Theory and Practice of Science and Technology
2025, VOL. 6, NO. 9, 237-240
DOI: 10.47297/taposatWSP2633-456945.20250609

Reconstruction Strategies of Teaching Modes for Marine Engineering Majors Empowered by "AI+English" from the Perspective of School-Enterprise Collaboration

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ABSTRACT

Against the backdrop of the international development of the marine industry, the traditional English teaching model for marine-related majors can no longer meet the demand for cultivating interdisciplinary talents. From the perspective of school-enterprise collaboration, this paper deeply explores the strategies for reconstructing the teaching model of marine-related majors empowered by "AI+English" technology. The study first analyzes the urgency of industry-education integration for the teaching reform of marine-related majors and the theoretical feasibility of the in-depth integration of AI technology and English teaching. Secondly, combined with the special needs of the marine industry for English application capabilities, it proposes specific application paths of "AI+English" technology from three dimensions: intelligent language training, virtual simulations teaching, and personalized learning support. At the same time, it constructs a trinity cooperation mechanism involving school-enterprise collaborative development of teaching resource databases, joint construction of practical training platforms, and co-cultivation of dual-qualified teachers. Verified by practical cases, this model has significantly improved students' professional English application ability and practical adaptability. The research shows that the depth integration of school-enterprise collaboration and "AI+English" provides a replicable practical solution for the innovation of teaching models in marine-related majors, and is of great significance for promoting the cultivation of high-quality international talents in the marine industry.

KEYWORDS

School-enterprise Collaboration; AI+English; Marine-related majors teaching model

1 Introduction

Against the backdrop of the global shipbuilding industry accelerating its transformation toward intelligence, greenization, and internationalization, the marine industry has been deeply integrated into the international industrial chain and technological cooperation network. According to the latest data from the international Maritime Organization, over 90% of maritime trades rely on English for communication and collaboration, and the demand for professional English application in ship construction, operation, and management has shown a trend of contextualization and complexity. Meanwhile, breakthroughs in artificial intelligence (AI) technology—such as intelligent speech recognition, natural language processing, and virtual simulation—are reshaping the paradigm of education and teaching, providing technical support for the innovation of professional English teaching. However, the current professional English teaching for marine-related majors is still trapped in the constraints of traditional models: the teaching content lags behind the new technologies and standards of the marine industry, failing to cover English application in emerging fields such as LNG ship cargo management and intelligent ship remote control; teaching scenarios are limited to classroom theoretical lectures, lacking practical contexts like real international ship engineering negotiations and cross-cultural team collaboration; and the personalized adaptation of teaching resources is insufficient, unable to meet the differentiated learning needs of students.

As the core path to promote in-depth integration of industry and education, school-enterprise collaboration offers a new direction to solve the above problems. In recent years, the cooperative practices between leading enterprises in the marine industry and vocational colleges have shown that through the integration of school-enterprise resources and complementary advantages, the precise alignment between teaching content and industry needs can be effectively promoted. On this basis, the in-depth integration of "AI + English" into the teaching of marine-related majors not only conforms to the new requirements for talent cultivation brought by the digital transformation of the marine industry but also serves as an important measure to implement the "Advance the Strategic Action of Educational Digitalization" proposed in China's Opinions on Deepening the Reform of Modern Vocational Education System Construction. Focusing on the perspective of school-enterprise collaboration, this study systematically explores the reconstruction strategies of "AI + English"-empowered teaching models for marine-related majors, aiming to build a new "technology-supported, industry-education collaborative, and competence-oriented" teaching system. Against the background of industry-education integration, this paper explores the application of digital technology in English teaching to construct an innovative "English + Major" teaching model. This model, while aligning with industry demands, leverages digital technology to help students integrate English knowledge with professional knowledge, thereby enabling them to apply what they have learned and ultimately achieve all-round development [1]. It is expected to provide theoretical and

practical references for cultivating high-quality marine talents with both professional literacy and international competitiveness.

2 Analysis of the current situation and contradictions in professional english teaching for marine-related majors

The global marine industry is undergoing an intelligent transformation, with rapid development in emerging fields such as LNG-powered ships and unmanned shipping. According to the 2024 report by the International Maritime Organization (IMO), the annual update rate of marine technical terminology reaches 15%, and English expressions related to automated control systems and green shipping regulations are iterating frequently. However, the content of current professional English textbooks for marine-related majors lags behind the actual industrial application by an average of 3–5 years. These textbooks still focus on traditional ship structure terminology, which fails to meet students' language needs in scenarios such as intelligent ship operation and international maritime arbitration. A survey conducted by a ship enterprise shows that only 32% of new employees can proficiently use professional English to handle fault reports of intelligent ship equipment.

