

Research on the Optimization of Practical Teaching System under the Mode of Integration of Production and Teaching in Institute of Navigation Technology and Industry

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Abstract

Under the background of global economic integration and the rapid development of shipping industry, navigation technology education is facing challenges such as the disconnection between theory and practice and limited practical opportunities. In order to meet these challenges, this paper deeply analyzes the implementation status of the integration mode of production and teaching in Maritime Technology Industry College, and discusses its advantages and disadvantages in personnel training, curriculum system construction, teacher team development, training base construction and teaching quality monitoring. Through the strategies of modular curriculum design, virtual simulation training, enterprise internship opportunities, double-qualified teachers training and diversified evaluation system, this paper puts forward a set of plans to comprehensively optimize the practice teaching system. The program aims to enhance students' practical ability, innovation ability and professional accomplishment, make them better adapt to the needs of the industry, and provide high-quality talent guarantee for the sustainable development of the navigation technology industry. At the same time, this paper also emphasizes the importance of school-enterprise cooperation, and realizes the deep integration and sharing of educational resources and industrial resources through co-construction of curriculum system, teaching staff and training base. Finally, this paper looks forward to the potential contribution of the optimized practical teaching system in improving teaching quality, promoting industrial upgrading and technological innovation.

Keywords

Teaching System; Navigation Technology and Industry; Integration of Production and Teaching.

1. Introduction

Driven by the tide of global economic integration, the shipping industry, as a bridge connecting the world economy, has become increasingly important. With the continuous progress of technology and frequent exchanges of international trade, the demand for talents in navigation technology also presents new characteristics: it requires not only a solid theoretical foundation, but also rich practical experience and the ability to solve practical problems. However, the traditional maritime technology education mode often focuses on the teaching of theoretical knowledge, but there are many shortcomings in practical teaching, such as the disconnection between teaching content and industry reality, limited practical opportunities and single evaluation system, which seriously restrict the quality of maritime technology personnel training.

In recent years, the integration of production and education, as a new educational model, has been widely concerned and applied because it can effectively promote the deep integration of education and industry and improve the pertinence and effectiveness of personnel training [1]. In the field of navigation technology, the introduction of the integration mode of production and education provides a new idea and way to solve the above problems. Through school-enterprise cooperation and work-study combination, students can not only better understand the industry trends and master cutting-edge technologies, but also enhance their practical ability and professional quality, thus cultivating high-quality maritime technical talents that better meet the needs of the industry [2].

In view of this, this paper intends to take the Institute of Navigation Technology Industry as the research object, and deeply discuss the optimization of practical teaching system under the mode of integration of production and education. This paper analyzes the present situation of the practical teaching system of navigation technology education, and puts forward a set of feasible optimization strategies and implementation paths in combination with the theory and practice of the integration mode of production and education, with a view to contributing to improving the quality of navigation technology personnel training and promoting the sustainable development of the shipping industry.

2. Analysis on the Integration Mode of Production and Education in Institute of Navigation Technology Industry

2.1. Overview of the integration mode of production and education

The integration of production and education is a mode of close combination of education and industry. Through deep cooperation with enterprises, the Institute of Maritime Technology and Industry has realized resource sharing and complementary advantages on many levels [3]. Specifically, this model is not only reflected in the joint development of talent training programs and curriculum systems that meet the needs of the industry by both schools and enterprises, but also in the joint construction of training bases to provide students with practical working environment to enhance their practical skills. In addition, colleges and enterprises also jointly carry out scientific research projects to promote the innovation ability and scientific research level of teachers and students, and jointly devote themselves to the construction of teachers, and introduce enterprise experts as part-time teachers to enhance the practical teaching ability of teachers [4]. In terms of students' employment, school-enterprise cooperation provides employment guidance to help students better adapt to the workplace and improve their employment competitiveness.

The integration mode of production and education has multiple advantages. It makes education closer to the actual needs, thus improving students' practical ability and competitiveness in serving the job market. This model is helpful to cultivate high-quality talents that meet the needs of industrial development, and then promote industrial upgrading and technological innovation. The integration of production and education can also optimize the allocation of resources, realize the sharing of educational resources and industrial resources, and improve the efficiency of resource utilization. This model helps to strengthen the cooperation between schools and enterprises and promote the common development of both sides [5].

