Research on Project-based Teaching Design for Marine Engineering English in Marine Engineering Technology Major

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Abstract: In order to meet the needs of maritime safety, environmental protection, and the shipping industry in the context of globalization, this study delves into the teaching of English for marine engineering technology using project-based learning (PBL). Given that communication barriers are one of the main causes of many maritime accidents and the specialized nature of marine engineering English, this research leverages PBL to enhance students' proficiency in professional English, particularly their listening and speaking skills. The results indicate that the implementation of this educational reform not only significantly improved students' listening and speaking abilities in marine engineering English but also increased their learning motivation, teamwork skills, and problem-solving capabilities, laying a solid foundation for their comprehensive development and future careers. Additionally, the implementation of PBL successfully transformed traditional teaching methods, making the learning process more flexible and efficient, strengthening student interaction, enhancing the practicality of the course, and boosting the overall reputation of the school.

Keywords: Marine engineering technology; English; Project-based teaching

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1. Introduction

In today's increasingly globalized world, effective communication has become pivotal for maritime safety, marine environmental protection, and the sustainable development of the shipping industry. Unfortunately, analysis of maritime accidents reveals that approximately 20% of ship sinkings and casualties can be attributed to communication barriers. Despite the Manila Amendments to the STCW Code striving to improve communication efficiency, challenges persist in international crews composed of people from diverse cultural and linguistic backgrounds. Particularly in the field of marine engineering technology, proficiency in professional English is crucial to achieving the aforementioned goals, as marine engineering English is highly specialized, encompassing numerous technical terms, abbreviations, and complex expressions, making it a significant challenge for learners. Students often report that learning marine engineering English is difficult, and the limitations of traditional teaching methods exacerbate the problem. Relying on traditional translation teaching methods may allow students to pass exams, but they struggle to apply their knowledge in practice and solve real-world problems. Therefore, educational reform is urgently needed. In this context, this paper explores the potential for fundamental reform in teaching marine engineering English using project-based learning (PBL), considering the school's specific circumstances and students' individual differences. The goal is to design a flexible Marine Engineering English Teaching Syllabus that relies on continuous language learning and faculty development to nurture students with advanced language skills and a solid foundation in professional knowledge.

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of maritime accidents reveals that approximately 20% of ship sinkings and casualties can be attributed to communication barriers. Despite the Manila Amendments to the STCW Code aiming to improve communication efficiency, challenges persist among international crews composed of individuals from diverse cultural and linguistic backgrounds. Particularly in the field of marine engineering technology, proficiency in specialized English is essential to achieving these goals, as marine engineering English is highly technical, encompassing numerous specialized terms, abbreviations, and complex expressions, posing a significant challenge for learners. Students often report that learning marine engineering English is difficult, and the limitations of traditional teaching methods only exacerbate the problem. Relying on traditional translation teaching methods may allow students to pass exams, but they struggle to apply their knowledge in practice and solve real-world problems. Therefore, educational reform is urgently needed.

In this context, this paper explores the potential for fundamental reform in teaching marine engineering English through project-based learning (PBL). This reform plan takes into account the school's specific circumstances and students' individual differences, with the goal of designing a flexible "Marine Engineering English Teaching Syllabus" that relies on continuous language learning and faculty development to nurture students with advanced language application skills and a solid foundation in professional knowledge.

2. Overview of Project-Based Learning

Project-based learning (PBL) is heavily influenced by constructivist teaching theory, which posits that the learning process should be led by students actively constructing knowledge rather than passively receiving information from teachers. In this teaching model, students are viewed as active participants in knowledge construction, and the educational process emphasizes learning in a meaningful context, making the learning environment the focus of teaching. Under the guidance of instructors, students engage in project-centered activities, exploring and completing a series of tasks. This approach helps to effectively integrate theoretical knowledge with practical experience, stimulates students' innovative thinking, and enhances their ability to solve real-world problems. PBL simulates actual tasks in the workplace, allowing students to not only learn professional skills but also improve their language abilities and effectively boost their learning motivation . This teaching method also strengthens interaction and teamwork among students, as they work together to complete project tasks and share learning outcomes, thereby building knowledge collaboratively and enhancing their team collaboration skills. As emphasized by Richards and Rodgers (2001), task-based language teaching places tasks at the center of teaching, focusing on "learning by doing" to enhance skills and knowledge for future work environments, with an emphasis on practical application rather than just theoretical knowledge. This method advocates completing tasks through participation, communication, and team interaction, thereby establishing new knowledge structures in practice.

3. Basic Requirements for Project-Based Teaching Design

Planning for project-based learning is a meticulous and complex process aimed at enhancing students' comprehensive abilities and problem-solving skills. The initial step in implementing PBL is conducting a thorough needs analysis, which serves as the foundation of PBL design. This analysis requires a detailed exploration of students' expectations and the specific demands of the industry to gain key insights and carefully design course content. The goal is to respond to students' actual learning situations and support their career growth path.

Next, the defined teaching goals must be clear and specific, encompassing knowledge, skills, and attitudes. These goals should cover the overall vision of the course and set specific targets for each task or module. This provides direction for the teaching process and establishes standards for evaluating students' learning outcomes.

