No.	Item	Characteristics
1	Student knowledge foundation	Students lack a solid foundation in English and vocabulary, have poor mastery of professional vocabulary and fixed sentence structures, significantly lack of confidence in learning, and still need to improve their business negotiation skills
2	Student cognitive characteristics	Students lack independent learning ability, initiative in oral expression, and the desire for self-exploration
3	Student learning style	Students have a strong sense of self-awareness and average recognition and judgment abilities

According to Table 5 as well as front-end problem analysis and professional teaching content, the goals of applying AI technologies in Business English teaching can be designed from the dimensions of knowledge, ability and emotion, as shown in Table 6.

Table 6 The goals of applying AI technologies in Business English teaching

Overall goals	Sub-goals	Details
Knowledge	Understand knowledge	Students can use AI technologies to understand the key and difficult knowledge taught by teachers in Business English.
	Use knowledge	Students are familiar with AI technology and can use it to master relevant English expressions in business and trade.
Ability	Listening and speak ability	Students can improve their English listening and speaking skills in an business English learning environment based on AI.
	Translation ability	Students can use AI technologies to enhance their ability of Business English translation.
Emotion	Interests	Using AI technologies to enhance students' interest in learning Business English
	Confidence	Using AI technologies to enhance students' confidence in speaking English
	Satisfaction	Using AI technologies to enhance students' enjoyment in learning English
	Willpower	Using AI technologies to enhance students' willingness to constantly overcome difficulties and persist in learning

According to Table 6, teachers can clarify the overall and sub goals of applying AI technologies in business English teaching, and flexibly adjust them according to the teaching content, providing clear guidance for AI based business English teaching.

4.2 Setting up the professional teaching process based on AI

Setting up the teaching process is an important task for educators, which is related to the efficiency of Business English teaching based on AI [16]. In the process of analyzing professional teaching processes, it is necessary to put students in the center and regarded them as active constructors of knowledge meaning, design reasonable AI technology applications, and fully motivate their enthusiasm for learning Business English with AI technologies. From the perspective of the process of teaching Business English based on AI, the process can be simply divided into several phases: pre-class, in-class, and post-class. Among them, the post-class phase can be further divided into several parts: new course introduction, speed reading, intelligent exploration, AI scenario creation, evaluation, and summary. According to the differences in the content of Business English teaching, there are also some differences in the focus of AI technology application in these phases [17]. For example, the course of "Receiving Visitors" mainly focuses on the English expressions related to airport, hotel reception and check-in, emphasizing the use of AI technologies to create a highly realistic hotel-reception atmosphere, promoting students to understand business etiquette and express in English. The application of AI technologies in courses focuses on creating relevant scenarios, and the specific activity process is shown in Table 7.

Table 7 Teaching process of "Receiving Visitors" based on AI Technologies

Teaching process		AI technologies		Teacher activities	Student activities
Pre-class		Knowji		Summarize audio-visual vocabulary and track student preview progress	Customize preview content and adjust preview progress based on predicted forgetting law
In-class	New Course Introduction	Altitude Learning		Assign tasks and empower students with a dominant role	Understand the new course subject and independently collect relevant knowledge
	Speed reading	Dragon	voice recognition of Nuance	Verbal command navigation document	Learn about course outline and reading list at a multiple speed
	Intelligent exploration	Ivy Robot	Talking	Collect data and provide necessary information to students	Conduct real-time and remote chat and interaction
	AI scenario creation	Cognii Virtual Learning Assistant		Create a hotel reception simulation scene	Use learned knowledge to communicate in simulation scenarios
Evaluation and Summary		Gradescope	AI tool	AI assisted viewpoint grouping, summarizing educational guidance achievements, and evaluating student performance	Evaluate and provide feedback TO each other
Post-class		Querium AI Platform		Assign personalized homework and guide students to introduce business etiquette to friends via email	Analyze the length of time required to complete assignments, provide personalized guidance, and increase STEM skills

According to Table 7, in the pre-class phase, teachers should use the Knowji tool to summarize new vocabulary and organize students to preview in advance. During student preview, Knowji can evaluate forgetting law as a reference, customize preview methods and improve preview efficiency.

In the in-class phase, teachers can use the Cognii virtual learning assistant to create hotel reception scenarios, introduce topics in different ways, use Altitude Learning to automatically focus on students' difficulties in preview, and assign tasks in response to weak points. Students can conduct intelligent exploration by virtue of Ivy talking robots and provide real-time feedback on the exploration progress. When the exploration activity comes to the end, teachers and students can use the Gradescope AI tool as an aid to summarize their learning experience and conduct evaluation.

