

Exploration and Practice of AI-Empowered English Teaching in the Forest Protection Major

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Abstract: The core course "Forest Protection Professional English" at the undergraduate level is indispensable for enhancing students' professional knowledge, English proficiency, and international perspective in the field of forest protection. However, students encounter various challenges in learning this course, including difficulties in vocabulary memorization, contextual understanding, lack of learning motivation, scarcity of reference materials, and cross-cultural communication barriers, all of which contribute to the complexity of their learning process. the integration of Artificial Intelligence (AI) technology has opened a new path to address these challenges. AI can simulate real-life dialogues in the context of forest protection, provide students with professional background explanations, and effectively enhance their professional knowledge and logical thinking skills. An in-depth analysis of the application of AI technology in "Forest Protection Professional English" has revealed significant improvements in teaching effectiveness. Additionally, it anticipates the broad prospects for the application of AI technology in future English teaching for forest protection majors. By exploring the application and practice of AI technology, the aim is to foster innovation in teaching methods, improve teaching quality, and contribute to cultivating more forest protection talents with an international perspective and professional competence.

Keywords: Professional English, Artificial Intelligence (AI), Teaching Innovation

1. Introduction

1.1 The Significance of Forest Protection Professional English

In the context of globalization, the importance of English language instruction in the forest protection specialty has become increasingly prominent. This field encompasses crucial areas such as pest control, plant disease management, forestry chemical protection, and biological invasion prevention and control. Professional English language teaching not only assists students in adapting to international exchanges and facilitating cross-border collaboration but also introduces cutting-edge international academic resources, deepens students' understanding of the discipline, enhances their professional competence, and fosters the cultivation of compound talents with interdisciplinary knowledge and international competitiveness [1]. As an elective professional course for undergraduates in this specialty, "Forest Protection Professional English" aims to improve students' professional competence and strengthen their English reading and application skills, guiding them to delve deeply into professional knowledge. This course holds significant value in broadening students' international perspectives and serves as a bridge for them to access the forefront of science and technology and absorb international knowledge. Through systematic learning, students are expected to have a solid grasp of fundamental professional English knowledge, proficiently master specialized vocabulary, demonstrate strong reading comprehension abilities for professional English documents, be familiar with common English writing techniques for various genres, accurately express forest protection issues, and be capable of bidirectional translation of professional materials between English and Chinese, thereby laying a solid foundation for academic research and international exchanges.

1.2 Characteristics of Forest Protection Professional English

Forest Protection Professional English, as a specialized language tool within the field of forest protection science, possesses its unique attributes while also facing numerous challenges. Its uniqueness is primarily manifested in three aspects: Firstly, the vocabulary is diverse and highly specialized, encompassing multiple sub-fields such as ecology, plant pathology, entomology, biological invasion, and integrated pest management [2-3], requiring learners to possess a wealth of professional background knowledge. Secondly, the contexts are specific and complex, with closely related to particular ecological environments, forest protection, and management strategies, necessitating learners to have a profound reserve of professional knowledge and strong contextual comprehension abilities. Lastly, the rapid pace of updates is a distinctive feature; as scientific research progresses and environmental protection awareness increases, the vocabulary and expressions in Forest Protection Professional English are constantly evolving, demanding that learners maintain a continuous learning attitude and keep abreast of the latest professional developments and terminological changes. These characteristics and challenges collectively constitute the uniqueness and complexity of learning Forest Protection Professional English.

1.3 Research Progress of Artificial Intelligence in the Education Industry

The rapid development of Artificial Intelligence (AI) technology is quietly transforming the education industry [4]. Universities serve as crucial venues for technology application, and in 2018, the Ministry of Education issued an action plan encouraging the exploration of an "AI+X" talent cultivation model. To implement the national "AI+" strategy, promote the integration of higher education with AI, and support talent cultivation, teaching method reform, and educational governance, the Ministry of Education collected and evaluated the first batch of 18 typical application cases of "AI+Higher Education" in 2024. These cases cover large model teaching assistants, novel laboratories, and specific teaching scenarios, aiming to drive the deep integration of higher education and AI, innovate talent cultivation, reform teaching methods, and enhance

educational governance capabilities. Numerous top international universities are accelerating the exploration of the deep integration of "AI+Education." For example, in September 2023, Tsinghua University launched a pilot program for "AI-empowered teaching," developing vertical applications of large language models. In early 2024, Peking University introduced "Brainiac Buddy," an AI teaching assistant based on GPT-4, capable of high-quality interactions and completing complex tasks. In January of the same year, Zhejiang University launched the "HuiXue Foreign Language Intelligent Learning System," which utilizes AI and cognitive diagnostic technologies to precisely assess students' English proficiency and provide personalized learning suggestions.

