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Research Article

Maritime English for navigational watch officers: Textbook development

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Article information	Abstract
Received: May 5, 2026 Revision: August 11, 2026 Accepted: August 16, 2026	This study addresses the lack of a dedicated Maritime English textbook for Navigational Watch Officers that is aligned with international maritime standards. The purpose of this research is to develop such a textbook and evaluate its validity, practicality, and effectiveness, guided by the Analysis, Design, Development, Implementation, Evaluation model. The analysis phase identified a clear need for a curriculum and for lecturer and students' workplace communication. In the Design phase, the textbook framework was aligned with IMO Model Course 3.17 and STCW requirements. During Development, three experts validated the textbook, and the results indicated strong content, media, and language validity (Aiken's $V \geq 0.84$). The textbook was implemented in a field trial with 80 Nautical Study Program students from Batch IX at Politeknik Pelayaran Sumatera Barat in two randomly assigned classes (experimental vs. control). Practicality was rated as "very practical" by students (80.65 %) and lecturers (87.0 %), suggesting that the textbook is clear, usable, and suitable for classroom instruction. For learning outcomes, ANCOVA showed that the experimental class outperformed the control class after controlling for pretest scores, and the adjusted mean of experimental class was higher than the control class. Pairwise comparisons also showed a significant difference in posttest scores in favor of the experimental class. Educationally, this indicates that the textbook successfully promotes practical, duty-specific Maritime English communication. However, because this trial was limited in duration and scope, these results serve as strong indicators of success rather than conclusive proof of long-term value. Future research should examine sustained use in broader settings.
Keywords Maritime English; Maritime pedagogy; Navigational watch officer; Textbook development; Vocational higher education	

1. Introduction

Maritime English is offered as a general course at maritime higher-education, aiming to equip students with the specialized English-language skills required by the maritime industry (Korieshkova et al., 2024). In the shipping sector, clear and standardized communication is essential to ensure both safety and operational efficiency. Consequently, mastery of Maritime English constitutes a critical component of seafarer education and training (Sartini et al., 2025). Beyond serving as a global lingua franca, Maritime English fulfills internationally mandated competency standards for maritime personnel (Ekse et al., 2025). Therefore, instruction in Maritime English must align with global benchmarks to remain relevant to industry needs.

The Maritime English curriculum for the Nautical and Marine Engineering programs in

maritime higher education is based on the International Maritime Organization's Model Course 3.17 (IMO MC 3.17). This curriculum is designed to address the communication demands of a globally interconnected maritime workplace (Galicia et al., 2024). IMO MC 3.17 comprises two primary modules. The first is General Maritime English (GME), which covers foundational English usage in a maritime context. The second is Specialized Maritime English (SME), which focuses on technical terminology and task-specific communication required for ship operations and navigation (Lehtimäki & Teperi, 2026).

The SME component of IMO MC 3.17 is organized into six key sections. The first section covers Maritime English for Navigational Watch Officers on vessels of 500 GT or above, including standard phrases related to navigation, safety, and operational procedures (Hung et al., 2026). The second section addresses Maritime English for Engine Watch Officers, either in a continuously manned engine room or for those tasked with occasional engine-room duties emphasizing technical terminology and maintenance protocols (Park & Lee, 2025). The third section focuses on Electro-Technical Officers (ETO), centering on shipboard electrical systems, electronic equipment, and related maintenance and safety communications (Göksu et al., 2025). The fourth section examines bridge-deck communication, including watch keeping orders and standard deck-operation phrases (Fan et al., 2025). The fifth section details Maritime English for Global Maritime Distress and Safety System (GMDSS) Radio Operators, covering emergency distress communications, rescue procedures, and radio-equipment usage (Banaszek & Lisaj, 2025). The final section outlines communication skills for passenger-service personnel, including service interactions, passenger safety, and emergency response protocols (Burg & Bram, 2024).

In vocational education, particularly maritime training, textbooks play an indispensable role. An effective textbook must support competency-based learning and reflect actual industry practices (Mashartanto et al., 2024). Vocational learners require instructional materials that transcend theory to include practical applications, enabling them to bridge classroom learning and real-world work contexts (Siska et al., 2024). Well-structured textbooks also facilitate both independent study and guided instruction, thereby reducing academic stress by serving as a coping resource. Moreover, textbooks establish reference standards for assessing learner outcomes (Hasnur et al., 2026). Accordingly, developing textbooks that meet maritime-industry requirements is crucial for enhancing the quality of vocational education.

Numerous studies have shown growing attention to Maritime English materials and curriculum development. For example, scholars have developed Maritime English syllabi for vocational high-school students, project-based Maritime English curricula for university students, and ESP modules to enhance undergraduates' technical vocabulary (Fan et al., 2025). Although these studies contributed to the field, there is still a need for a dedicated Maritime English textbook tailored to Navigational Watch Officers in a higher-education vocational setting. This textbook is important, since it reflects the communication tasks, terminology, and competency demands for navigation duties onboard. The need for this textbook is supported by a practical gap between international standards and instructional materials available at maritime higher institutions (Belabyad et al., 2026). Maritime English material should be developed based on the Standard Marine Communication Phrases (SMCP) and the Standard of Training, Certification & Watchkeeping (STCW) Convention. However, many existing instruction materials do not fully integrate these standards into a single textbook for navigational-related duties (Han et al., 2025). As a result, students may be provided with limited content materials and insufficient authentic instructional communication tasks for navigational watch officers. **Table 1** compares five existing Maritime English books to clarify the novelty of the proposed textbook.

In conclusion, the five existing textbooks show that the Maritime English materials are designed for beginners, targeted at other specific groups, and too general. In contrast, the *Maritime*

English for Navigational Watch Officers is developed as a more specialized text because it focuses directly on the communication needs of navigational watch officers, according to IMO MC 3.17, and is related to international standards. The development process is based on students' needs, curriculum expectations, and maritime industry demands (Fernando & Wickramasinghe, 2024). Accordingly, this study seeks to document the process of developing *Maritime English for Navigational Watch Officers*, with particular emphasis on establishing the textbook's validity and practicality and empirically testing its educational effectiveness. The research questions are explicitly stated as follows:

1. To what extent is the Maritime English for Navigational Watch Officers textbook valid?
2. How practical is the Maritime English for Navigational Watch Officers textbook for lecturers and students?

How effective is the Maritime English for Navigational Watch Officers textbook in improving students' Maritime English proficiency?

Table 1 Comparison of Existing Maritime English Books and the Proposed Book.

Book	Strength	Limitation
English for Mariners (Grice, 2009)	It has comprehensive scope and an intense focus on maritime communication.	It offers broad coverage, but lacks specificity for Navigational Watch Officers.
English for Maritime (Ridwan & Ulfa, 2018)	It is user-friendly and is designed specifically for beginner learners.	The materials cover basic elements without being specialized for bridge communication and watchkeeping duties.
Maritime English, Volume 1 (Keimeno & Naytikoy, 2018)	It contains rich technical maritime terminology.	Its scope is too broad and is less focused on the specific needs of navigational watch officers.
Maritime English for Ratings Forming (Siska et al., 2024)	It has an outcome-based structure and a clear learning sequence.	It is aimed at ratings, not for navigational watch officers.
General Maritime English for Sea Transportation (Siska et al., 2024)	It integrates four language skills and is well structured.	It is designed for General Maritime English, not Specific Maritime English.

2. Literature review

2.1 Maritime education

Maritime education is a vocational study focused on developing human resources competencies to meet the needs of maritime and shipping industry (Yi et al., 2025). In vocational higher education, maritime education emphasizes both theoretical and practical skills related to ship operations, safety, and international standard compliances (Ghosh et al., 2025). Maritime education encompasses various disciplines, such as nautical study, engineering study, sea transportation, and port management, as well as professional communication skills that support effective seafarers' duties onboard (Yin et al., 2025). Furthermore, the maritime curriculum should be designed based on students' needs to ensure the job-readiness of graduates. In addition, maritime education must be integrated with national and international standards, particularly in the competency and certification areas (Karahalil et al., 2025). In maritime education, the learning process ideally utilizes a contextual and practice-based approach to enable the workforce to face real-world situations onboard

(Phanphichit & Bartusevičienė, 2025). Therefore, maritime education plays a strategic role in creating a disciplined and competent workforce who are able to achieve the global shipping industry demands.

2.2 Maritime English

A specialized form of English used in maritime communication, Maritime English supports professional interactions at sea. It contains terminology, phrases, and communication structures related to ship operations, safety procedures, navigations, and emergency situations at sea (Jurkovic & Satler, 2025). In the shipping sector, it serves as the international working language for seafarers and, therefore, plays an essential role in daily onboard communication (Khan et al., 2026). Mastery of this language involves general skills, as well as specific skills in technical terms and standard phrases proper to seafarers' duties context. In maritime education, such competence is crucial because it upholds the communication skills demanded by international standards (Veltsin et al., 2025). The learning process of Maritime English must be geared towards the use of authentic language appropriate to work needs onboard, especially for emergency situations and bridge and engine room communication (Symes et al., 2025). Therefore, Maritime English is a crucial communication skill for professional ship officers, especially Navigational Watch Officers, to carry out their duties onboard effectively and safely.