Current school-enterprise cooperation mostly focuses on the construction of internship bases and order-based talent cultivation, with insufficient in-depth collaboration in core teaching links. On one hand, the proportion of transforming real enterprise project cases into teaching resources is low—only 25% of enterprise technical documents are effectively adapted into teaching materials. On the other hand, the joint cultivation of teachers is a mere formality: school teachers lack practical experience in ship enterprises, while enterprise engineers are unfamiliar with teaching rules, leading to a disconnection between course theory and practice. Additionally, schools and enterprises have not formed a unified standard in the student evaluation system—schools focus on theoretical exams, while enterprises emphasize practical abilities—creating a "dual-track" contradiction in talent cultivation evaluation.

AI-empowered innovative teaching in college English classrooms refers to leveraging advanced artificial intelligence technologies, such as natural language processing and machine learning, and integrating them with teaching practices to enhance the quality of English teaching [2]. Although some colleges and universities have introduced AI English learning tools, their functions are limited to basic aspects such as vocabulary memorization and grammar exercises. For complex scenarios unique to marine majors—such as English communication for emergency operations in ship engine rooms and the writing of international average accident reports—it is difficult to achieve effective simulation due to two key issues: the accuracy of AI speech recognition for professional terminology is less than 70%, and the development cost of virtual simulation scenarios is high. Statistics show that the coverage rate of virtual simulation courses for marine-related majors is currently less than 40%, and most of these courses lack connection with the actual business processes of enterprises, failing to meet the industry's requirements for students' practical English abilities.

3 In-depth integration of school-enterprise collaboration mechanisms

Schools and enterprises jointly establish a special teaching resource development center, and construct a closed-loop mechanism of "demand-oriented—content development—dynamic update". Relying on its frontline business advantages, the enterprise regularly provides real materials such as the latest marine technical manuals, international project negotiation cases, and intelligent ship operation specifications; the school, leveraging its expertise in educational technology, is responsible for transforming these materials into digital resources adapted to AI teaching scenarios, such as intelligent interpretation modules for maritime regulations and interactive English courseware for ship equipment operation. To ensure the timeliness of resources, the two parties agree to add no less than 20% of cutting-edge industry content each year, focusing on covering English application knowledge in emerging fields such as green shipping and unmanned ships, so as to ensure that teaching content iterates in sync with industry practices.

With the "two-way secondment" program as the core, the channel for teacher exchange between schools and enterprises is opened up. Every semester, the school dispatches professional teachers to settle in the enterprise, who deeply participate in practical work such as international shipbuilding projects and cross-border maintenance collaboration to accumulate experience in industry English application; the enterprise regularly sends senior engineers to the classroom to offer a series of "Marine English Practical" courses, explaining practical skills such as ship inspection report writing and cross-cultural communication in port operations with real cases. In addition, through regular activities such as joint lesson preparation and teaching seminars, the two parties jointly polish curriculum design, optimize teaching methods, and gradually improve the composite level of "teaching ability + industry literacy" of dual-qualified teachers.

Focusing on the full-chain needs of "teaching—learning—application", schools and enterprises jointly build the

"Intelligent Marine English Teaching Cloud Platform". This platform integrates three core functions: first, the online course module, which provides English learning content classified by major and scenario; second, the virtual training module, which simulates real scenarios such as emergency communication in ship engine rooms and international freight contract negotiations; third, the school-enterprise interaction module, where enterprises release talent demand standards and technology update dynamics in real time, and teachers and students can consult industry-related questions online and obtain practical guidance. Empowered by the platform, the real-time connection between teaching content and industry needs is realized, promoting the accurate matching between the cultivation of students' English ability and their career development needs.

4 Practical value and development direction of reconstruction

Through the in-depth integration of school-enterprise collaboration and "AI+English", the teaching model of ship-related majors has achieved a significant transformation from "theoretical indoctrination" to "scenario-based practice". This transformation accurately responds to the shipping industry's demand for interdisciplinary talents. As Huang Bangyan pointed out his research, industry-specific higher vocational colleges need to deepen school-enterprise collaboration to break the institutional bottlenecks in the key path to overcoming the limitations of traditional teaching. In this process, students are the direct beneficiaries [3]. With the help of AI-driven virtual simulation technology, they can practice their English communication and professional operation skills repeatedly in simulated real work scenarios such as ship navigation and maritime negotiations, at the same time Artificial intelligence technology can help teachers dynamically grasp students' learning outcomes [4], effectively addressing the shortage of practical scenarios in traditional teaching. This aligns with the application effects of smart teaching platforms in enhancing practical abilities in vocational education.