This provides innovative solutions to the challenges faced by learners of English in the forest protection specialty. Through smart devices and computers, teaching is no longer constrained by time and space [5], making learning and teaching more convenient and personalized. the widespread application of AI in the education sector not only accomplishes many repetitive and cumbersome tasks, allowing teachers to focus more on students themselves and implement individualized instruction, but also promotes the transition from textbooks to digital teaching materials, gradually realizing applications from elementary to advanced stages [6]. Furthermore, various AI-based educational and teaching auxiliary tools have emerged, providing tremendous assistance to the learning of specialized English, especially for non-native English speakers. These tools can not only generate question banks with one click based on courseware content to reduce teachers' workload in creating questions but also possess the capability to generate virtual teaching assistants. This function effectively facilitates communication and interaction between teachers and students. With the assistance of these intelligent teaching assistants, teachers can concentrate more on the core content of teaching while reducing the burden of grading assignments, thereby having more time to focus on the individual development of students. They help novice paper writers learn writing methods and improve their paper writing skills [7], reduce anxiety in specialized English writing, and enhance writing

motivation [8] ultimately improving the quality of students' papers [9-10]. Based on these significant advantages, it is urgent to introduce advanced AI technology into English language teaching in the forest protection specialty to drive the innovation of teaching modes. This move is not only a key strategy to address current challenges in the education industry but also an important path to enhance teaching quality and achieve educational modernization.

2. Challenges in Learning Forest Protection Professional English

Firstly, the vocabulary is diverse and highly specialized, posing significant memory challenges. Learners must invest considerable time and effort, and master scientific and effective memory methods and techniques. For instance, the term "ecdysone," meaning molting hormone, is actually a blend of "ecdysis" and "hormone." Without understanding this etymological composition, the word becomes extremely difficult to remember and recite. Secondly, contextual understanding presents difficulties. the contexts is used are specific and complex, requiring learners to possess a solid foundation in professional knowledge, strong logical thinking skills, and contextual analysis abilities. For example, the sentence "Aphids have highly modified gut morphology and the genome, perhaps not surprisingly, reveals many sugar transporter proteins" implies that due to the highly specialized gut structure of aphids, it is not unexpected to find many sugar transporter proteins in their genome, where "modified" is extended to mean "specialized." Without relevant background knowledge, students may struggle to grasp this nuanced meaning of "modified." Furthermore, some learners lack sufficient self-motivation for learning, lacking clear learning objectives, interest, or facing significant learning pressure, which can impair learning outcomes and progress. Additionally, the scarcity of teaching resources poses another challenge. Compared to English materials for more popular specialties, resources for Forest Protection Professional English are relatively limited, causing difficulties for learners. the closest reference material available is "Plant Protection Professional English." Lastly, cross-cultural communication barriers cannot be ignored. In international academic exchanges and

cooperation, learners need to possess cross-cultural communication skills, but differences in cultural backgrounds and language habits across different countries and regions can pose obstacles. In summary, learners need to devise scientific and effective learning plans and methods, maintain a continuous learning attitude and mental state, and actively seek out and utilize various teaching resources and learning opportunities.

3. Exploration and Practice of AI-Empowered Curriculum Design for Forest Protection Professional English

The curriculum design for Forest Protection Professional English has established seven knowledge modules, each of which deeply integrates AI technology, aiming to achieve breakthroughs in imparting professional knowledge, cultivating language skills, and enhancing international communication abilities. Specifically, these modules encompass an overview of specialized English, morphology of specialized English, translation of specialized English, writing of English letters and resumes, selected readings of scientific papers (on pathology, entomology, and pesticides), online presentations by foreign experts and selected readings from international conference handbooks, as well as scientific paper writing (Table 1).