2.3 Research gap and study objective

Textbooks specifically aimed at Navigational Watch Officers remain limited, although various studies have developed modules and materials in teaching Maritime English. Most existing textbooks tend to be general and are not fully integrated with international curriculum standards, such as IMO, SMCP, and STCW. This creates a gap between classroom teaching and learning materials and real-word communication demands onboard (Mohammad et al., 2026). Meanwhile, vocational education demands authentic and applicable textbook aligned with professional duties onboard. This gap highlights the need to develop textbooks that focus on nautical communication and navigational watch officer work context. Textbook development should provide valid, practical, and effective procedures for students and lecturers. Therefore, this study aims to develop a valid, practical, and effective Maritime English for Navigational Watch Officers that align with students' and lecturers' needs, curriculum requirements, and international maritime communication standards for seafarers.

3. Method

3.1 Research method

This study employed a Research and Development (R&D) approach. The textbook was developed according to the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE framework is one of the most widely adopted instructional design models, providing a systematic guide for producing effective educational materials (Hidayati et al., 2025). A schematic overview of the research and development procedure is presented in **Figure 1**.

3.2 Study area

This study was conducted at Politeknik Pelayaran Sumatera Barat (Poltekpel Sumbar) as a single-case study to analyze textbook development in a real maritime education setting. This institution was selected as the study area as it represents a relevant vocational context in Maritime English to support English language competency in accordance with international maritime standards. This study area is also relevant because the students and lecturers involved as participants in this research are directly engaged in Maritime English instruction within a curriculum context (Arslan & Akturan, 2026). This real maritime learning environment makes Poltekpel Sumbar a suitable area for this study. The use of this specific institution as a case study reinforces the validity of textbook development, since it is relevant to actual instructional condition, curriculum demands, and learner

characteristics. However, because the study was limited to one institution, the findings may not be fully generalizable to other maritime education contexts.

3.3 Research participants

The study participants comprised both students and lecturers. The students sample included 80 second-semester Nautical majors from Batch IX (academic year 2025/2026) at Poltekpel Sumbar. The sample was selected from four classes (Nautical A, Nautical B, Nautical C, and Nautical D) into two classes: 40 students in the experimental group, and 40 in the control group. The lecturer sample consisted of the two lecturers responsible for the Maritime English course. Instruction for both the experimental and control class in this study was delivered by the same lecturer to minimize instructor-related variability. All participants in the study provided written informed consent. This research has obtained written informed consent and Consent to Publish from each individual. All individuals included in this study have been fully anonymized, and all personal identifiers have been removed to protect participant confidentiality. This study was reviewed by the Ethical Research Committee of Politeknik Pelayaran Sumatera Barat, which was officially established under Decree No. KP-POLTEKPEL.SBR 473 Tahun 2025 dated 3 July 2025.

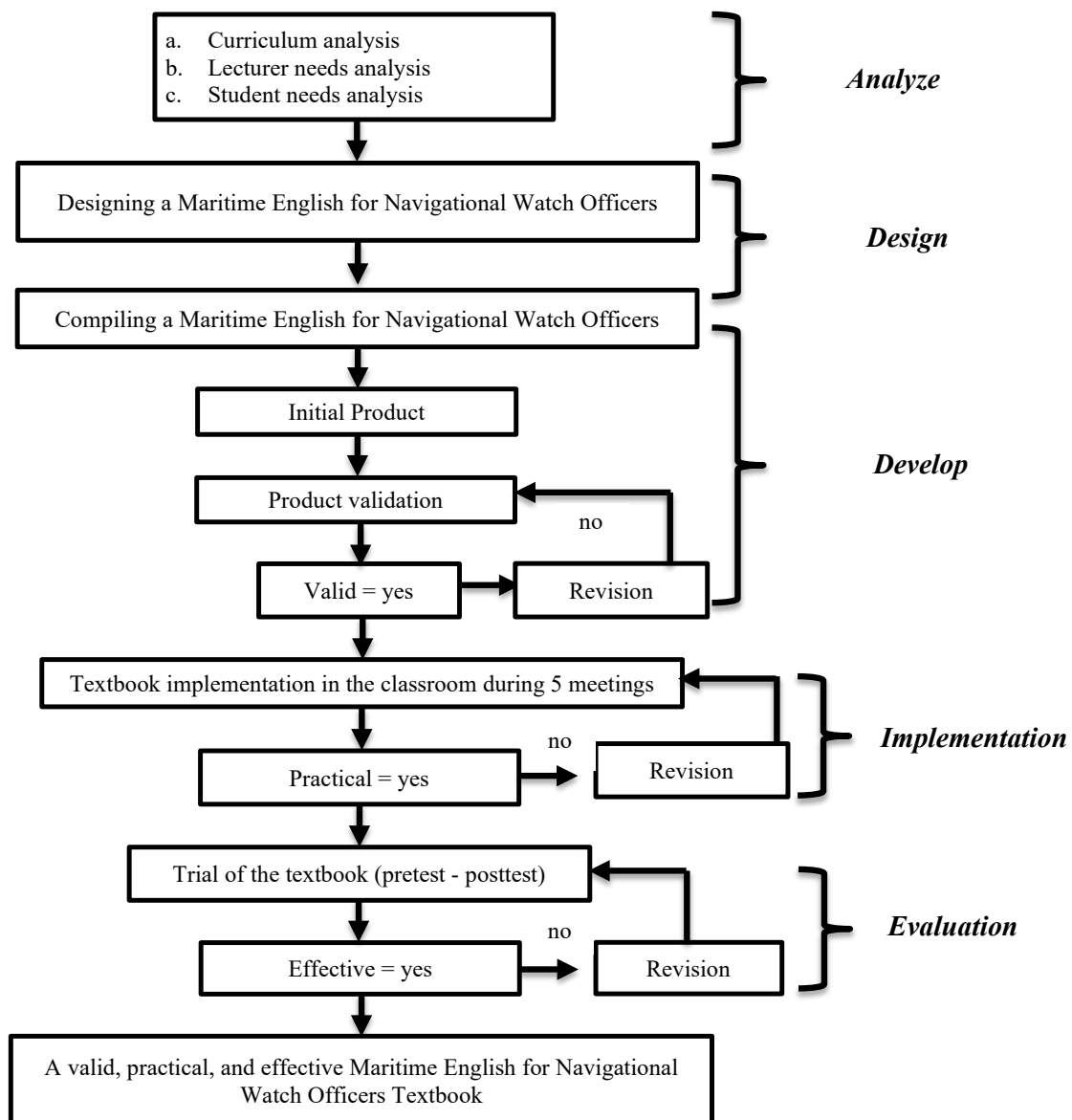


Figure 1 Research flow diagram.

3.4 Instrumentation

Three research instruments were employed: 1) validity questionnaire, 2) practicality questionnaire, and 3) effectiveness test.

3.5 Data collection technique

3.5.1 Validity data

A textbook validity questionnaire was administered to three panels of experts, namely, a subject-matter specialist, a media-design specialist, and a linguistics specialist. The validity indicators can be seen in **Table 2**.

Table 2 Validation instrument for Content, Media, and Language.

Aspect	Indicators
Content	(1) Alignment with curriculum
	(2) Achievement of learning objectives
	(3) Relevance to student needs
	(4) Depth of coverage
	(5) Accuracy of content
	(6) Coherence of topics
	(7) Completeness of material
	(8) Clarity of presentation
Media	(1) Visual design quality
	(2) Readability
	(3) Quality of illustrations and graphics
	(4) Consistency of formatting
	(5) Navigation and structure
	(6) Media integration
	(7) Appeal
	(8) Technological appropriateness
Language	(1) Clarity of language
	(2) Grammatical correctness
	(3) Academic style appropriateness
	(4) Lexical accuracy
	(5) Consistency in terminology
	(6) Sentence clarity and effectiveness
	(7) Clarity of instructions
	(8) Readability

Adapted from Melani et al. (2025)

The validity of the textbook was evaluated based on expert ratings using a Likert-scale questionnaire.

3.5.2 Practicality data

A textbook practicality questionnaire was completed by the two Maritime English lecturers and the experimental-group students to assess the usability and applicability of the *Maritime English for Navigational Watch Officers* textbook. Two separate practicality questionnaires were administered: one for lecturers, and one for students. The practicality assessment aspect for lecturer and students can be seen from **Table 3**.

Table 3 Practicality instrument for the textbook.

Respondent	Assessment Aspect
Lecturer	(1) Curriculum alignment
	(2) Integration of content
	(3) Ease of use
	(4) Completeness of material
	(5) Relevance to learner needs
	(6) Support for student-centered learning methods
	(7) Ease of student assessment
	(8) Availability of supporting media
	(9) Affordability and accessibility
	(10) Overall instructional effectiveness
Students	(1) Ease of understanding
	(2) Clarity of information delivery
	(3) Real-world relevance
	(4) Engagement in learning activities
	(5) Clarity of exercise instructions
	(6) Support for independent study
	(7) Variety of exercises and activities
	(8) Cultural and contextual appropriateness
	(9) Ease of navigation and access
	(10) Utility for improving communication skills

Adapted from Hidayah et al. (2024)

3.5.3 Effectiveness data

A pilot test was conducted on the 40 respondents outside the research sample. The pilot test showed that all 100 items were valid and reliable ($r = 0.972$). Difficulty index shows that 3 items are difficult, and 97 items are moderate. Discrimination power shows that 4 items are satisfactory, 73 items are good, and 23 items are excellent. Therefore, the instrumentation was deemed valid, reliable, and acceptable to be used in the main study.

The effectiveness test comprised pretest and posttest multiple-choice items designed to measure the impact of the textbook on students' Maritime English learning outcomes. To assess instructional effectiveness, a 100-item multiple-choice test was administered as both a pretest and a posttest. The test blueprint of pretest and posttest is shown in **Table 4**.

Table 4 Textbook's effectiveness instrument blueprint.