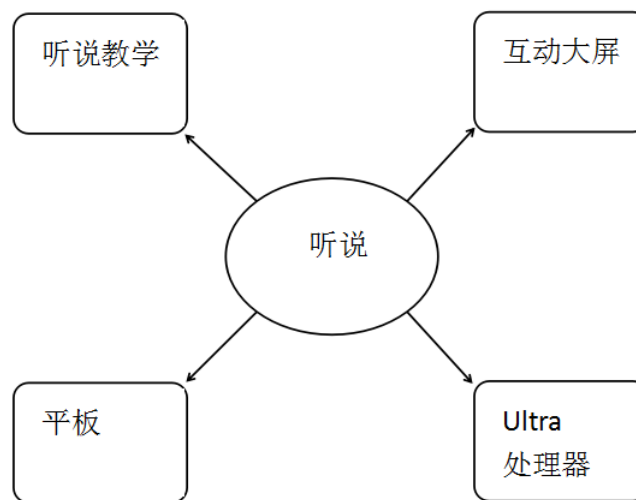
In the post-class phase, teachers can assign homework through the Querium AI platform, including chart analysis, PPT presentations and performances in business scenario, which require student to present as a team. Students complete them online and submit in real-time. Post-class homework guidance based on AI technologies is characterized by personalization, and it can connect students with their performance in class and improve their mastery of hotel reception English vocabulary, sentence structures and expression skills in a targeted way [18].

4.3 Consolidating the professional teaching foundation based on AI technologies

4.3.1 Introduction of sufficient AI hardware equipment

In the existing network hardware environment, teachers can strive to introduce sufficient AI hardware equipment, create a comprehensive framework for the application of AI technologies, and consolidate the hardware foundation of Business English teaching based on AI technologies. For example, the 14th generation Core Ultra processor with the powerful computing power of the Sharp Spin GPU can be introduced to support the operation of AI computing NPU modules by virtue of the advantages of bidirectional driving by the CPU and GPU of the processor. Meanwhile, according to the characteristics of AI technology applicable to Business English, specialized tools can be introduced. For example, based on the operational characteristics of the Querium AI platform, tools such as OpenVINO, oneAPI and Web Assembly can be introduced to meet the requirements of running large language models on PC and on the web.

On the basis of introducing the latest AI hardware equipment, further optimization of the framework of AI hardware equipment can be carried out in accordance with the requirements of teaching Business English listening, speaking, reading, writing and translation [19]. Taking the teaching of Business English listening and speaking courses as an example, the AI hardware required for the teaching should be flexible and adaptable to the teaching goals and methods, as shown in Figure 5.



听说教学	Listening and speaking teaching
互动大屏	Interactive large screen

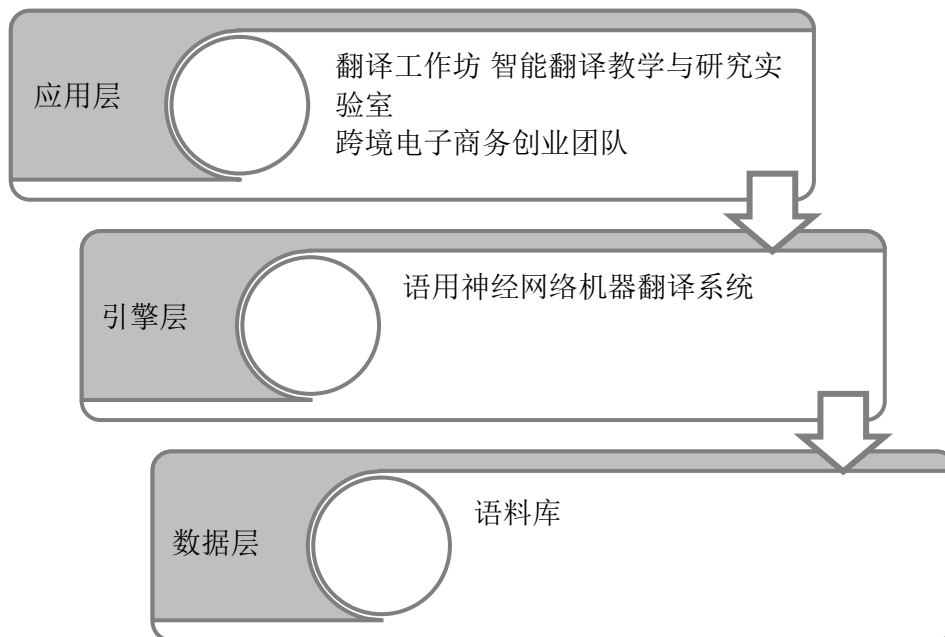
平板	Pad
处理器	Processor
听说	Listening and speaking

Figure 5 Combination of AI and Hardware for teaching business English listening and speaking courses

According to Figure 5, in common scenarios of Business English listening and speaking courses, hardware such as interactive large screens, multimedia classrooms, Pads and Ultra processors are required to be equipped to create a rich, interesting, and efficient teaching system. In addition, according to the requirements of live and recorded teaching, interactive screens and Pads can be added to simulate specific scenarios and support human-machine dialogue exercises, thus meeting the demand of every higher vocational college student for developing business English listening and speaking skills.