AI technology plays a pivotal role in the deep integration of professional knowledge and language skills. the vocabulary of Forest Protection Professional English is characterized by its diversity and complexity, posing significant challenges to traditional teaching methods, as exemplified by the second knowledge module: morphology of specialized English. However, by incorporating AI technologies, such as AI-powered one-click question generation and the intelligent recommendation system of Rain Classroom, not only is the burden on teachers for creating questions significantly reduced, but also personalized and targeted exercise delivery is achieved, effectively deepening students' mastery and understanding of specialized vocabulary. Furthermore, leveraging the story-creation function of online English learning systems like SmartSchool, along with instances of AI-queried keyword applications in the field of forest protection, enables students to practice repeatedly in rich

contexts, greatly enhancing their learning enthusiasm and practical abilities. For example, specialized terms such as "pest management," "transmit," and "virus" frequently appear, and these words are not only diverse but also carry profound professional knowledge. Traditional teaching methods often struggle to fully cover the multiple meanings of these terms and their specific applications in real-world forest protection scenarios. To overcome this challenge, we have introduced the innovative online English learning system, SmartSchool, which cleverly incorporates these key vocabulary items into carefully designed learning materials (Figure 1) through its story-creation function, supplemented by reading comprehension exercises. Additionally, we utilize advanced AI technology to proactively query and display the practical applications of these terms in defining specific concepts within the forest protection field, describing actual cases, and summarizing relevant academic papers, ensuring their repeated occurrence in diversified contexts. This approach, which integrates AI technology with contextualized learning, not only significantly enhances the practicality of vocabulary learning but also greatly stimulates students' enthusiasm and motivation, injecting new vitality into their journey of learning Forest Protection Professional English.

In the deepening of cross-cultural communication, AI technology has emerged as a vital bridge facilitating intercultural exchanges and international academic communication. Taking the sixth knowledge module, "Online Reports by Foreign Experts" and "Selected Readings from International Conference Handbooks," as an example, we specifically invite foreign experts to provide in-depth interpretations of the latest SCI articles in the field of forest protection, aiming to expose students to cutting-edge academic perspectives. To ensure smooth communication, we equip each student with a translator that leverages AI's machine translation capabilities to instantly convert dialogue content, effectively eliminating language barriers. Simultaneously, by integrating the meeting recording and question prompt-and-answer functions of our AI companion, we facilitate face-to-face exchanges through the ZOOM platform, further enhancing the efficiency and depth of

communication and achieving seamless integration in international academic exchanges and cooperation. During the learning session on international conference handbooks, AI translation technology once again plays a pivotal role. Students can upload relevant conference handbooks (such as "The Conference Handbook of the International Congress of Entomology held in Tokyo, Japan, 2024 (Pages 1-15)") and use specific prompts, like "Please summarize commonly used English vocabulary related to accommodation, conference schedules, and introductions of individuals at international conferences, and provide translations for these terms," to quickly grasp the essential vocabulary used in international conferences. The AI system promptly delivers high-quality responses, helping students rapidly familiarize themselves with the linguistic environment of international conferences. Furthermore, we encourage students to delve into the etiquette, customs, and values of the conference host country by posing questions to the AI, fostering a more comprehensive understanding of different cultural contexts. This interactive learning approach not only enhances students' intercultural communication skills but also deepens their understanding of experts from various countries through role-playing games and other forms. This AI-integrated cross-cultural communication teaching mode provides robust support for broadening students' international horizons and enhancing their cross-cultural communication abilities.

The application of AI technology demonstrates tremendous innovative potential in the crucial field of English writing for forest protection majors. As a bridge connecting theory with practice, tradition with innovation, English writing for forest protection majors demands high standards of accuracy, scientific rigor, timeliness, and innovation, making the application of AI technology particularly important. The following four aspects fully showcase how AI brings disruptive changes to English writing in the forest protection field. Firstly, AI technology aids in precisely grasping research trends and hotspots. In the realm of forest protection, research trends and hotspots cover a wide range of topics. AI, through big data analysis and machine learning algorithms, leverages its power to rapidly screen and summarize the latest research