2.2. Practice of integration of production and education in institute of navigation technology and industry

The Maritime Technology Industrial College of Ocean Navigation Technology University collaborates with multiple shipping companies to jointly develop talent cultivation programs. Enterprises participate in curriculum design, ensuring that courses are closely aligned with industry needs. For example, in cooperation with Maersk Line, the college offers a course in

"International Shipping Management," taught by corporate experts, which helps students understand the latest industry trends and practical skills, thereby enhancing their employability.

The college works with enterprises to build a curriculum system that integrates industry standards and corporate requirements. For instance, in partnership with COSCO Shipping Group, the course "Ship Operations and Management" is offered, featuring practical instruction by corporate engineers, enabling students to acquire the skills needed for ship handling and management to meet industry demands.

The college also collaborates with enterprises to establish a faculty team. Corporate experts regularly come to campus to teach, while college instructors periodically engage in practice at enterprises to enhance their teaching capabilities. For example, through cooperation with China Merchants Shipping, corporate experts come to campus to impart skills in ship maintenance and repair, while college instructors visit enterprises to gain insights into the latest technologies and management practices.

Furthermore, the college and enterprises jointly establish practical training bases, allowing students to undergo practical training in real-world environments. For example, in collaboration with China Shipping Group, a "Maritime Simulation Training Center" has been set up where students can conduct practical training in simulated bridge environments to improve their navigation skills.

3. Research on the Optimization of Practical Teaching System

3.1. Optimization principle of practical teaching system

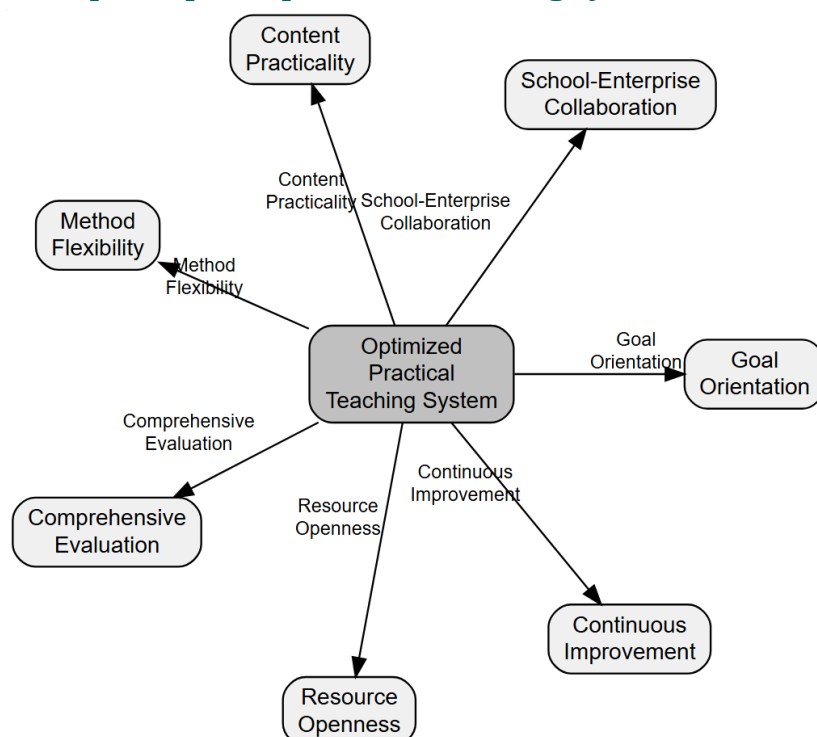


Figure 1. Principles of optimizing practice teaching system

The principles of optimizing the practice teaching system include goal orientation, school-enterprise cooperation, content practicability, method flexibility, comprehensive evaluation, open resources and continuous improvement (Figure 1). These principles aim to ensure that teaching activities are closely focused on cultivating professionals with strong practical ability and innovation ability. By strengthening cooperation with enterprises, keeping up with

industry development trends and technological frontiers, adopting diversified teaching methods, constructing diversified evaluation systems, making full use of resources inside and outside the school and establishing feedback mechanisms, the practice teaching system is constantly adjusted and improved, so as to effectively improve the teaching quality and cultivate professionals who meet the needs of the industry.