4.3.2 Conducting AI software training systematically

Software training is the key for higher vocational college students to master and apply AI technology in certain learning tasks. Whether these students majoring in Business English have practical and effective AI application strategies is related to the progress of professional teaching practice based on AI technologies [20]. Therefore, it was found from the preliminary investigation that some students refuse to cooperate with teachers in applying AI technologies in class due to low understanding of them. Considering the current situation where most teachers have poor mastery of practical skills in the application of AI technologies, the training of systematic software practical strategies can be conducted for the application of AI technologies. In training practice, existing on-campus and off-campus practice platforms can be fully utilized to create a complete standardized operating system by imitating the new and full-process talent project which companies participate in. The overall structure of the on-campus and off-campus practical training platform for Business English Major based on AI technologies is shown in Figure 7.



应用层	Application layer
引擎层	Engine layer
数据层	Data layer
翻译工作坊	Translation workshop
智能翻译教学与研究实验室	Intelligent translation teaching and research laboratory
跨境电子商务创业团队	Cross border e-commerce entrepreneurship team

语用神经网络机器翻译系统	Pragmatic neural network machine translation system
语料库	Corpus

Figure 7 Overall structure of an on campus and off campus practical training platform for Business English Major based on AI technologies

Figure 7 indicates that the on campus and off campus practical training for Business English Major based on AI technologies consists of several parts: application layer, engine layer, and data layer. A full-process and comprehensive composite training system can be constructed with a corpus as the base, a pragmatic neural network machine translation system as the engine, as well as translation workshops, intelligent translation teaching and research laboratories and cross-border e-commerce entrepreneurship teams as carriers, aiming at empowering companies with certain responsibilities, encouraging company representatives to participate in software training, changing the perception of professional students towards AI, enhancing the practical ability of professional teachers in AI, and laying the foundation for deeply integrating AI technologies into Business English teaching.

V. Effectiveness verification evaluation

The second survey on the performance of students was conducted after the practice in order better verify the practical effect of AI technologies in Business English teaching in higher vocational colleges. The study subjects are 100 sophomores, and the questionnaire is shown in Table 8. The research results were processed by the Likert five component scale method (strongly agree with 5 points, agree with 4 points, no comments with 3 points, disagree with 2 points, strongly disagree with 1 point), as shown in Table 8.

Table 8 Effect of applying AI technologies in Business English teaching in higher vocational colleges

No.	Dimension	Scores and proportion				
		5	4	3	2	1
1	Students' interest in learning Business English after the application of AI technologies	56%	23%	23%	6%	4%
2	Students' participation in professional learning activities after the application of AI technologies	62%	20%	10%	8%	0%
3	Improvement of Business English literacy among students after the application of AI technologies	58%	22%	11%	6%	3%

According to Table 8, 79% of students believed that the application of AI technologies in business English teaching could enhance their interest in learning business English, 82% believed that their participation in professional activities was significantly improved after the application of AI based teaching mode, and 80% agreed that the application of AI technologies can improve their professional competence in this major. However, there were still a small number of students who do not agree with these application advantages due to their short application time in higher vocational Business English Major and the lack of sufficient practical experience. Therefore, in the next stage of Business English teaching, it is necessary to further formulate more detailed application plan of AI technologies in line with the course development, highlight the application effectiveness in Business English teaching, and better promote their application in this major.

VI. Conclusion

Business English professionals play a crucial role in international business trade, and the higher vocational Business English Major is an important platform for cultivating professional talents. Based on the current study

status of AI + education at home and abroad, this study investigates the understanding of AI technologies among sophomores of a higher vocational college by taking the Business English Major in higher vocational colleges as an example and through interview, questionnaire, and literature review methods. 60% of higher vocational college students believe that AI can stimulate their interest in learning Business English, 40% believes that applying AI in Business English classrooms can promote interaction between teachers and students, and 94% are willing to cooperate with teachers to apply AI technologies in the Business English classroom. However, 85% believe that AI technologies have been hardly applied in the Business English classroom. Furthermore, the problems of applying AI technologies in the Business English Major were summarized from the interview with the teachers, and it is concluded that main problems in the current teaching practice of Business English based on AI technologies are unclear application goals, non-standard application processes and low utilization rate of basic resources. Corresponding suggestions are proposed as follows: clarifying the application goals of AI technologies in Business English teaching, setting up the teaching process of Business English based on AI technologies, and systematically strengthening the software and hardware foundation of Business English learning based on AI technologies.

In addition, there are still some shortcomings in this study, specifically manifested as: the survey data has a significant room for improvement; the survey objects were local higher vocational college students majoring in Business English, without that strong representativeness; the teacher interview samples collected at the initial stage are not comprehensive; the optimization suggestions proposed in this study have not been widely promoted and still need further examined.

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