findings on a global scale. This capability helps writers quickly locate research gaps and frontier topics. Secondly, AI enhances literature review efficiency and accelerates knowledge absorption. Forest protection writers face a massive amount of literature, and improving reading efficiency becomes a significant challenge. AI technologies, such as text summarization generators and smart key sentence highlighting tools, provide powerful support for addressing this issue. These tools automatically extract the core ideas, research methods, and conclusions of articles, allowing writers to focus more on in-depth thinking and creation, significantly reducing reading time. Additionally, AI-assisted literature management tools, such as automatic classification and tagged storage, help writers quickly locate the information they need and build their personal knowledge systems. Furthermore, AI plays a crucial role in generating writing outlines, stimulating

innovative ideas, and constructing logical frameworks, which are key to successfully completing professional English writing. By analyzing vast amounts of literature and databases, AI can break traditional thinking patterns and provide writers with diverse perspectives and novel viewpoints. Lastly, AI empowers the precise optimization of paper writing quality. AI tools like Grammarly and Turnitin excel in grammar checking, spell correction, and sentence structure improvement, providing instant feedback and modification suggestions. They help writers avoid common errors, enhance the accuracy and professionalism of their language expression. More importantly, AI tools can guide writers on how to make their language more concise, clear, and logically rigorous. Through the analysis of large corpora, these tools ensure that papers effectively convey the value and significance of research findings while adhering to academic norms.

Table 1. AI Technologies Utilized in the Current Knowledge Module

Knowledge Module	Teaching Objectives, Key Points, and Difficulties	Empowered by AI
Chapter 1 Professional English Overview	Teaching Objective: Grasp the characteristics of professional English. Key Point: Understand the development process of professional English. Difficult Point: Master the sentence structures commonly used in professional English.	(1) ChatGPT/ERNIE Bot: i. Feature Analysis: By analyzing a large corpus of professional English texts, AI extracts unique characteristics of professional English in terms of vocabulary, grammar, sentence structures, etc., helping students gain a deeper understanding of the nature of professional English. ii. Sentence Pattern Classification and Analysis: AI can classify common sentence patterns in professional English and provide detailed explanations and example sentences, assisting students in mastering the structures and usages of different sentence patterns.
Chapter 2 Professional English Word Formation and Mastery of Complex Vocabulary	Teaching Objective: Grasp the basic content of word formation in professional English and master complex vocabulary. Key Point: Focus on the roots of professional English words. Difficult Point: Understand and apply the affixes in professional English.	(1) Rain Classroom: AI One-Click Question Generation: Facilitates in-class review of learned content through automated question generation. (2) Smartschool: i. Pronunciation Correction: Assists in improving pronunciation accuracy. ii. Homework Grading: Automates the grading process for assignments. iii. Story Creation with Professional Vocabulary: Generates short stories incorporating professional vocabulary to enhance learning. (3) Quizlet: i. Professional English Vocabulary Bank for Memorization: Establishes a vocabulary bank specifically for professional English to aid memorization. ii. Assists students in remembering professional English words and terms.
Chapter 3 Professional English Translation	Teaching Objective: Understand the principles and basic techniques of English translation. Key Point: Grasp the rules of professional English translation. Difficult Point: Grasp the characteristics and essentials of professional English translation.	(1) Rain Classroom's AI One-Click Question Generation: Enables repeated practice of professional English translation skills through automated question creation. (2) iReadWrite and PaperRater: Sentence Structure Analysis Tools: Provide tools for analyzing sentence structures in professional English. (3) ChatGPT/ERNIE Bot: i. Offers a bilingual (Chinese-English) database of forestry and pest control terminology, enhancing the accuracy of term translation. ii. Constructs a cross-lingual knowledge base, enabling translators to quickly retrieve relevant English or Chinese information during the translation process, providing robust support. iii. BOB Translation Plugin: An immersive translation plugin for seamless language conversion.