Lesson Unit	Item no.	Percentage
Unit One: Use charts and other nautical publication.	1 - 9	9 %
Unit Two: Understand meteorological information and messages concerning ship's safety and operation.	10 - 16	7 %
Unit Three: Communicate with other ships, coast stations, and VTS centers.	17 - 32	16 %
Unit Four: Perform the officer's duties.	33 - 84	52 %
Unit Five: Communicate appropriately with a multi-lingual crew.	85 - 100	16 %
Total	100	100 %

Source: IMO MC 3.17

Although the test covered all five units, Unit Four contained the largest number of items, because it encompasses a broader range of competencies and learning objectives related to officers' duties, requiring more items to adequately represent its content.

3.6 Data analysis technique

The validity analysis was computed by Aiken's V formula across three aspects from the three experts. In addition, the practicality was calculated from lecturers' and students' questionnaire results. Then, the effectiveness analysis was done by comparing pretest and posttest score from both classes through Independent Sample T-Test.

4. Results

4.1 Analysis

The first phase of this R&D study was the Needs Analysis, which served as the foundation for the development of the *Maritime English for Navigational Watch Officers* textbook at Poltekpel Sumbar. This analysis comprised three interrelated components: (1) curriculum analysis, (2) student-needs analysis, and (3) lecturer-needs analysis.

4.1.1 Curriculum analysis

Within the ADDIE framework, the Analysis phase begins with a thorough mapping of the theoretical and operational underpinnings that will guide textbook development. In this study, the IMO Model Course 3.17 was adopted as the primary curricular reference. Two main rationales justify this choice. Firstly, the International Maritime Organization (IMO) is the United Nations agency responsible for setting safety, security, and environmental standards in global shipping. Its STCW Convention and associated Code explicitly recommend the inclusion of maritime English competencies for Navigational Watch Officers. IMO Model Course 3.17 is specifically designed to satisfy the STCW Code Table A-II/1 requirements across the four language skills (listening, speaking, reading, and writing) in navigation and maritime-communication contexts. By anchoring the textbook on this model course, compliance with the minimum global benchmarks recognized across flag states is ensured.

Secondly, IMO Model Course 3.17 delineates the functional competencies required of Navigational Watch Officers on vessels of 500 GT or greater. These competencies include: (1) Charts & Publications: Understanding and using nautical charts and publications, (2) Meteorology & Warnings: Interpreting meteorological data and navigational warnings, (3) Ship-Shore & Inter-Vessel Communication: Exchanging routine and emergency messages with other vessels, shore stations, and VTS centers, (4) SMCP Usage: Employing Standard Marine Communication Phrases (SMCP) to guarantee clarity in maritime communication functions, (5) Official Correspondence: Drafting formal ship's correspondence in English, and (6) Multilingual Crew Collaboration: Communicating effectively within a multilingual crew environment. These competencies directly reflect the practical demands faced by Indonesian navigators, who must operate navigation instruments, manage radio-communication equipment, and respond to emergencies in English. Hence, structuring the textbook around SMCP and the navigational modules of IMO MC 3.17 guarantees that the content will be both application-oriented and compliant with international certification requirements.

4.1.2 Student-needs analysis

The student-needs analysis employed three complementary approaches.

1) Target situation analysis

The target learners are second-semester nautical study program students preparing for roles as Navigational Watch Officers on merchant vessels. In accordance with STCW requirements, their English-language competencies must include the ability to understand and issue navigational

instructions (both spoken and written), to employ SMCP in routine and emergency communications, and to collaborate within multilingual shipboard teams. It is assumed that each student enters the course at a lower-intermediate level of general English and is ready to develop proficiency in listening, speaking, reading, and writing in maritime contexts. The ultimate objective is for students to pass the STCW certification for Navigational Officers and to communicate professionally in the international maritime environment.

Moreover, target-situation competencies extend to operational scenarios such as chart interpretation, dialogue with Vessel Traffic Service (VTS) authorities, and emergency-signal response. Students at Poltekpel Sumbar are expected not only to master technical tasks but also to internalize the cultural nuances and global maritime terminology. Therefore, the textbook must facilitate the internalization of SMCP phrases and navigational terminology, as well as bolster students' psychological readiness to handle communication across diverse accents and dialects in Maritime English.

2) Current situation analysis

Field observations and in-depth interviews revealed that many students lack sufficient fluency in Maritime English, particularly in the consistent application of SMCP. This condition is also influenced by the general English courses offered at the campus, which are conducted for 3 hours per week with 20 students per class. The courses are not offered at different levels according to students' proficiency. Students' average TOEFL prediction scores range from 400 to 450, indicative of a lower-intermediate level. Practical SMCP exercises during routine navigation or emergency simulations are minimal, often limited to generic role-plays without direct integration into navigational contexts. Coordination with marine-competency lecturers is infrequent, further restricting authentic practice. Consequently, students struggle when asked to simulate VHF radio calls for collision avoidance or oil-spill emergencies.

Interviews also indicated low confidence in using standardized SMCP phrases, since existing role-plays are not systematically aligned with the IMO MC 3.17 syllabus. While the current curriculum includes a general English course, its focus is predominantly on everyday vocabulary and grammar, with only brief, unsupported coverage of navigational communication. This gap between the STCW-mandated competencies and the students' actual abilities underscores the need for a dedicated, structured textbook.

3) Learning-environment analysis

The predominant pedagogical approach at the Polytechnic remains interactive lectures and brief Q&A sessions. English classrooms are equipped with LCD projectors and speakers, but audiovisual simulations of shipboard communication are infrequent. The language laboratory, ideally a hub for interactive practice, lacks sufficient audio equipment, such as VHF-radio simulators. This limits students' opportunities to rehearse broadcast-style navigational calls or to practice emergency scenarios in a realistic shipboard format.

Furthermore, existing instructional materials are largely generic (e.g., lecturer-created PowerPoint slides and unrelated electronic modules), offering only cursory coverage of navigational and ship-correspondence topics. Some lecturers have developed supplementary worksheets, but these are not standardized within a cohesive textbook. To support effective learning, students need task-based materials featuring real-world navigation scenarios, a maritime glossary, and VHF-audio exercises. The absence of such structured resources provided the principal impetus for designing the *Maritime English for Navigational Watch Officers* textbook under the ADDIE model.

4.1.3 Lecturer needs analysis

1) Target situation analysis for Maritime English lecturers

Maritime English lecturers at Poltekpel Sumbar carry the strategic responsibility of equipping students with the English language competencies required for international maritime operations. They

must deliver instruction beyond General English, focusing instead on technical, profession-specific communication skills relevant to the shipping workplace. As global standards for maritime safety and communication, such as the STCW Convention, become more stringent, lecturers are expected to adopt contextualized and authentic pedagogical approaches that prepare graduates to operate effectively on foreign-flagged vessels.

However, this ideal is challenged by the scarcity of specialized instructional materials tailored to the unique demands of maritime training and education. Existing textbooks are often generic and lack the depth needed to master shipboard terminology and communication contexts. Consequently, lecturers spend substantial time adapting diverse materials, which often leads to inconsistencies among the content, learning objectives, and field practice. In interviews with three Maritime English lecturers, all three lecturers (100 %) stated that their main teaching goal is to prepare students to use Standard Marine Communication Phrases (SMCP) effectively in real shipboard situations. On average, each lecturer invests four to six hours per week revising content to achieve contextual relevance. As one lecturer noted: “The available textbooks are too general, I have to revise every navigation scenario, from hazard warnings to weather reports.”

2) Current situation analysis for Maritime English lecturers

Most Maritime English lecturers at Poltekpel Sumbar possess appropriate academic backgrounds and vocational teaching experience. Nonetheless, they face obstacles in accessing relevant, practice-oriented materials for the Maritime English course, especially those covering navigational competencies. In practice, lecturers rely on a mix of foreign reference books, general English modules, and Internet resources, which do not always align with the local context or the outcome-based STCW curriculum.

In addition, lecturers lack interactive and field-oriented teaching media. As a result, instruction tends to remain theoretical and fails to reflect the authentic communication challenges encountered by Navigational Watch Officers at sea. There is a clear need for a textbook that integrates text with real-world communication scenarios, including SMCP usage, navigational reporting, and shipboard work instructions.

A similar questionnaire administered to the three lecturers revealed that two (67 %) depend heavily on online resources (e.g., YouTube, Google, Wikipedia) because printed textbooks are inadequate; yet all (100 %) report difficulty in calibrating language level, resulting in materials that are either overly technical or too abstract for students. Three weeks of classroom observations yielded the data summarized in **Table 5**.

Table 5 Gap analysis between instructional content and lecturers needs.

No.	Observed Activity	Frequency	Percentage (%)
1	SMCP practice exercises	6/14 sessions	42.85
2	Routine / emergency communication simulations	2/14 sessions	14.28
3	Discussion of real-world navigation cases	4/14 sessions	28.57

From these results, SMCP exercises occur in only 42.85 % of sessions, indicating that core SMCP content has yet to become a routine part of instruction, despite its foundational role in maritime communication competence. Emergency simulations (e.g., “Mayday” calls, “Man Overboard” procedures) appear in only 14.28 % of sessions, even though STCW mandates emergency-communication proficiency. Real-world case discussions take place in 28.57 % of sessions, leaving two-thirds of class time without hands-on analysis of authentic shipboard scenarios such as narrow-channel maneuvers or pilot coordination. One lecturer emphasized: “We need a ready-to-use textbook at the appropriate student level, not just a glossary of terms.”