3.2. Optimization strategy and implementation path

3.2.1. Optimization of curriculum system

To closely align with the needs of the maritime technology industry, the Maritime Technology Industrial College, operating under the industry-education integration model, should undertake comprehensive optimization of its practical teaching system (Figure 2). The college achieves this through modular course design, dividing courses into three modules: basic skills, specialized skills, and integrated application, precisely matching industry job requirements and adhering to International Maritime Organization (IMO) standards and domestic regulations. The college employs virtual simulation training and collaborates with shipping companies to provide onboard internship opportunities, promoting project-driven learning to enhance students' ability to solve practical problems [6].

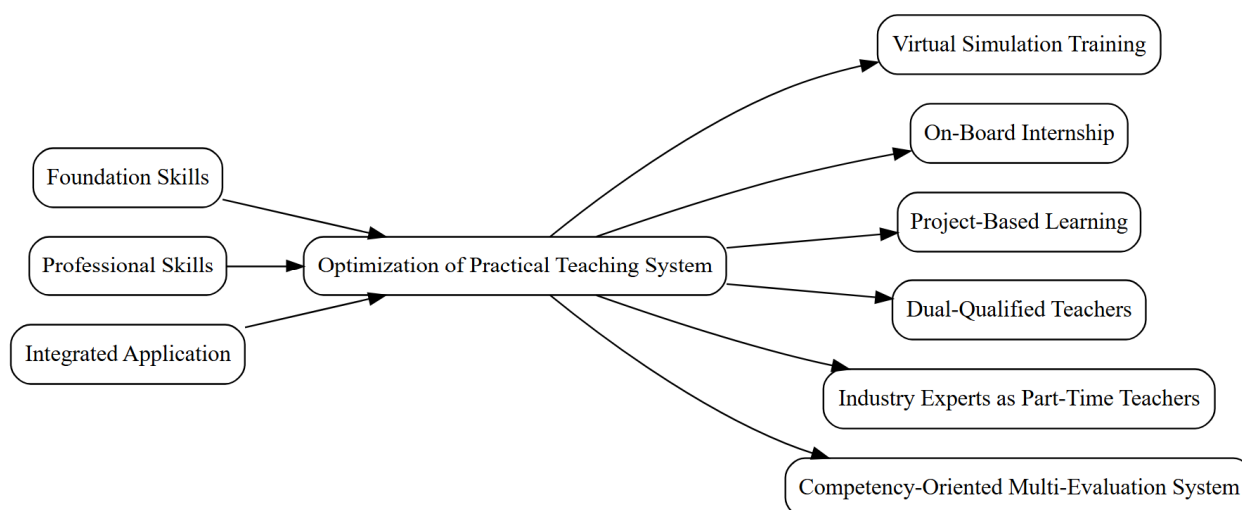


Figure 2. Comprehensive optimization of practical teaching system

In terms of faculty development, the college emphasizes the cultivation of dual-qualified instructors, encouraging teachers to participate in industry practices and inviting industry experts to serve as part-time instructors. Regarding the evaluation system, the college establishes a diversified evaluation system oriented towards competency, incorporating multiple dimensions such as theoretical examinations, skill assessments, and project reports to ensure teaching quality.

3.2.2. Innovation of teaching mode

In the aspect of teaching mode innovation strategy, the Institute of Maritime Technology and Industry has established a stable school-enterprise joint training mechanism, jointly worked out a talent training plan, and implemented a dual tutorial system, introducing enterprise experts as part-time professors or practice instructors, and jointly taking charge of students' practical teaching and career planning with the school tutors. In the content and method of practical teaching, case teaching method is adopted, and scene simulation and problem-solving training are carried out in combination with the latest maritime accident cases, and VR technology is used to simulate the cockpit environment of ships, thus enhancing the practical

experience [7]. In addition, by encouraging students to participate in enterprise practical projects and interdisciplinary teamwork, project-based learning is strengthened and compound talents are cultivated.

On the implementation path, the college strives for government support, integrates internal and external teaching resources and optimizes resource allocation; And through regular training and development of teachers, establish an incentive mechanism to enhance teachers' industry experience and teaching ability. In terms of quality control, a student-centered process evaluation and achievement-oriented evaluation system is established to collect students' opinions regularly and evaluate the effect of practical teaching, so as to ensure the high matching between teaching quality and students' ability.

