

A Study on the Establishment of a New-Style Teaching Team in Higher Vocational Navigation Institutions from the Perspective of Smart Ships

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Abstract:

In the context of the rapid development of smart ship technology, maritime education is confronted with novel challenges and opportunities. This research conducts an in-depth analysis of the substantial value and practical methods for constructing maritime teaching teams in higher vocational colleges within the smart ship environment. The paper centers on three crucial aspects: the establishment of interdisciplinary and composite professional teaching innovation teams; the development of a new faculty training mechanism featuring in-depth integration of industry and education and collaborative innovation between schools and enterprises; and the promotion of the integration of education and research via diversified collaborative platforms for teaching and research. The study reveals that cross-disciplinary team building, the integration of industry and education, and the convergence of education and research can effectively improve the comprehensive capabilities of maritime teaching teams, stimulate the innovative development of maritime education, and lay a solid foundation for cultivating high-quality maritime professionals in the smart ship era.

Keywords:

Smart Ships, Higher Vocational Institutions, Maritime Teaching Faculty Groups, Interdisciplinary Cooperation, Integration of Industry and Education, Integration of Science And Education

1. Introduction

In the context of the rapid development of the global shipping industry and the continuous progress of smart ship technology, maritime education is confronted with unprecedented opportunities and challenges. As a symbol of next-generation shipping technology, smart ships integrate advanced technologies such as artificial intelligence, big data, and the Internet of Things. They not only transform traditional shipping models but also set higher requirements for the knowledge structure and professional competencies of maritime professionals [1]. In this situation, vocational colleges, as key institutions for cultivating high-quality maritime talents, find the development of their maritime faculty teams particularly significant [2].

Currently, the development of maritime faculty teams in higher vocational colleges encounters numerous challenges [3]. Firstly, the rapid progress of intelligent ship technology necessitates that instructors continuously update their knowledge systems and acquire interdisciplinary expertise, which poses a substantial challenge for teachers with traditional single-discipline backgrounds. Secondly, as the shipping industry attaches greater importance to practical skills, the lack of practical experience among faculty members has become more prominent. Thirdly, insufficient research capabilities impede the improvement of teaching quality, making it difficult to incorporate the latest research results into teaching content [4]. Fourthly, inadequate collaboration within faculty teams, along with the absence of effective team-building and incentive mechanisms, has a negative impact on the overall improvement of teaching standards.

In response to these challenges, strengthening the development of maritime teaching teams has become crucial for enhancing the quality of maritime education and cultivating talents who can meet the demands of the smart ship era [5]. This study aims to explore strategies for constructing maritime teaching teams in higher vocational institutions in the context of smart ships, focusing on establishing interdisciplinary and composite teaching teams, innovative models for faculty training that integrate industry and education, and collaborative research teams that combine teaching with scientific research. By analyzing the current challenges in the development of maritime teaching teams [6,7], this study proposes corresponding solutions to provide theoretical bases and practical guidance for improving the quality of maritime education and cultivating high-quality maritime professionals suitable for the smart ship era.

The significance of this study is manifested in the following aspects: (1) By establishing a cross-disciplinary and composite teaching team, the limitations of a single disciplinary background can be overcome, the comprehensive teaching capabilities of teachers can be enhanced, and a foundation can be laid for cultivating maritime professionals with interdisciplinary thinking abilities; (2) Developing a faculty training model that integrates industry and education through school-enterprise cooperation enables teachers to keep up with industry trends, update teaching content and methods, and improve the practicality and foresight of teaching; (3) Forming a collaborative teaching and research team that combines science and education enhances teachers' research capabilities, facilitates the transformation of research results into teaching practice, and promotes the innovative development of maritime education.

2. The Significance of Establishing Maritime Teaching Teams in Higher Vocational Colleges under the Context of Smart Ships

The rapid progress of smart ship technology has placed new requirements on maritime education. The traditional maritime education model is no longer capable of meeting the talent demands of the smart ship era. There is an urgent need to update and enhance the knowledge structure and teaching abilities of maritime educators. Smart ships integrate advanced information technology, automation technology, and artificial intelligence technology, which requires maritime professionals to possess not only traditional maritime knowledge and skills but also interdisciplinary expertise in information technology, data analysis, and system management. This transformation places higher demands on maritime teaching teams, necessitating continuous knowledge updates and improved interdisciplinary teaching capabilities [8].