3) Learning environment analysis for Maritime English

Current Maritime English instruction relies heavily on conventional lecture, translation, and set-exercise methods, rather than the work-based learning approach expected in vocational maritime education. Although the curriculum framework integrates technical and communication competencies, classroom practice remains dominated by teacher-centered lectures and decontextualized drills. Students receive limited immersive or situational practice to develop rapid, accurate responses in emergency, international navigation, or multinational crew collaboration contexts.

This situation is exacerbated by the lack of a textbook that supports integrated, systematic maritime-communication simulations. Existing materials are often outdated with respect to modern navigation technologies and shipboard procedures, impeding achievement of learning outcomes that require functional communication skills.

Observations were conducted across nine regular Maritime English class sessions (out of the 14 sessions in one semester) to analyze the existing learning environment involving the lecturers and students. The observations found that lectures occupied 88.9 % of instructional time, and translation exercises 66.7 %, while role-plays and practical simulations occurred in only 33.3 % of the sessions. A satisfaction survey of 55 second-semester students revealed that a relatively small proportion of students felt adequately prepared for shipboard communication after completing the course. Summary results are shown in **Table 6**.

Table 6 Student satisfaction survey on course content.

No.	Assessed Aspect	Very Satisfied	Satisfied	Neutral	Dissatisfied
1	Relevance of content to practice	6 (10.9 %)	10 (18.2 %)	19 (34.5 %)	20 (36.4 %)
2	Effectiveness of simulations	3(5.5 %)	14 (25.5 %)	22 (40 %)	16 (29.1 %)

Both lecturers and students concurred that learning would be more effective with a textbook that integrates written content with audio dialogues, video simulations, and task-based worksheets grounded in real-world scenarios. These findings underscore the urgent need for the *Maritime English for Navigational Watch Officers* textbook, designed in accordance with the ADDIE model to systematize SMCP practice and navigational case studies at an accessible language level aligned with STCW standards.

4.2 Design

4.2.1 Cover

The front cover uses a light blue-and-white layout and displays the title MARITIME ENGLISH FOR NAVIGATIONAL WATCH OFFICER and the subtitle BASED ON IMO MODEL COURSE 3.17. A vessel illustration reinforces the maritime theme, while three inset photographs depicting classroom teaching, smart-class simulation, and student group discussion suggest the material's practical orientation. The author names and publisher logos are placed in the lower right corner, along with institutional and partner logos. The display of textbook cover is presented in **Figure 2**.

4.2.2 Typography and spacing

The textbook employs Berlin Sans FB typeface. Title text is set at 24 pt, subtitle at 18 pt, with 1.5 line spacing.

4.2.3 Structure

The textbook follows a conventional format: cover, preface, table of contents, list of tables, list of figures, user guide, and core content (Units One-Five), references, and glossary. The structure of textbook is displayed as **Table 7**.

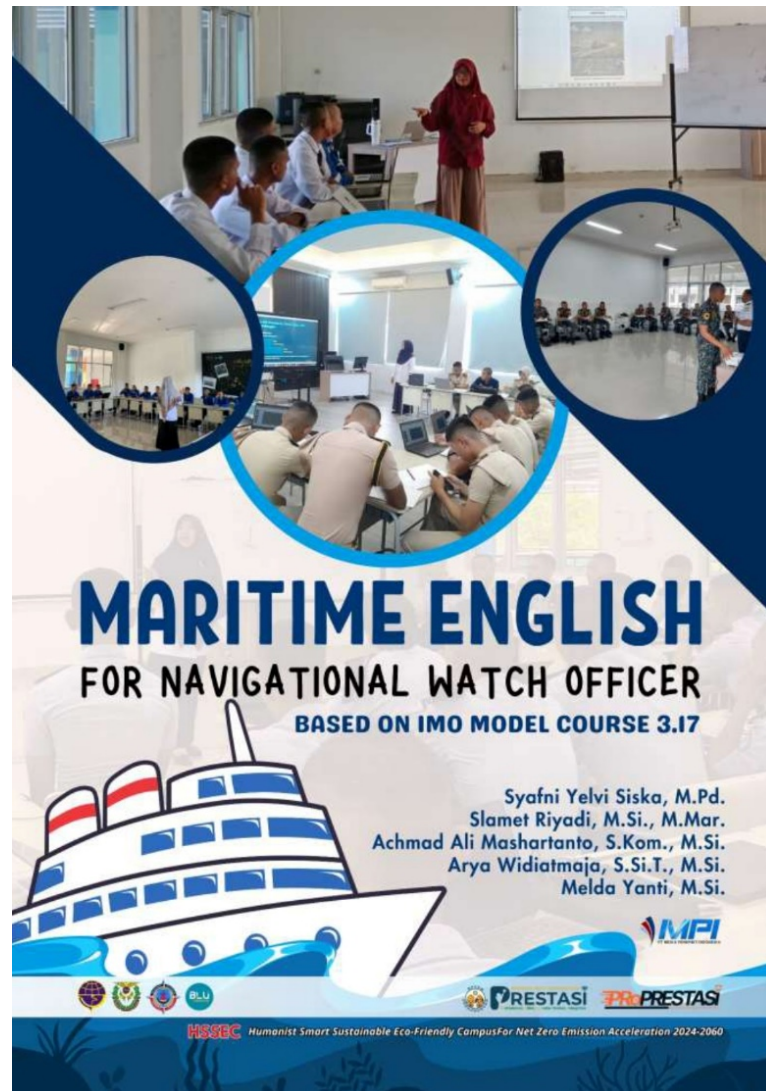


Figure 2 Textbook cover.

Table 7 Textbook structure.

No.	Section	Description
1	Preface	Acknowledgments, background, purpose, and scope of the textbook
2	Table of Contents	Chapter and unit titles with page numbers for navigation
3	List of Tables	All textbook tables with titles and page references
4	List of Figures	All illustrations, photographs, and diagrams with captions and page references
5	User Guide	Instructions for lecturers and students, including recommended session durations and supporting media
6	Core Content (Units One-Five)	Five learning units, each containing learning outcomes, content, SMCP exercises, practice activities, and formative assessments
7	References	Bibliographic entries, IMO/STCW documents, articles, and other sources
8	Glossary	Definitions of maritime terms and abbreviations (e.g., SMCP, navigational terminology, radio communication)

4.2.4 Textbook content

The textbook content was crafted by integrating key pedagogical concepts and maritime-English requirements into the outlined structure. An illustrative content map is provided in **Figure 3**.

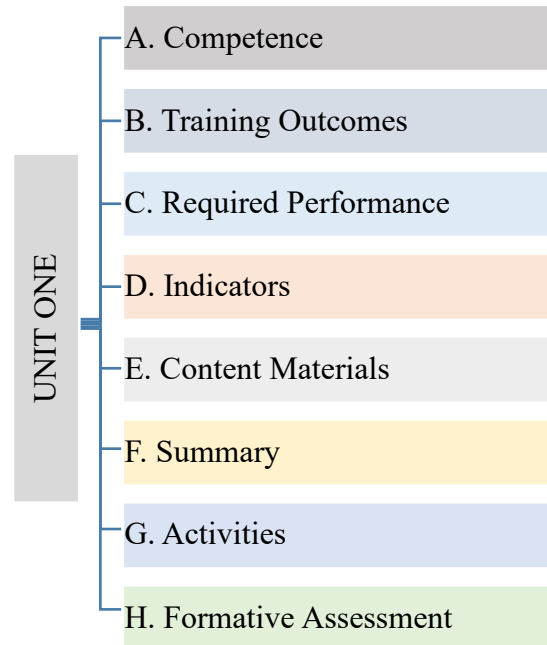


Figure 3 Textbook content map.

During the ‘design’ phase, each unit of the textbook was structured according to the framework outlined above. The following components were developed for every learning unit. Each unit begins with a ‘competence’ section that states the core competency students are expected to achieve in that unit. For example, the Competence statement in Unit 1 is: “The learner will be able to use Standard Marine Communication Phrases (SMCP) accurately in both daily and emergency navigation contexts.” This description integrates the dimensions of knowledge, skills, and professional attitudes that underpin all subsequent learning activities within the unit. Training Outcomes specify the concrete, measurable results expected of students. For instance: “Students will prepare a voyage plan using nautical charts and publications and demonstrate a correct VHF dialogue in compliance with standard procedures.” All outcomes are phrased in clear, observable terms, oriented toward real-world performance. Required Performance subsection sets the minimum performance standard that students must achieve. For example: “Students will accurately interpret chart symbols for depth, current, and navigation aids on both paper and electronic charts.” This establishes the quality benchmarks for learning outputs. Indicators provide precise metrics for evaluating the attainment of the stated competence and training outcomes. Examples include: “Students will recognize 15 SMCP terms without error,” or “Students will respond to a simulated ‘Mayday’ call in under 30 seconds.” Each indicator is accompanied by explicit assessment criteria. The Layout of Competence, Training Outcomes, required Performance, and Indicators in the textbook are shown as **Figure 4**.

The Content Materials section lists the topics and subtopics covered, such as navigational terminology, SMCP dialogue structures, chart-use procedures, and summaries of nautical publications. Materials are presented in a logical sequence, complemented by explanatory text, illustrations, and reference citations. A display of Content Materials is shown in **Figure 5**.