Chapter 4 English Letter and Resume Writing	Teaching Objective: Master the methods of writing English letters and resumes. Key Point: Understand the structure of English letters and resumes. Difficult Point: Develop writing skills for English letters and resumes.	ChatGPT/ERNIE Bot: i. Provides templates for various writing tasks. ii. Offers writing tips and strategies. iii. Checks for spelling and grammar errors in letters and resumes. iv. Provides personalized resume writing suggestions based on individual circumstances and career goals.
Chapter 5 Selected Readings of Scientific Papers (Pathology, Entomology, Pesticides)	Teaching Objective: Grasp the basic knowledge and skills for reading pathology literature. Key Point: Learn the core vocabulary related to pathology, entomology, and pesticides. Difficult Point: Improve reading skills.	(4) ChatGPT/ERNIE Bot for Academic Purposes: i. Resource Acquisition: Assists in obtaining relevant academic resources. ii. Professional Terminology Translation and Explanation: Provides translations and explanations of professional terms. iii. AI Machine Translation: Facilitates quick and accurate translation of texts. iv. Semantic Structure Analysis of Papers: Analyzes the semantic structure of papers, extracts key information and core viewpoints, and generates concise summaries, helping readers quickly grasp the main ideas and points. v. Automatically constructs relevant knowledge graphs, aiding readers in systematically organizing and integrating their knowledge, forming a more complete and coherent knowledge system.
Chapter 6 Selected Readings from Online Reports by Foreign Experts and International Conference Handbooks	Teaching Objective: Grasp the basic knowledge and skills for participating in international academic conferences. Key Point: Learn commonly used vocabulary and sentences in academic conferences. Difficult Point: Understand cultural backgrounds.	(1) Machine Translation: Utilizes AI for efficient language conversion. (2) Zoom's AI Companion: Automatically drafts meeting content, generates meeting summaries, answers meeting-related questions, and provides real-time decision-support information.
Chapter 7 Scientific Paper Writing	Teaching Objective: Master the skills for writing and submitting scientific papers. Key Point: Grasp the skills for writing a complete scientific paper. Difficult Point: Develop the ability to write the background and discussion sections effectively.	(1) ChatGPT/ERNIE Bot for Research and Writing: i. Keeps abreast of research trends and hot topics. ii. Enhances the speed of literature reading. iii. Generates outlines for writing assignments. iv. Provides specific ideas and suggestions for improving the quality of paper writing. (2) Grammarly: Checks for spelling and grammar errors, offers vocabulary selection suggestions, and optimizes text clarity and conciseness.

Pest Management

Farmers use **pest management** to protect crops. Some insects, like the **whitefly**, harm plants. They eat the leaves and can **transmit viruses** to the crops. Farmers need to control these insects to keep plants healthy. Good **pest management** helps stop the spread of disease and keeps food growing strong.

Lexile (蓝思指数): 100
AR值 (Reading AR Value): 0.2
中文翻译:
农民使用害虫防治来保护农作物。一些昆虫,比如白粉虱,会损害植物。它们吃叶子,还会将病毒传播到农作物上。农民需要控制这些昆虫,保持作物健康。良好的害虫防治有助于阻止疾病的传播,确保食物茁壮成长。

词汇表

词汇	词性	音标	分音节	CEFR等级	中文
pest management	n	/ˈpest ˈmænɪdʒmənt/	pest man-age-ment	B1	害虫防治
whitefly	n	/ˈwaɪt flaɪ/	white-fly	A2	白粉虱
transmit	v	/ˈtrænz mɪt/	trans-mit	B1	传播
virus	n	/ˈvaɪrəs/	vi-rus	A2	病毒

阅读理解选择题

1. What is the main purpose of pest management?

○ A) To grow more crops
○ B) To control insects that harm plants
○ C) To feed insects
○ D) To help insects spread viruses

2. Which insect is mentioned in the article?

Figure 1. Story Composition Based on Vocabulary in Smartschool

文件上传: 2024年日本东京举行的国际昆虫学大会会议手册 (Page1-15)
提示语: 请帮我总结国际会议常用的关于住宿, 会议安排以及人物介绍中常用的英文词汇, 并给出相关英文词汇的翻译:

住宿 (Accommodation) 1.Registration Desk - 注册台 2.Cancellation Policy - 取消政策 3.Invoice and Receipt - 发票和收据 4.Hotel Reservation - 酒店预订 5.Room Rates - 房价 6.Single Room - 单人间 7.Double Room - 双人间 8.Suite - 套房 9.Check-in - 入住 10.Check-out - 退房 11.Housekeeping - 客房服务 12.Concierge - 礼宾服务 13.Complimentary Breakfast - 免费早餐	会议安排 (Conference Arrangement) 1.Opening Ceremony - 开幕式 2.Closing Ceremony - 闭幕式 3.Plenary Lectures - 主题演讲 4.Symposia - 专题研讨会 5.Poster Sessions - 海报展示环节 6.Oral Presentations - 口头报告 7.Coffee Break - 茶歇 8.Lunch Break - 午休 9.Exhibition - 展览 10.Welcome Mixer - 欢迎酒会 11.Gala Dinner - 晚宴 12.Social Activities - 社交活动 13.Time Table - 时间表 14.Program Book - 会议手册 15.Certificate of Presentation - 演讲证书 16.Certificate of Attendance - 出席证书 17.Code of Conduct - 行为准则 18.Family-Friendly Space - 家庭友好空间 19.Childcare Services - 儿童保育服务 20.Accessibility - 无障碍设施	人物介绍 (Introduction of Personnel) 1.Chair of the ICE Council - 国际昆虫学大会理事长 2.President of Local Organizing Committee - 当地组委会主席 3.Vice President of Local Organizing Committee - 当地组委会副主席 4.Scientific Section Convener - 科学分会召集人 5.Session Chair - 分会场主席 6.Speaker - 演讲者 7.Delegate - 代表 8.Volunteer - 志愿者 9.Advisory Board Member - 咨询委员会成员 10.Sponsor - 赞助商 11.Exhibitor - 参展商
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这些词汇涵盖了国际会议中住宿、会议安排以及人物介绍等常见方面。希望这些总结对您有所帮助!

Figure 2. ERNIE Bot Facilitates Accommodation, Conference Scheduling, and Participant Introduction at International Conferences

3. Enhanced Effectiveness of AI-Powered in Forest Protection Professional English Teaching

The integration of AI technology into the vast

realm of Forest Protection Professional English teaching has brought unprecedented learning experiences to students. the instant feedback provided by AI, in conjunction with instructors, swiftly identifies and corrects student errors, thereby accelerating the learning process. In particular, AI technology has demonstrated its unique charm in vocabulary learning, assisting students in effortlessly mastering complex words and enhancing their language proficiency. Furthermore, in the realm of artificial intelligence, this technology has opened a door to a wealth of knowledge and case studies on forest conservation from around the world, significantly broadening students' horizons and stimulating their curiosity and exploratory desire. Through AI-simulated forest conservation scenarios, students have achieved remarkable results in practicing their English listening, speaking, reading, and writing skills, especially in oral and aural comprehension. This practical learning in a virtual environment not only strengthens students' ability to use English in the field of forest conservation but also significantly improves their problem-solving skills.

The introduction of AI technology has also brought innovative changes to teaching methodologies. It requires teachers to continuously enhance their digital literacy, master and utilize digital tools, and integrate AI with teaching methods for innovation. This transformation not only enhances classroom interaction and fun but also greatly stimulates students' interest and enthusiasm for learning. At the same time, AI technology alleviates teachers' burdens in lesson preparation and grading, providing them with abundant

teaching resources and auxiliary tools, thereby significantly improving teaching efficiency. More importantly, AI technology can achieve precise matching and optimal allocation by analyzing big data on students' learning needs and rationally configuring teaching resources. It integrates high-quality educational resources from around the world, compensating for the shortcomings of traditional textbooks and providing rich materials for English language learning in forest conservation majors.

The application of AI technology in Forest Protection Professional English teaching has yielded significant results. From the students' perspective, classroom participation, attendance rates, online learning frequency, and academic performance have all seen notable improvements, along with a significant boost in students' self-confidence. Meanwhile, the dual increase in postgraduate entrance examination rates and employment rates, as well as the enhancement of employer satisfaction, fully demonstrates the positive role of AI technology in enhancing students' overall quality. From the teachers' perspective, positive changes have also been observed in discipline construction, teaching teams, and teachers' enthusiasm and motivation for teaching. These achievements undoubtedly prove the enormous potential and value of AI technology in the education sector, injecting new vitality into English language teaching for forest conservation.