Following this, teaching resources should be carefully selected, prioritizing materials that are closely related to students' future career paths and sourced from real-world contexts, such as real-life case studies of life-saving drills, fueling operations, and ship repairs. The core focus is to enhance the applicability of learning materials and increase students' interest in learning. Students should practice and apply their knowledge in simulated real-world work environments to gain a deeper understanding and mastery of course content.

Next, teaching methods should be selected to align with course goals. PBL tends to adopt strategies such as problem-solving and case studies that replicate real challenges in the maritime industry. These methods guide students to learn and apply their knowledge while dealing with real-world scenarios, helping them construct specific contexts and tasks—such as handling procurement and marine pollution prevention situations. Students will be guided to use specialized English in discussions and problem-solving, thereby improving their industry-specific English proficiency.

Task design should adhere to the "three-phase task design" principle: initiation, execution, and review phases. In the initiation phase, the teacher's role is to activate students' prior knowledge, help them understand the task requirements, and prepare them for the task. In the execution phase, students should use language in near-realistic contexts to complete assigned tasks, with teachers providing necessary support through remote supervision. The review phase involves additional practice and discussion to help students consolidate the knowledge and skills they have gained.

Finally, an effective assessment system should be established to evaluate individual tasks or the overall project completion, considering students' knowledge acquisition, skill application, participation enthusiasm, and teamwork skills. Combining student self-assessment with teacher evaluations, this diversified assessment approach can motivate all students to actively engage in the learning process and ultimately enhance the effectiveness of PBL.

4. Strategies for Project-Based Teaching Design in Marine Engineering English

(1) Establishment of course standards

In planning the course framework, setting course objectives, selecting teaching content and its requirements, developing teaching materials, choosing teaching methods, creating course resources, assembling teaching teaching teams, and establishing teaching evaluation strategies, we have developed a comprehensive set of course standards. Based on three aspects—work task descriptions, and required knowledge and skills—we have deeply planned and designed the course content, specifying the requirements, skills, and knowledge points for each work task. The aim is to closely align the course content with the specific English language proficiency requirements of the marine engineering field.

(2) Development of project-based course design plan

When creating a project-based course plan, the key is to adopt a core teaching method by designing practical tasks that are highly relevant and targeted for instruction. For instance, the marine engineering English course is divided into several real-world work tasks such as researching English materials on the main propulsion system of a ship, auxiliary equipment, power and automation systems, and English documents on ship management and international maritime treaties. Each work task is further broken down into more specific units. For example, when studying English materials on auxiliary equipment, activities may include interpreting and translating power equipment manuals, preparing English ship ballast water management plans, interpreting and translating typical hydraulic system manuals, and completing maintenance records in English.

This approach divides each major task into smaller units and further breaks them down into multiple specific activities such as text reading, chart analysis, group discussion, sharing online resources, simulation practice, or

writing various reports and maintenance records. Evaluations and review exercises are conducted after each activity, aiming to expand knowledge through a variety of tasks and assessments. This approach allows students to acquire knowledge of marine engineering English while learning professional knowledge, making the learning content both rich and meaningful, thereby stimulating students' enthusiasm and curiosity. Project-based course design should also implement the "learning by doing" teaching philosophy, which involves not only teaching theory but also practicing writing documents and verbal communication in simulated real-world scenarios.

Incorporating online learning platforms and multimedia resources such as images, real-world work documents, videos, animations, educational videos, and practice questions enriches learning resources both in and out of the classroom, boosting students' learning motivation to effectively achieve the course design goals.

(3) Development of project-based textbooks

The core of developing project-based textbooks lies in following a teaching strategy that is project-based, modular, and task-driven, while deeply incorporating the details of the 2010 Manila Amendments to the STCW Convention and the "11 Rules" to ensure the textbook content meets international certification standards and aligns with real-world workplace needs. The marine engineering English course textbooks are divided into four core sections: research and compilation of materials on the ship's main propulsion system, auxiliary equipment, power, and automation systems, and handling ship-related documents. Under each theme, there are multiple modules designed to reflect a task-oriented learning approach, encouraging students to acquire relevant knowledge and skills through practical activities.

The textbook content covers training in reading, speaking, writing, and translation, aiming to break down the barriers between these learning elements and integrate them into unified learning activities within modules. This design method provides a learning platform that simulates a real-world workplace environment, allowing students to perform and familiarize themselves with potential future occupational tasks.

To achieve this goal, the textbooks incorporate a large amount of real-world work scenario resources, including images, work forms, shipboard work documents, and manuals for students to practice reading, translating, writing, and speaking. The careful selection and arrangement of these textbook contents create a simulated professional environment for students to become familiar with and practice the various tasks they may encounter in their future careers.

By leveraging this teaching method, project-based textbooks provide professional English knowledge and skills while emphasizing the practical use of professional marine engineering documents, compliance with international maritime conventions, and drafting work documents in the marine engineering department. Ultimately, the application of this teaching strategy has trained numerous senior engineers with advanced English knowledge and skills in the marine engineering department. They can effectively fulfill marine engineering duties and communicate smoothly and accurately in English within the global shipping industry, allowing for the efficient execution of professional tasks.