- A. Competence**
 "Use the IMO Standard Marine Communication Phrases and Use English in Written and Oral Form" (IMO, 2014)
- B. Training Outcomes**
 Demonstrates a knowledge and understanding of:
1. Using English in written and oral form
 2. Using IMO Standard Marine Communication Phrases (IMO SMCP, 2000)
- C. Required Performance**
1. Use charts and other nautical publications
- D. Indicators**
 At the end of the learning, students are able to:
 Explain symbols and abbreviations on a chart especially navigational marks, obstructions, contours, soundings, bottom nature, traffic lanes and separation zones etc;
1. Develop and practise a glossary of the key items with definitions relating to information given on a chart;
 2. Explain the title, explanatory notes including warnings given on a chart;
 3. Create a dialogue to prepare the ship with an appropriate routing chart by using given information;
 4. Explain how to select standard charts by areas or routes with a given chart catalogue;
 5. Discuss in pairs or group, information from nautical publications such as Sailing Directions, Ocean Passage for the World, Mariner Handbook, Almanac, Tide Table, List of Lights and Fog Signals, List of Radio Signals, Notices to Mariners, radio navigational warnings and Guide to Port Entry etc;
 6. Interpret corrections of charts and publications by Notices to Mariners, worldwide and nationwide;
 7. Compile a glossary of the terms and abbreviations used in ECDIS;
 8. Explain the functional basics of electronic charts.

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Maritime English for navigational watch officer
 based on IMO model course 3.17

Figure 4 Layout of Competence, Training Outcomes, Required Performance, and Indicators.



E. Content Materials

Symbols and Abbreviations on Nautical Charts

1. Navigational marks

Navigational marks are visual aids for navigation, indicating safe passages, dangers, and other features.

- a. Buoys and Beacons:** Represented by symbols showing their type (e.g., lateral, cardinal, isolated danger, etc.) and color.

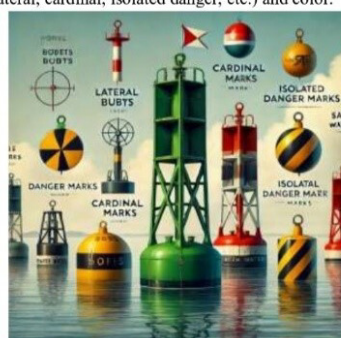


Figure 2. Buys and Beacons

- 1) Lateral Marks: Indicate the sides of navigable channels:
 - Starboard (right): Green color, triangular top mark, or cone-shaped buoy.
 - Port (left): Red color, square top mark, or cylindrical buoy.
- 2) Cardinal Marks: Indicate the direction of safe water relative to a hazard using the cardinal points (North, East, South, West). Markings and top shapes (two cones) show safe passage (e.g., North = safe water to the north).

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Figure 5 Display of Content Materials.

Each unit concludes with a concise summary of key points, definitions, procedures, and steps to help students review essential concepts before moving on to activities or assessments. **Figure 6** is a sample of the Summary.

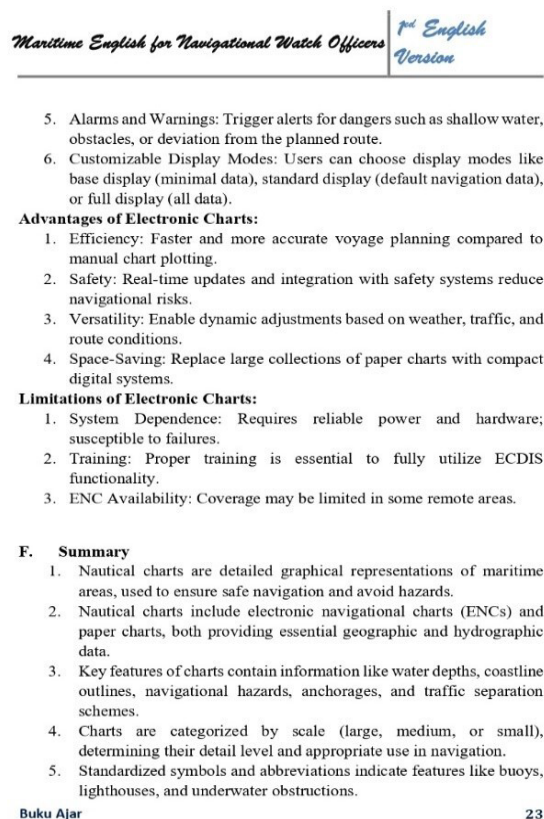


Figure 6 Sample of Summary.

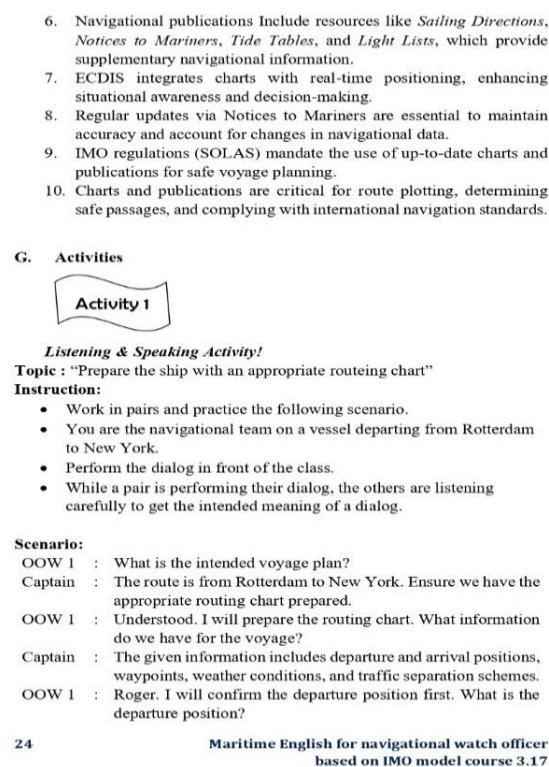


Figure 7 Sample of Activities.

The Activities section comprises exercises and assignments that foster active learner engagement. Examples include role-play simulations of routine and emergency communications, chart-selection case studies, terminology quizzes, and mini-projects such as creating a navigational glossary. Each task includes step-by-step instructions. **Figure 7** is a sample of Activities for each unit.

Formative Assessments are designed to monitor learning progress and include: oral tests (SMCP dialogue practice), written tests (multiple-choice and short-essay items on chart symbols), behavioral observation of professional conduct during simulations, and performance portfolios comprising practice-session recordings and student-generated reports, assessed against an integrated rubric covering technical execution, communication clarity, and safety compliance. A Formative Assessment can be seen as **Figure 8**.

Maritime English for Navigational Watch Officers | *1st English Version*

1. What is the primary purpose of the Admiralty Chart Catalogue in maritime navigation?
2. What types of charts does the Admiralty Chart Catalogue recommend for a voyage from Indonesia to Singapore?
3. Why is it important to use up-to-date charts when planning a voyage?
4. What challenges unique to the Indonesia-Singapore route are highlighted in the Admiralty Chart Catalogue?
5. How does the Admiralty Chart Catalogue help navigators anticipate potential challenges during a voyage?

FORMATIVE ASSESSMENT UNIT 1

A. Choose one correct answer from the five options; a, b, c, d or e below on your answer sheet.

1. What does the symbol "  " represent on a nautical chart?
 - a. A lighthouse
 - b. A wreck
 - c. An anchorage area
 - d. A safe water mark
 - e. A prohibited area
2. What does the abbreviation "TSS" indicate on a nautical chart?
 - a. Traffic Surveillance System
 - b. Traffic Separation Scheme
 - c. Temporary Safety Signal
 - d. Tide Stream Signal
 - e. Transit Shipping System

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Figure 8 Sample of Formative Assessment.

4.3 Development

The third phase of the ADDIE model involves the development of the product. During this stage, the draft manuscript was submitted to three expert validators to gather feedback and ensure content validity prior to implementation. The experts were purposively selected based on their relevant expertise. Validator 1 (V001) was selected for content evaluation, due to his expertise in navigational systems. Validator 2 (V002) was selected for language evaluation, due to his expertise as an English lecturer at maritime institution. Then, validator 3 (V003) was selected for media evaluation, due to his expertise in developing instructional media. The validation panel is presented in **Table 8**.

Table 8 Validator profiles.

Component	Validator	Affiliation
Content	V001	Lecturer of Navigation Systems at a Maritime Polytechnic
Language	V002	Lecturer of Technical & Maritime English in Higher Education
Media	V003	Lecturer of English for Tourism at a State University

The three experts were purposively selected for the validation, since they represented the core domain required in textbook evaluation (content, language, and media). Each validation criterion consisted of eight (8) statements, which were assessed by the three experts using a five-point Likert scale. The Aiken's V score as quantitative result and qualitative feedback from validators are presented in **Table 9**.

Table 9 Result of textbook validation.

Indicator	V	Meaning	Feedback	Textbook Revision
Content	0.95	Valid	Add additional assignments that focus on navigational duties terminology.	The assignments have been expanded to cover more navigational terminology and contexts.
Language	0.71	Valid	Simplify the instructions and explanations to improve readability of the textbook.	The textbook has been revised in terms of the instructions, grammar, and sentence structure.
Media	0.85	Valid	Some figures, spacing, and page layout need to be improved.	The authors have adjusted the formatting, visual alignment, and overall page layout.
Average Score	0.84	Valid		

According to conventional thresholds ($V \geq 0.70$), each domain meets the criterion for validity. Consequently, given these quantitative outcomes and the subsequent consensus-driven revisions based on expert feedback, the textbook is deemed sufficiently validated for use in the field implementation.

4.4 Implementation

The implementation phase involved applying the validated textbook in a real-classroom setting. Two classes were randomly assigned, via simple random sampling, to serve as the experimental and control groups. Both groups receiving identical content coverage, learning objectives, and contact hours (five sessions $\times$ two hours), and the same pre- and posttest instruments, to ensure comparability. The experimental group was taught using the validated textbook as the core instructional resource, with each session structured around textbook units and specified tasks. The control group covered the same units and objectives but the content was delivered primarily via teacher-led PowerPoint presentations. Both groups received the lecture explanations and question-and-answer segments and, to promote systematic language production and interaction, both groups also received the guided practice, pair/group communicative activities, role-plays, and assigned out-of-class exercises. The same lecturer taught both groups following prepared lesson plans and implementation checklists monitored by the researchers. Teaching activities in the experimental and control classes are stated in **Table 10**.