The development of maritime faculty teams in contemporary higher vocational institutions encounters numerous challenges. Firstly, the faculty structure is overly homogeneous, lacking interdisciplinary expertise, which fails to meet the requirements of intelligent ship education. Secondly, instructors have insufficient practical experience and are out of touch with industry developments, making it difficult to incorporate the latest intelligent ship technologies into teaching [9]. Thirdly, their research capabilities need to be improved. The lack of high-quality research projects and outcomes hinders the improvement of teaching quality. Finally, collaboration among faculty members is still inadequate. These deficiencies in maritime education, combined with the absence of effective team-building and incentive mechanisms, have an adverse impact on the overall improvement of teaching standards.

In the face of such challenges, the significance of strengthening the development of maritime teaching teams has become increasingly prominent. A high-quality teaching team is crucial for cultivating talents that meet the demands of the intelligent ship era. By forming interdisciplinary and composite teaching teams [10], the limitations of a single disciplinary background can be overcome, thereby enhancing teachers' overall teaching capabilities. Establishing a faculty training model that integrates industry and education through school-enterprise collaboration enables teachers to keep up with industry developments and update their teaching content and methods. Creating collaborative research teams that combine teaching with scientific research enhances teachers' research capabilities and facilitates the application of research findings in teaching practices [11]. Therefore, strengthening maritime teaching teams is an essential means to improve the quality of maritime education and cultivate high-caliber maritime professionals.

In this context, this paper centers on the current construction status of maritime teaching teams in higher vocational colleges within the context of smart ships. It systematically analyzes the primary challenges in team structure, teacher professional development, and institutional support. Moreover, it further explores targeted construction approaches to offer a valuable reference for higher vocational maritime education institutions to advance high-quality teaching team construction and better meet the talent cultivation requirements of the smart ship industry.

3. Measures for the Construction of Maritime Teaching Teams in Higher Vocational Colleges in the Era of Smart Ships

Against the backdrop of the rapid advancement of smart ships, the significance of constructing maritime teaching teams in higher vocational colleges is highly evident. This paper endeavors to probe into strategies for strengthening maritime faculty teams in higher vocational institutions within the framework of the smart ship paradigm. The focus lies on cultivating interdisciplinary and composite teaching teams, formulating innovative models for faculty training that integrate industry and education, and establishing collaborative research teams that combine teaching and scientific research.

3.1. Establishment of an Interdisciplinary and Innovative Teaching Team

In the context of smart ships, the establishment of interdisciplinary innovative teaching teams is of great significance for improving the quality of maritime education. These multidisciplinary teams have diverse academic backgrounds, which

allows them to integrate knowledge and skills from different fields and provide students with comprehensive intelligent vessel education. Such team structures contribute to breaking down disciplinary boundaries, promoting knowledge integration, and cultivating maritime professionals with interdisciplinary thinking abilities.

Constructing a cross-disciplinary and versatile teaching team necessitates the adoption of multiple strategies. Firstly, recruiting professionals with backgrounds in information technology, automation, artificial intelligence, and related fields can diversify the disciplinary composition of the teaching staff. Secondly, encouraging existing teachers to engage in interdisciplinary training and learning can enhance their capacity to conduct interdisciplinary teaching. Thirdly, establishing interdisciplinary teaching teams promotes exchanges and cooperation among educators with diverse professional backgrounds. Additionally, initiating interdisciplinary research projects can stimulate teachers' innovative thinking and collaborative spirit.

The establishment of interdisciplinary teams significantly enhances maritime education. Firstly, it equips students with comprehensive and up-to-date knowledge of intelligent vessels while cultivating their interdisciplinary thinking skills. Secondly, these teams enable innovative teaching research, developing new curricula and teaching methods tailored to the requirements of the intelligent vessel era. Thirdly, they facilitate more effective industry-academia-research collaboration, translating the latest scientific achievements into teaching content to enhance the practicality and foresight of education. Finally, constructing interdisciplinary teams improves teachers' overall competence and promotes their professional development, creating a virtuous cycle that continuously drives innovation and progress in maritime education.

3.2. Establishment of a Novel Teacher Training Model Featuring In-depth Industry-Education Integration and College-Enterprise Collaborative Innovation

The profound integration of industry and education, coupled with the collaborative innovation between schools and enterprises, stands as a vital approach for enhancing the practical skills and industry awareness of maritime teachers. By strengthening school-enterprise cooperation, long-term and stable partnerships can be established to promote resource sharing and complementary advantages. Specific measures are as follows: establishing a school-enterprise cooperation committee to conduct regular exchange activities; jointly developing training bases and R & D centers to offer teachers practical and research platforms; and implementing joint talent cultivation programs to align teaching content with industry requirements.