Smart technologies correspond exactly to their content, enabling humans to form a rational understanding of the smart environment and develop the ability to use various smart facilities and equipment. Artificial intelligence technology provides important support for higher vocational English teaching to improve students' core English literacy, helping higher vocational colleges cultivate more high-quality smart talents [5]. At the same time, enterprises' in-depth participation in the teaching process also brings significant benefits. By providing real project cases, industry data and technical guidance, enterprises integrate job requirements into the teaching process in advance, enabling seamless connection between talent cultivation and industry standards. This "co-construction and sharing" collaborative model is consistent with the core logic of the "three-level and four-party" education framework effectively improve the post adaptability of graduates, realizes the accurate matching between the talent supply of schools and the talent demand of enterprises, and forms a positive cycle of win-win cooperation between schools and enterprises. The involvement of AI technology further optimizes this process: through intelligent data analysis of the matching degree between students' learning behaviors and enterprise job requirements, it provides a basis for teaching adjustments, which is consistent with the concept of AI empowering the ecological reconstruction of industry-education integration in vocational education.

Looking ahead, there is still broad room for innovation in the teaching of ship-related majors. On the one hand, we can further explore cutting-edge technologies such as metaverse and augmented reality (AR) to build more immersive and interactive learning scenarios, promoting the dual upgrading of teaching experience and effects. This continues the in-depth application direction of smart teaching platforms in personalized learning and data-driven education. On the other hand, it is necessary to continuously improve the school-enterprise data sharing mechanism, deepen the application of AI in teaching evaluation and vocational ability prediction, and build an intelligent and dynamic talent cultivation system. This echoes the integrated development framework of "technology + teaching + evaluation" in "artificial intelligence + vocational education". At the same time, we can draw on the practical experience of the integration of AI and English teaching, and embed technologies such as intelligent speech recognition and natural language processing into ship-related professional scenarios more accurately, injecting new impetus into the high-quality development of the global shipping industry.

5 Conclusion

This study focuses on the reconstruction of the teaching model for ship-related majors empowered by "AI + English" from the perspective of school-enterprise collaboration. It systematically analyzes the core contradictions between industry demands and current teaching status, explores collaborative innovation paths, and verifies practical values. The research confirms that the global trend of intelligence and internationalization in the shipping industry places dual high demands on the English application capabilities and technical literacy of ship-related professionals. However, traditional teaching has prominent issues such as outdated content that lags behind updates to international maritime regulations,

and practical scenarios limited by safety and cost constraints, making it difficult to meet the industry's demand for interdisciplinary talents. The in-depth integration of "AI + English" provides a key solution to this contradiction. By incorporating real scenarios such as ship equipment operation and ocean-going communication into teaching through technologies like intelligent voice interaction and virtual simulation, it effectively addresses the practical shortcomings of traditional teaching and significantly enhances students' practical abilities in professional English [6]. Reality technology in enhancing immersion and reducing cognitive load in ship-related English teaching.

The deep integration of the school-enterprise collaboration mechanism is the core guarantee for the reconstruction of the teaching model. By jointly developing curriculum systems, sharing AI teaching resources, and establishing a "double-teacher" team, the ship industry standards, practical experience from enterprises are organically integrated with the educational and teaching rules of schools, realizing the accurate alignment between talent cultivation goals and job requirements. This "co-construction and sharing" collaborative model not only improves students' adaptability to positions but also reserves talents that meet the needs of intelligent development for enterprises, forming a positive win-win ecosystem between schools and enterprises. It practices the vocational education reform path of deep integration of artificial intelligence technology and industry resources, and also responds to the core demand of higher vocational education to optimize teaching resources and strengthen the practical orientation through school-enterprise collaboration.

The reconstructed teaching model has demonstrated significant value in practice. Students have enhanced their cross-cultural communication and problem-solving abilities in virtual simulation scenarios, while enterprises' enthusiasm for participating in teaching and the quality of talent cultivation have improved simultaneously. Looking ahead, with the iteration of technologies such as the metaverse and augmented reality, the teaching of ship-related majors will upgrade towards a more immersive direction. Continuously improving the school-enterprise data sharing mechanism, deepening the application of AI in teaching evaluation and vocational ability prediction, while addressing challenges such as data security and teacher adaptation in technology application, will promote the continuous iteration of the teaching model. In conclusion, the integration of "AI + English" and school-enterprise collaboration not only provides a feasible solution for the teaching reform of ship-related majors but also offers practical references for the intelligent development and industry-education integration in the field of vocational education. Its long-term value needs to be continuously explored in the context of technological evolution and industry transformation.

Funding

Jiangsu Province University Philosophy and Social Science Research Project: "Research on the Reconstruction of the Teaching Mode for Ship-related Majors Empowered by 'AI+English' from the Perspective of Integration of Industry and Education" (NO: 2025SJYB0548);Research on the Effectiveness of Project-based Curriculum Ideology and Politics in Higher Vocational English Teaching (NO: 2024SZyb08); Research on Modular Curriculum Design for Higher Vocational English Based on the Needs of Professional Groups; Research on Modular Curriculum Design for Higher Vocational English under the New Curriculum Standards: A Case Study of Jiangsu Maritime Institute (NO: JYJXGG-202405)

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