Table 10 Teaching activities in experimental and control classes.

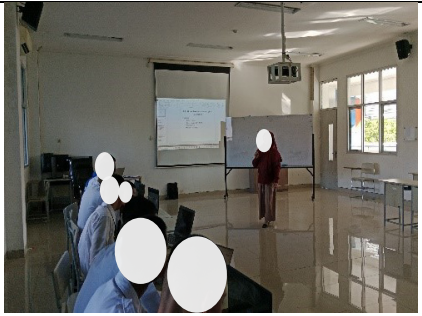
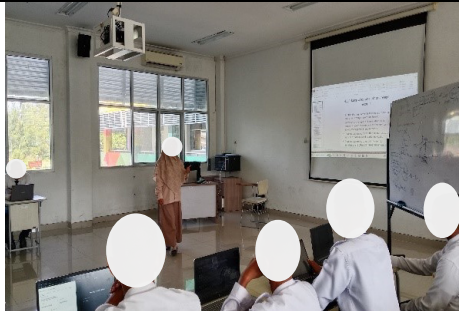
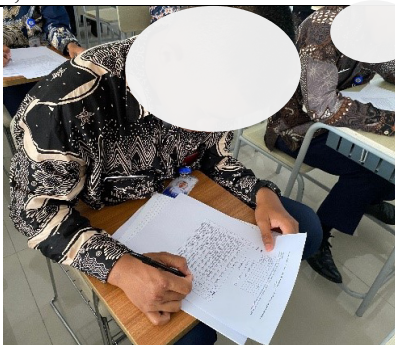
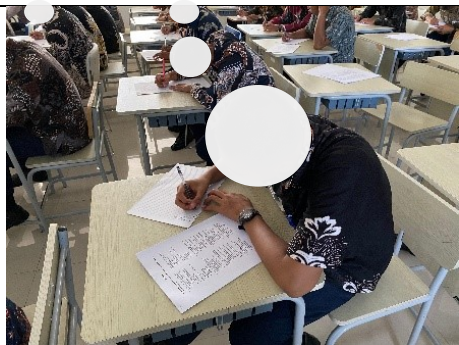
Date	Activity	Experimental Class	Control Class
Monday, April 28 th 2025	Pretest (8:00 a.m. – 10:00 a.m.)	 55 Nautical Study Program students completed a 100-item multiple-choice pretest under the supervision of Maritime English lecturers to ensure integrity. The time allocated for completing the pretest is 120 minutes.	
Tuesday, May 6 th 2025	First meeting	 Experimental class using the textbook for Unit One: Nautical Charts and Publications. The class was held for 2 hours, from 8:00 a.m. – 10:00 a.m.	 Control class using PowerPoint presentation for the same topic. The class was held for 2 hours, from 10:00 a.m. – 12:00 p.m.
Wednesday, May 7 th 2025	Second meeting	 Experimental class covering Unit Two: Meteorological Information & Messages using the textbook. The class was held for 2 hours, from 8:00 a.m. – 10:00 a.m.	 Control class covering the same topic via PowerPoint. The class was held for 2 hours, from 10:00 a.m. – 12:00 p.m.
Thursday, May 8 th 2025	Third meeting	 Experimental class covering Unit Three: Routine & Emergency Communication using the textbook. The class was held for 2 hours, from 8:00 a.m. – 10:00 a.m.	 Control class covering the same topic via PowerPoint. The class was held for 2 hours, from 10:00 a.m. – 12:00 p.m.

Table 10 (continued) Teaching activities in experimental and control classes.

Date	Activity	Experimental Class	Control Class
Wednesday, May 21 st 2025	Fourth meeting	 Experimental class covering Unit Four: Officer's Duties using the textbook. The class was held for 2 hours, from 8:00 a.m. – 10:00 a.m.	 Control class covering the same topic via PowerPoint. The class was held for 2 hours, from 10:00 a.m. – 12:00 p.m.
Thursday, May 22 nd 2025	Fifth meeting	 Experimental class covering Unit Five: Communication with a Multi-Lingual Crew using the textbook. The class was held for 2 hours, from 8:00 a.m. – 10:00 a.m.	 Control class covering the same topic via PowerPoint. The class was held for 2 hours, from 10:00 a.m. – 12:00 p.m.
Friday, May 23 rd 2025	Posttest (8:00 a.m. – 10:00 a.m.)	 After posttest, the students in the experimental class completed the practicality survey on the textbook's usability (10:30 a.m. – 10:45 a.m.)	 Control class and experimental class took the 100-item multiple-choice posttest under controlled conditions.

Although the experimental intervention lasted for five sessions, each lasting 2 hours and covering five distinct textbook units, instructional procedures were standardized through pre-prepared lesson plans, implementation checklists, and researcher observations to ensure comparable contact time and consistent implementation across sessions. However, because exposure to each unit was relatively limited and dispersed, the opportunity for deep mastery may have been constrained. Therefore, the superior gains observed in the experimental group should be interpreted cautiously and not attributed solely to the textbook. Future studies should vary the intensity of exposure, for example, by focusing multiple sessions on a single unit, to distinguish the effects of material design from those of instructional time and practice. Since the intervention was limited to five sessions, the results should be viewed as short-term teaching efficacy rather than long-term learning gains.

4.5 Evaluation

4.5.1 Practicality

The practicality of the *Maritime English for Navigational Watch Officers* textbook was evaluated by lecturers and students in the experimental group to determine its usability. The practicality questionnaire was administered only to the experimental group because the textbook was used exclusively as the treatment in that class, and only participants who directly experienced the materials could provide valid judgments of its practicality. However, this method may cause positive-response bias, as the ratings come only from users who were exposed to the book and may therefore view it more favorably than those unfamiliar with it. The study also acknowledges this as a limitation that should be addressed in future research by collecting usability feedback from a broader range of participants. The textbook practicality result from students is described in **Table 11**.

Table 11 Students' ratings of textbook practicality.

No.	Aspect Evaluated	Mean (%)	Category
1	Material is easy to understand	82.00 %	Very practical
2	Explanations are not confusing	76.50 %	Very practical
3	Provides examples relevant to daily watchkeeping duties	83.50 %	Very practical
4	Motivates active student engagement	85.50 %	Very practical
5	Task and exercise instructions are easy to follow	77.00 %	Very practical
6	Supports independent student learning	80.00 %	Very practical
7	Presents varied and engaging exercises	78.00 %	Very practical
8	Reflects cultural diversity and supports multicultural understanding	81.00 %	Very practical
9	Features a clear structure and easy navigability	78.00 %	Very practical
10	Enhances students' Maritime English writing and speaking skills	85.00 %	Very practical
Overall Mean		80.65 %	Very practical

According to the students' feedback, the textbook achieved an overall mean practicality score of 80.65 %, categorizing it as *very practical*. Students reported that the text facilitated comprehension, clarity of instructions, and authentic practice of Maritime English in a professional context. **Table 12** presents the lecturers' assessment of the textbook's practicality.

Table 12 Lecturers' ratings of textbook practicality.

No.	Aspect Evaluated	Mean (%)	Category
1	Aligns with the applicable curriculum standard (IMO MC 3.17)	80 %	Very practical
2	Systematic to be implemented in teaching process	90 %	Very practical
3	Easy to use for instructional purposes	80 %	Very practical
4	Provides sufficient material, exercises, and evaluations to enhance student understanding	90 %	Very practical
5	Meets students' needs in a multicultural context	100 %	Very practical
6	Supports varied teaching methods (discussion, simulation, role-play, and other SCL approaches)	90 %	Very practical
7	Facilitates lecturer's assessment of student English proficiency	90 %	Very practical
8	Includes illustrations, graphics, and additional references	90 %	Very practical
9	Readily available and accessible for lecturers	80 %	Very practical
10	Helps improve students' speaking and writing skills	80 %	Very practical
Overall Mean		87 %	Very practical

The practicality result from two lecturers produced an overall mean practicality score of 87 %, also falling within the *very practical* category. These results confirm that the textbook is practical and suitable for classroom implementation.

4.5.2 Effectiveness

Before conducting the t-test, the authors confirmed the pretest and posttest data of both experimental and control groups met the assumptions of normality and homogeneity, as presented in **Table 13**.

Table 13 Normality and homogeneity for pretest and posttest scores.

No.	Data	Group	Shapiro-Wilk Sig.	Decision	Levene's test Sig.	Decision
1	Pretest	Control	0.216	Normal	0.580	Homogeneous
2	Pretest	Experiment	0.241	Normal	0.580	Homogeneous
3	Posttest	Control	0.080	Normal	0.888	Homogeneous
4	Posttest	Experiment	0.127	Normal	0.888	Homogeneous

Table 13 shows that the pretest and posttest scores for both experimental and control class were normally distributed and homogeneous; in other words, the data met the assumptions for parametric analysis. To determine the impact of intervention, an Analysis of Covariance (ANCOVA) was utilized to compare posttest results between the treatment and control groups, with initial baseline (pretest) scores factored in as a covariate. The result of ANCOVA can be seen in **Table 14**.

Table 14 ANCOVA results.