3.2.3. Construction of teaching staff

In order to optimize the teaching staff of the Institute of Maritime Technology Industry, firstly, it is necessary to actively introduce professionals with rich practical experience from shipping companies, port management institutions and other units to enrich the teaching staff, and encourage existing teachers to participate in professional training at home and abroad to improve their teaching ability; Secondly, we should establish a close cooperation mechanism with enterprises, not only invite enterprise experts to teach in the school regularly, but also provide internship opportunities for teachers to enhance their practical skills. At the same time, through the way of resource sharing, we should use the training base and experimental equipment of enterprises and introduce real enterprise cases into classroom teaching, so as to improve the practicality and pertinence of teaching content.

3.2.4. Construction of training base

By strengthening the depth of school-enterprise cooperation, we will work with leading enterprises in the maritime industry to formulate training base construction standards and teaching content to ensure the seamless connection between training and industry needs. In practice, a joint teaching team will be formed, seminars on the integration of production and education will be held regularly, and practical courses will be jointly developed to keep the teaching content practical and forward-looking. Build a training platform combining virtual and entity, use virtual simulation technology such as "Maritime Simulator 2020" to build a navigation operation simulation system, and improve the physical training ship facilities, so as to realize the close combination of theory and practice and improve students' practical operation and emergency handling ability. Introduce industry standard certification system, such as STCW Convention, and hold certification training regularly and invite industry experts to guide through cooperation with the International Maritime Organization, so as to ensure that the teaching quality of the training base meets international standards, thus enhancing students' professional competitiveness.

Establish a multi-functional training ship integrating navigation operation, engine management, ship communication and other functions. Through cooperation with well-known shipbuilding enterprises, customize the design to meet the teaching needs and reflect the latest technology in the industry. Develop a virtual training platform covering navigation, marine engineering, communication and other fields, build a virtual navigation environment by using VR/AR technology, and simulate real navigation situations to provide an immersive learning experience. Establish an industry tutor system, invite industry experts as training tutors, provide on-site guidance and career planning suggestions, establish an industry expert database and regularly invite experts to the training base for on-site teaching and exchange, and at the same time carry out online guidance to broaden students' industry horizons.

3.2.5. Monitoring and evaluation of teaching quality

Construct a multi-level teaching quality monitoring system, including the school-level teaching quality monitoring Committee, the department-level teaching quality monitoring team and the

person in charge of quality monitoring at the curriculum level. At the same time, a multi-party evaluation mechanism including student evaluation, teacher self-evaluation and enterprise tutor evaluation is introduced, and feedback is collected through questionnaires and symposiums. Establish a dynamic adjustment mechanism, optimize teaching content and methods in time according to the evaluation results, and organize teaching seminars regularly to promote exchanges. Establish a teaching quality monitoring system by means of information technology, and provide a scientific basis for teaching improvement through big data analysis. Make a teaching quality monitoring plan, define the objectives, contents, methods and cycles, and plan specific steps. Set up quality monitoring teams at all levels, define responsibilities and ensure the orderly implementation of monitoring work. Conduct a comprehensive evaluation every semester, covering students' satisfaction, teachers' teaching effect and feedback from corporate tutors, form a report and put forward suggestions for improvement. According to the evaluation results, formulate improvement measures, specify the responsible person and completion deadline, and regularly follow up the implementation. Strengthen teacher training, regularly organize skills and industry knowledge update training to enhance teachers' ability; Encourage teachers to participate in teaching research and support the declaration of projects and the publication of papers. Establish an incentive mechanism to commend outstanding teachers, and take the evaluation results as the basis for professional title evaluation, post appointment and performance appraisal.

4. Conclusion

Under the background of global economic integration, the demand for navigation technical talents in the shipping industry is increasing, which requires talents to have a solid theoretical foundation and rich practical experience. However, the traditional education model emphasizes theory and lacks practice. The integration mode of production and education promotes the combination of education and industry, and improves the pertinence of personnel training. This study focuses on the Institute of Navigation Technology Industry, discusses the optimization of practical teaching under the integration of production and education, and puts forward the principles of goal orientation, school-enterprise cooperation, practical content, flexible methods, comprehensive evaluation, open resources and continuous improvement. Through innovative modes such as modular curriculum design, virtual simulation training, double tutorial system, case teaching and VR technology simulation, and the establishment of multi-functional training boat and virtual platform, the teaching quality is improved and talents meeting the needs of the industry are trained. At the same time, a multi-level teaching quality monitoring system is constructed, and a multi-party evaluation mechanism is introduced to ensure the matching between teaching quality and students' ability, which provides reference for improving the quality of maritime technical personnel training and promoting the development of shipping industry.

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