4. Leading Future Trends: Building an AI-Empowered Comprehensive English Learning Management System for Forest Protection Specialties

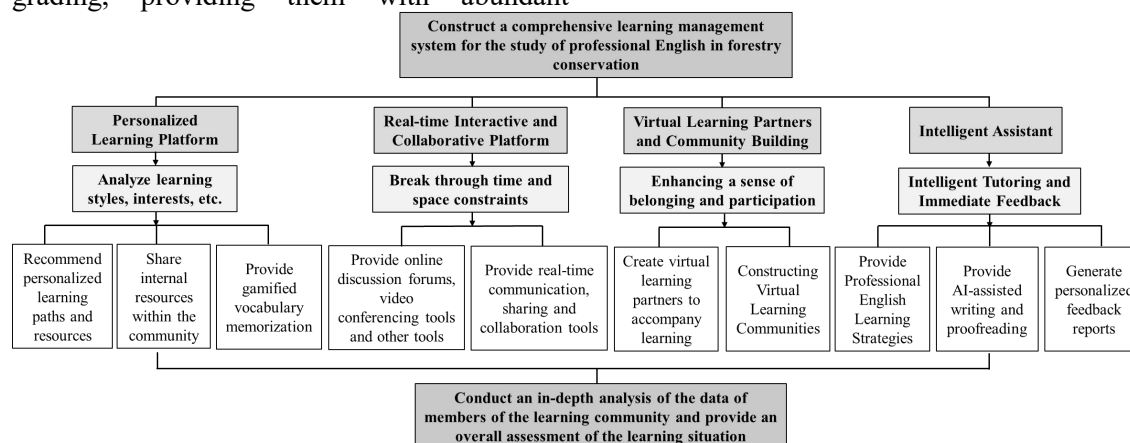


Figure 3. Future Framework for the Application of AI-based Intelligent Teaching in Forest Protection Professional English Learning

Under the deep empowerment of AI technology, the field of Forest Protection Professional English teaching is undergoing a revolutionary transformation, with significant improvements in learning efficiency, enthusiasm, and ultimate outcomes. Against this backdrop, the construction of a comprehensive English learning management system for forest protection specialties becomes particularly necessary. This system is proposed to consist of four core modules: a personalized learning platform, a real-time interaction and collaboration platform, an intelligent assistant, and virtual learning companions with community building (Figure 3).

Firstly, the personalized learning platform incorporates gamified learning modules, such as "Pest Elimination Fun" and "Forest Guardian Challenge," presenting otherwise dry professional knowledge in an engaging manner. This allows students to unconsciously enhance their English skills while enjoying a relaxed and pleasurable gaming experience. This edutainment design philosophy not only increases the fun of learning but also improves knowledge absorption efficiency. Secondly, the real-time interaction and collaboration platform integrates various interactive tools, including video conferencing, instant messaging, file sharing, and more, creating a comprehensive and multi-dimensional interactive learning environment for learners. This stimulates intellectual collisions among students, facilitates deep processing and internalization of knowledge, and encourages students to fully realize their potential through enhanced learning interactions. Furthermore, the introduction of an intelligent assistant provides instant learning support to students. Given their strong learning capabilities, this assistant not only promptly answers questions and alleviates anxiety but also includes an AI-assisted writing and proofreading function, effectively improving the quality of students' English writing. Lastly, each student can create one or more virtual learning companions. These AI-based virtual characters provide continuous learning motivation and emotional support, accompanying students throughout their learning journey.

5. Conclusion

AI-assisted tools are gradually emerging,

demonstrating unique advantages in addressing the challenges faced by Forest Protection Professional English learners. They not only promote learners' mastery of professional knowledge and English application skills but also comprehensively facilitate the innovation and progress of English education in forest protection specialties, as well as students' personal development. By scientifically and reasonably integrating AI technology, we have significantly improved teaching efficiency and learning experiences, effectively tackled numerous challenges in the education sector, and strongly promoted the innovation and practical application of professional knowledge. This has led to a marked enhancement in students' learning outcomes and assessment accuracy. However, like every emerging technology, AI has a double-edged sword characteristic. While marveling at AI's powerful functions, we should also be aware of potential issues it may bring, including increased plagiarism, text errors, content instability, and the widening digital divide [11]. Therefore, when utilizing AI, we must maintain an objective and prudent attitude, fully leveraging its positive impacts while actively addressing potential challenges. Establishing sound regulations and standards, enhancing technological research and innovation, and improving teachers' and students' information literacy are essential to ensure that AI technology truly contributes to the healthy and sustainable development of education.

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