No.	Source	Sig.	Adjusted Mean
1	Control Class	0.000	82.012
2	Experimental Class	0.000	88.320

Table 14 indicated that the class variable significantly influences posttest scores, after controlling for pretest scores ($p = 0.000$). Furthermore, the experimental group achieved a significantly higher adjusted mean score than the control group, showing a meaningful difference in their overall outcomes. Pairwise comparisons using a Bonferroni adjustment revealed a statistically significant difference in final scores between the control and experimental class. The experimental group showed a mean advantage of 6.31 points over the control group, with a 95 % confidence interval from 3.371 to 9.245. This establishes that the intervention was effective, yielding higher posttest outcomes when adjusting for baseline pretest scores.

For ensuring comparable baseline characteristics, the researchers conducted an independent sample t-test on the pretest scores and complemented this analysis with an effect-size estimate (Cohen's d). The mean pretest score for experimental group was $M = 48.75$ ($SD = 13.541$, $n = 40$) and for the control group $M = 48.55$ ($SD = 15.444$, $n = 40$); the difference was not statistically significant, $t(78) = 0.62$, $p = 0.91$, and the effect size was negligible (Cohen's $d = 0.013771$), which indicates baseline equivalence. Thus, the average proficiency of the experimental and control class did not differ significantly prior to the intervention.

Furthermore, to assess relative improvement between pretest and posttest scores and enable a between-group comparison, the researchers computed individual normalized gain (g) scores. The experimental group's normalized gain was $M = 0.7587$, $SD = 0.1312$ ($n = 40$), which falls into the 'high' effectiveness category, whereas the control group's normalized gain was $M = 0.6174$, $SD = 0.1708$ ($n = 40$), classified as 'medium' effectiveness. Although the difference between the two

groups shows greater improvement for the experimental class, the absolute gap is not large; nevertheless, these findings indicate that the textbook-supported, task-oriented instruction produced greater gains in students' English proficiency than instruction delivered primarily via PowerPoint.

In addition, the researchers conducted an independent sample t-test on the posttest scores and complemented this analysis with an effect-size estimate (Cohen's *d*). The mean posttest score for experimental group was $M = 88.3$ ($SD = 5.612$, $n = 40$) and for the control group $M = 82.08$ ($SD = 5.086$, $n = 40$); the difference was statistically significant, $t(78) = 5.198$, $p = 0.00$, and associated with a very large effect size (Cohen's $d = 1.161$), indicating a substantial advantage for the experimental group. Thus, the average post-intervention proficiency of the experimental class was significantly higher than that of the control class.

While these findings are consistent with a positive effect of the textbook-supported, task-oriented instruction, the researchers do not interpret them as proof that the textbook alone produced the observed improvements. The researchers therefore temper these research conclusions by acknowledging alternative explanations (e.g., student motivation, instructor facilitation, classroom interaction, and potential test-instruction alignment).

5. Discussion

5.1 Validity of Maritime English textbook

The first objective of this study was to determine the validity of the *Maritime English for Navigational Watch Officers* textbook. The validation results indicate that this textbook is aligned with curriculum standards and instructional needs of students and lecturers (Dewan et al., 2024). This alignment demonstrates that the textbook satisfies not only language requirements but also the specific pedagogical needs of maritime professional training. In particular, this textbook reflects the competence demands of IMO Model Course 3.17, SMCP, and STCW, which strengthens its conceptual and instructional coherence (Nakashima et al., 2025). This alignment is essential in Maritime English training, since it reflects course materials to specific job-related communication skills rather than general language goals (Gabadava & Hu, 2025).

These findings are consistent with previous studies explaining that ESP textbooks should contain authentic tasks, work-specific language, and content derived from students' actual needs rather than generic language material (Hodne et al., 2024). In this case, this textbook does not only present maritime terminology, but teaching language related to real navigational communication onboard (Chan et al., 2025). This reinforces the textbook's instructional value, as it aligns language education with maritime practice. Essentially, the material is effective because it trains students for real-world communication on the bridge, and not only effective for its curriculum coverage.

5.2 Practicality of Maritime English textbook

The second objective was to examine the practicality of the *Maritime English for Navigational Watch Officers* textbook. The practical value of this textbook lies in the structured units, clear learning sequence, and readiness for instructional use in a maritime education setting (Tusher et al., 2024). For students, this textbook provides language learning contents related to real navigational contexts, which is essential for authentic maritime communication onboard (Siska et al., 2024). For lecturers, this well-organized textbook decreases the strain of preparing materials from many sources and supports consistency in delivery materials in the classroom teaching-learning process (Türkistanlı, 2024).

This result is in line with previous study showing that practicality in the materials of vocational learning increases when the content is easy to use, contextually relevant, and aligned to real-work situations (Masuwai et al., 2024). A possible reason for the textbook's high practicality is because its familiar structure minimizes students' cognitive load and supports guided teaching and independent study. In addition, it is highly valued by instructors for its immediate usability and allows

the instructors to deliver Maritime English more efficiently. Therefore, this developed textbook is not only practical for academic-use, but is also operationally useful for lecturers and students in everyday classroom teaching and learning (Pruyn, 2024). Its practicality is particularly significant in maritime education, where the learning materials can support both lecturer-guided instruction and students' independent study.

At the same time, the practicality findings warrant careful interpretation because they were based on responses from direct textbook users. Consequently, the result may also reflect a positive-response bias, as individuals who have used the material in the classroom are already predisposed to rate it favorably.

5.3 Effectiveness of Maritime English textbook

The third objective was to test the effectiveness of *Maritime English for Navigational Watch Officers* textbook in improving students' Maritime English proficiency. The findings show that textbook-supported instruction resulted in greater learning achievements than conventional instruction (Haque et al., 2025). This result suggests that the contextualized maritime language tasks helped students to internalize terminology, standard phrases, and routine communication related to navigational duties (Liu & Ma, 2025).

The textbook's effectiveness can be seen in its main emphasis on real-work communication, task-based practice, and SMCP-based scenarios. Since the learning activities are based on real-work communication, students are more likely to see direct relevance between classroom tasks and professional practice. This relevance can improve students' engagement, attention, and retention, which may contribute to better learning outcomes. This is relevant to previous research showing that effective language materials integrate content knowledge, real-work context, and task-based practice (Vlachopoulos & Makri, 2024).

However, the improved outcomes cannot be attributed to the textbook alone without caution. The improvements might stem from the instructor's teaching methodology, the novelty of the materials, and higher student engagement. Additionally, the short duration of the intervention means that the findings reflect immediate learning effects rather than sustained proficiency development. Nevertheless, the findings indicate that this textbook is more effective than traditional resources because it directly targets specific maritime communication skills. In maritime education, this approach is important because communication errors may have implications on workforce safety and operational performance (Morariu et al., 2025). This result supports the idea that the Maritime English textbook should not be used as supplementary materials, but as a core language resource for seafarers' professional competence.

5.4 Contribution to maritime education and wider relevance

The *Maritime English for Navigational Watch Officers* textbook has broader implication for maritime education in vocational higher institutions. Many vocational maritime higher education institutions face similar problems; particularly, the limited availability of Maritime English learning materials are often too general, theoretical, and insufficiently aligned with occupational tasks (Fjeld et al., 2026). This study explains that a needs-based and standards-based textbook development can bridge the gap between classroom instruction and onboard communication (Phanphichit & Bartusevičienė, 2024).

The implication of this study also lies with the other maritime specializations, such as Maritime English for engine room communication or port communication (Liu et al., 2026). In other words, this study contributes to the broader field of Maritime English by showing how textbook development can support curriculum needs and international professional standards (Han et al., 2024). It also strengthens the essentiality of contextualized learning materials for maritime education, where the mainly goal is for readiness for real-work performance.

At the same time, it is important to acknowledge that this study has a few limitations. Because the research took place in just one classroom for a short time, the findings should be viewed as promising evidence rather than definitive proof of broad effectiveness. Future studies should therefore test this textbook in different settings, over a longer period, and with careful observation of how it is used.

6. Conclusions

Based on the findings of this study, the *Maritime English for Navigational Watch Officers* textbook meets the criteria of validity, practicality, and effectiveness. Expert evaluations confirmed its strong validity across curriculum alignment, content depth, instructional clarity, and media appeal. Practicality surveys among lecturers and students rated the textbook as *very practical*. Effectiveness was demonstrated by relative improvement, assessed via individual normalized gain, being larger in the experimental group than in the control group. However, these conclusions should be interpreted cautiously. Conducted at a single location over a brief duration, the study cannot definitely exclude alternative variables such as instructor bias, novelty effects, or increased learner engagement. For that reason, the textbook should be viewed as a promising and contextually relevant instructional resources rather than as definitive evidence of universal instructional superiority. Future studies require broader, multi-site samples, longer testing periods, and tighter statistical controls to confirm if these results apply everywhere.

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Conflict of interest

The researchers confirm that the textbook evaluated in this study was written and co-authored by members of the researcher team, and the researchers disclose this relationship here as a potential conflict of interest; the researchers further declare that they have no financial or commercial interest in the textbook.

Declaration of generative AI in scientific writing

The authors used ChatGPT (OpenAI) to assist conceptual development of this manuscript and the textbook. The authors enhanced the resolution of **Figures 4, 5, 6, 7, and 8** to 600 dpi using the DPI Converter. With or without AI applications, the authors are fully accountable for every process of the work and manuscript writing. All final edits, interpretations, and conclusions are the sole responsibility of the authors. The authors academically and ethically confirmed that the stated AI statements are true, and the authors are ultimately responsible and accountable for the contents of the published work, including the correctness of the references in the reference list

CRedit contribution statement

Slamet Riyadi: Conceptualization; Methodology; Investigation; Supervision. **Achmad Ali Mashartanto:** Writing- Original Draft; Data Curation. **Arya Widiatmaja:** Project administration; Visualization; Software; Validation. **Syafni Yelvi Siska:** Formal analysis; Resources; Writing- Review & Editing. **Melda Yanti:** Conceptualization; Methodology; Investigation; Resources. **Dian Erliyani:** Project Administration; Writing- Review & Editing. All authors have read and approved the final manuscript.