(4) Development of marine engineering English online courses

The goal of developing marine engineering English online courses is to create a dynamic and highly interactive online learning space that leverages advanced information technology tools to ignite students' enthusiasm for learning and help them deeply understand and master knowledge . Since the release of the "Marine Engineering English Reading" online course, continuous updates have demonstrated the unique advantages of online learning, effectively transforming traditional teaching methods and making the teaching process more flexible and efficient.

The course integrates slides, images, video lectures, animations, and other multimedia teaching materials to provide an intuitive and easy-to-understand learning environment, significantly enhancing the fun and practical application of learning. The introduction of international textbook resources further expands students' horizons,

allowing them to directly learn about international maritime operations and the key role English plays in them. Our school has built a comprehensive multimedia course resource library that achieves cross-school resource sharing, enriching teaching materials and improving their usage efficiency.

A wealth of after-class exercises and extended activities provide students with extensive self-learning and practice opportunities, allowing them to learn independently according to their learning speed and interests, thereby deepening and expanding their knowledge. The development and implementation of online courses have thoroughly revolutionized teacher-student interactions and learning patterns. In this online learning environment, students are no longer passive recipients of knowledge but become active participants who need to actively explore and choose learning materials. They can customize their learning plans based on their abilities and learning needs, maintaining a high level of initiative throughout the learning process.

Meanwhile, the role of teachers has shifted from traditional information providers to guides and supporters who design innovative and challenging learning activities, promoting students' progress in learning.

(5) Enhancing extracurricular activities

To enrich students' leisure time and improve their listening and speaking skills in marine engineering English to meet employers' expectations for maritime professionals' English proficiency, the school has adopted several innovative extracurricular activity programs in recent years. These programs not only aim to help students pass the Maritime Safety Administration's English listening and speaking assessment tests smoothly but also aim to ignite students' passion for learning English, improve their English proficiency, and ultimately enhance the school's reputation.

These activities encompass self-study and speaking guidance, with a particular focus on meeting students' individual needs and providing personalized learning support. The weekly English Corner, jointly hosted by foreign and local English teachers, creates a practical language communication platform for students, helping them hone their English listening and speaking skills in a relaxed atmosphere.

The annual English speech competition and other language contests spark students' competitive spirit and provide them with a stage to showcase their English proficiency, encouraging them to engage more actively in learning English. Specialized courses in fundamental marine engineering English and interview English are designed specifically for students aspiring to pursue a career in the maritime industry, strengthening their industry-specific English and interview skills, and laying a solid foundation for their future careers.

This series of extracurricular activities effectively enhances students' listening and speaking abilities in marine engineering English. The school's maritime English vocabulary competition attracted more than 100 students from majors such as maritime technology, marine engineering, and ship electrical engineering. It became a comprehensive test of students' English vocabulary levels, greatly promoting mutual learning and exchange among students and increasing their interest in professional English.

5. Conclusion

In summary, the application of project-based learning methods in teaching marine engineering English has a significant impact on improving students' professional English proficiency, particularly their listening and speaking skills. The application of project-based learning not only promotes students' active learning, teamwork, and problem-solving abilities but also lays the foundation for their comprehensive development and successful careers. Leveraging innovative teaching design, textbook development, and online course creation effectively transforms traditional education methods, enhancing the interactivity and practicality of teaching. Combining rich extracurricular activities not only improves students' English skills but also inspires their enthusiasm for professional learning and enhances the school's reputation.

References

- [1] Zhang Wencai. Empirical Research on English Listening and Speaking Course Based on the Teaching Resource Database of Marine Engineering [J]. Pearl River Navigation, 2022, (22): 93-95.
- [2] Dong Jingming. An Initial Exploration of the Reform of English Listening and Speaking Course Immersed in Teaching Practice Ship [J]. Overseas English, 2021, (19): 4-5.
- [3] Su Tingting. Research on the Analysis and Construction of "Marine Engineering English (Operational Level)" from a Multimodal Perspective [D]. Dalian Maritime University, 2020.
- [4] Yang Shaobo. Exploration of the English Hybrid Teaching Mode in Open Education under the Background of "Internet +" [J]. Education Literature Collection (Upper Edition), 2020, (07): 177-179.
- [5] Bai Huan, Gao Bing. Dilemma and Countermeasure of Vocational Industry English Teaching Taking Marine Engineering English as an Example [J]. Journal of Guangdong Communication Polytechnic, 2019, 18 (04): 63-68.
- [6] Yan Tianming. Construction and Teaching Practice of Hybrid Learning Resources for Marine Engineering English Based on Cloud Classroom [J]. Maritime Education Research, 2018, 35 (04): 99-103.
- [7] Wang Xuefeng. Return to the Essence of Marine Engineering English Speaking Course in an Application-Oriented Context - Teaching Design of Marine Engineering English Speaking Course Based on Simulator Operation [J]. Maritime Education Research, 2018, 35 (03): 109-112.