The cultivation of “dual-qualified” teachers is a key goal of industry-education integration. These teachers possess both solid theoretical knowledge and extensive practical experience, which enables them to effectively bridge the gap between theoretical instruction and practical application. The following measures can be adopted: encouraging teachers to engage in corporate practice to acquire industry experience; inviting industry experts to participate in teaching activities to enhance the integration of theory and practice; establishing a faculty enterprise placement system to regularly assign teachers for hands-on training; and conducting joint school-enterprise training programs to improve teachers' practical skills and industry understanding.

Establishing a university-industry collaborative innovation platform is a key initiative for deepening the integration of industry and education. Such platforms can

be constructed through the following methods: jointly establishing industry-academia-research cooperation bases to conduct joint research projects; setting up technology transfer centers to facilitate the commercialization of research results; organizing industry forums and technical exchange events to promote knowledge sharing and innovation; and undertaking joint technological breakthroughs to address practical industry challenges. These platforms not only enhance the research capabilities and industry influence of faculty members but also provide students with practical opportunities, thereby improving the quality of talent cultivation.

By establishing a new teacher training model that deeply integrates industry and education with collaborative innovation between schools and enterprises, we can effectively enhance the practical skills and industry expertise of maritime educators, ensure that teaching content is closely aligned with industry needs, and provide strong support for cultivating high-quality maritime professionals capable of meeting the demands of the smart ship era. This model promotes two-way interaction between educational institutions and shipping enterprises, enabling teachers to keep abreast of the latest technological applications and industry standard developments in smart ship technology, thus preventing a disconnection between teaching content and real-world industry practices. It fundamentally addresses the issue of insufficient practical experience among teachers while simultaneously supplying enterprises with qualified talent in line with the needs of smart shipping development, achieving a win-win situation for both schools and enterprises.

3.3. Integration of Science and Education: Establishing Diverse Collaborative Teams for Teaching and Research

The integration of science, education, and research represents a vital strategy for enhancing the research capabilities and teaching quality of maritime educators. Through the establishment of diversified teaching and research collaborative teams, resources can be effectively integrated, thereby facilitating the transformation of research findings into practical teaching applications.

Firstly, interdisciplinary and inter-institutional research teams can be formed to conduct frontier research on intelligent ships. Such team structures promote innovative thinking and generate high-quality research results. Secondly, faculty members should be encouraged to participate in national and provincial/ministerial-level research projects to strengthen their research capabilities and academic influence. Thirdly, a mechanism for the practical application of research achievements should be established to ensure that research findings are promptly incorporated into teaching content, enhancing its relevance and practicality.

Enhancing teachers' research capabilities necessitates a series of measures. First, the establishment of dedicated research funds can support teachers in conducting innovative research. Second, regular academic exchange activities featuring lectures by domestic and international experts can broaden teachers' academic perspectives. Third, encouraging participation in international academic conferences enables teachers to keep abreast of the latest research trends and improve their global communication skills. Additionally, implementing a research mentoring program, where experienced professors guide young faculty members in their research work, can facilitate the transfer and improvement of research capabilities.

Facilitating the transformation of research outcomes into teaching practices is the core of the integration of science and education. This goal can be achieved through

the following methods: establishing a repository of research case studies to convert frontier findings into teaching materials; organizing lectures on frontier technologies where research team members share their latest discoveries; developing experimental projects and hands-on training courses based on research findings to enhance students' practical skills; and encouraging student participation in research projects to cultivate innovative thinking and research capabilities. These measures effectively bridge the gap between research outcomes and teaching content, thereby improving teaching quality and students' overall abilities.

4. Conclusions

In the context of smart ships, constructing a competent maritime teaching faculty in higher vocational colleges represents a complex yet pivotal undertaking. These institutions can elevate the overall quality and innovation capabilities of their faculty via multiple avenues: establishing interdisciplinary teaching innovation teams, devising novel models for faculty training that comprehensively integrate industry and education, and forming diversified teaching-research collaboration teams that combine academic and practical expertise. Such initiatives not only meet the escalating demand for maritime professionals in the smart ship era but also lay a firm foundation for the high-quality development of higher vocational colleges. As smart ship technology progresses, these institutions must consistently innovate and refine their faculty development mechanisms to nurture more high-caliber talents for the intelligent transformation of the shipping industry.

The implementation of these strategies contributes to enhancing the overall quality of maritime education and cultivating high-caliber maritime professionals capable of meeting the requirements of the smart ship era. Future research should further explore how to optimize the structure of teaching teams, deepen industry-education integration mechanisms, and more effectively convert research findings into teaching resources. Moreover, continuous evaluation of the long-term impact of faculty development is indispensable for continuously refining and improving strategies for building maritime teaching teams, thereby offering robust support for the sustainable advancement of maritime education in the intelligent ship era.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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