References

- Arslan, A., & Akturan, A. (2026). From efficiency to resilience: Strategic shifts in maritime organizations through digitalization, ESG, and human capital (2018 - 2025). *Maritime Technology and Research*, 8(2), 283716. <https://doi.org/10.33175/mtr.2026.283716>
- Banaszek, A., & Lisaj, A. (2025). The support decision system for establish radio communications in distress situations for masters of touristic yachts travelling around the Wallace's line sea area. *Procedia Computer Science*, 270, 192–202. <https://doi.org/10.1016/j.procs.2025.09.138>
- Belabyad, M., Kontovas, C., Pyne, R., & Chang, C. (2026). Skills and competencies for operating maritime autonomous surface ships (MASS): A systematic review and bibliometric analysis. *Maritime Policy & Management*, 53(1), 1-6. <https://doi.org/10.1080/03088839.2025.2475177>
- Burg, J., & Bram, S. (2024). Safety on automated passenger ships: Exploration of evacuation scenarios for coastal vessels. *Maritime Transport Research*, 6(6), 100110. <https://doi.org/10.1016/j.martra.2024.100110>
- Chan, J. P., Pazouki, K., Norman, R., & Golightly, D. (2025). Investigating the impact of seafarer training in the autonomous shipping era. *Journal of Marine Science and Engineering*, 13(4), 818. <https://doi.org/10.3390/jmse13040818>
- Dewan, M. H., Ahmed Mustafi, M. A., Matos, F., & Godina, R. (2024). Exploring seafarers' knowledge, understanding, and proficiency in SEEMP: A strategic training framework for enhancing seafarers' competence in energy-efficient ship operations. *Heliyon*, 10(17), e36505. <https://doi.org/10.1016/j.heliyon.2024.e36505>
- Ekse, E. B., Giskeødegård, M. F., Sellberg, C., & Wahl, A. M. (2025). Zooming in and out: Multidimensional coordination work through simulation-based training. *Studies in Continuing Education*. <https://doi.org/10.1080/0158037X.2025.2550289>
- Fan, S., Fairclough, S., Khaliq, A., Bury, A., & Yang, Z. (2025). Towards advanced decision-making support for shipping safety: A functional connectivity analysis. *Transportation Research Part E*, 193(11), 103861. <https://doi.org/10.1016/j.tre.2024.103861>
- Fan, S., Shi, K., Weng, J., & Yang, Z. (2025). Letting losses be lessons: Human-machine cooperation in maritime transport. *Reliability Engineering and System Safety*, 253(6), 110547. <https://doi.org/10.1016/j.ress.2024.110547>
- Fernando, H., & Wickramasinghe, V. (2024). Employability skills of maintenance technicians in container ports: Implications for maritime technical and vocational education and training. *Maritime Technology and Research*, 6(4), 269909. <https://doi.org/10.33175/mtr.2024.269909>
- Fjeld, G. P., Tvedt, S. D., & Sætre, B. (2026). The distinct roles of internal and external communication in perceived risk on offshore vessels. *Safety and Reliability*. <https://doi.org/10.1080/09617353.2026.2639115>
- Gabedava, G., & Hu, Y. (2025). Enhancing maritime safety through linguistic analysis: A case study of communication failures in maritime accidents. *WMU Journal of Maritime Affairs*, 24, 347-361. <https://doi.org/10.1007/s13437-025-00371-y>
- Galicia, P. R. B., Maravillas, N. C., Samillano, R. M., Huera, C. A. V., & Pechuanco, F. L. M. (2024). 21st century learning skills of maritime faculty in the province of Antique, Philippines. *Maritime Technology and Research*, 6(4), 270545. <https://doi.org/10.33175/mtr.2024.270545>
- Ghosh, S., Emad, G. R., & Ravi, A. (2025). Investigating the characteristics of skills and competency frameworks through a systematic literature review: a feasibility study to revise the STCW Code for seafarer training. *Australian Journal of Maritime & Ocean Affairs*, 17(4), 616-632. <https://doi.org/10.1080/18366503.2024.2374606>

- Göksu, B., Şakar, C., & Yüksel, O. (2025). A probabilistic assessment of ship blackout incident with Fault Tree Analysis into (FTA) Bayesian Network (BN). *Journal of Marine Engineering & Technology*, 24(1), 54-69. <https://doi.org/10.1080/20464177.2024.2423425>
- Grice, T. (2009). *English for mariners*. Germany: LCCTV Project Consortium.
- Han, C., Abeyesiriwardhane, A., Islam, R., & Chai, S. (2025). Situation awareness information requirement for marine engine room monitoring at the future shore control center. *Maritime Technology and Research*, 7(1), 271105. <https://doi.org/10.33175/mtr.2025.271105>
- Han, C., Islam, R., Abeyesiriwardhane, A., & Chai, S. (2024). Advancing maritime technology: Evaluating situation awareness support systems for engine room monitoring at the future shore control centre. *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 8(3), 2365504. <https://doi.org/10.1080/25725084.2024.2365504>
- Haque, M. N., Jabar, M. A. B. A., & Abdullah, M. A. R. (2025). The impact of contextual lexis learning on vocabulary disambiguation in ESP students. *Social Sciences & Humanities Open*, 12(11), 102211. <https://doi.org/10.1016/j.ssaho.2025.102211>
- Hasnur, J., Siska, S. Y., & Kurniawan, M. (2026). How maritime education system shapes students' professional mindset: Mediated by learning environment and self-directed learning. *Attractive: Innovative Education Journal*, 8(1), 164-179. <https://doi.org/10.51278/aj.v8i1.2361>
- Hidayah, H., Sahraini, S., & Jufriadi, J. (2024). Bridging cultures through language : Developing english- speaking materials for multicultural education contexts. *Elsya: Journal of English Language Studies*, 6(3), 244-264. <https://doi.org/10.31849/elsya.v6i3.21270>
- Hidayati, D., Widiati, U., Zen, E. L., & Ivone, F. M. (2025). Developing an LMS-based of ESP course for Islamic undergraduate students. *Social Sciences & Humanities Open*, 11(6), 101635. <https://doi.org/10.1016/j.ssaho.2025.101635>
- Hodne, P., Skåden, O. K., Alsos, O. A., Madsen, A., & Porathe, T. (2024). Conversational user interfaces for maritime autonomous surface ships. *Ocean Engineering*, 310(1), 118641. <https://doi.org/10.1016/j.oceaneng.2024.118641>
- Hung, T., Lin, J., & Chang, C. (2026). Influence of watchkeeping experience on workload during ship manoeuvring simulations. *Ergonomics*. <https://doi.org/10.1080/00140139.2026.2642368>
- Jurkovic, V., & Satler, T. B. (2025). Advancing navigational safety: Digimar's project focus on routine maritime communication. *Transportation Research Procedia*, 83, 349-356. <https://doi.org/10.1016/j.trpro.2025.02.046>
- Karahalil, M., Dreyer, L. O., Scanlan, J., Kim, T., & Lützhöft, M. (2025). Stakeholder perspectives on the comprehensive review of the IMO STCW convention and code. *Australian Journal of Maritime & Ocean Affairs*. <https://doi.org/10.1080/18366503.2025.2589597>
- Keimeno, & Naytikoy. (2018). *Maritime English volume I*. In Repertoire of the Practice of the Security Council: Supplement 2012-2013 (Vol. 1). Russia: Iapyma Eyreniaoy. <https://doi.org/10.18356/c7830fe1-en>
- Khan, R. U., Yin, J., Afzaal, M., & Yang, Z. (2026). Quantitative assessment of language and cultural diversity as human reliability factors in maritime safety. *Reliability Engineering and System Safety*, 273(12), 112358. <https://doi.org/10.1016/j.res.2026.112358>
- Korieshkova, S., Didenko, M., & Sybirko, O. (2024). Prospects of using electronic books when teaching Maritime English. *Jurnal Pendekatan Modern Dan Teknologi Pembentukan Inovatif Kompetensi Komunikatif Bahasa Asing*, 21(89), 195-200. [https://doi.org/10.25264/2519-2558-2024-21\(89\)-195-200](https://doi.org/10.25264/2519-2558-2024-21(89)-195-200)
- Lehtimäki, M., & Teperi, A. (2026). Developing behavioural markers of high-speed workboat crews' competencies. *International Journal of Occupational Safety and Ergonomics*, 3548(5), 44-57. <https://doi.org/10.1080/10803548.2025.2499338>

- Liu, J., & Ma, Q. (2025). Supporting low-proficiency L2 learners' vocabulary learning with custom GPT-scaffolded corpus-based language pedagogy: a case study. *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2025.2539152>
- Liu, P., Khan, R. U., Afzaal, M., Asad, M., Du, X., & Yang, Z. (2026). Studying the impact of contextual factors on language barriers in maritime safety: A structural equation modeling approach. *Maritime Policy & Management*. <https://doi.org/10.1080/03088839.2026.2660896>
- Mashartanto, A. A., Pranata, W., & Siska, S. Y. (2024). Development of learning media Maritime English textbook for ratings forming. *Journal of Languages and Language Teaching*, 12(3), 1238. <https://doi.org/10.33394/jollt.v12i3.11337>
- Masuwai, A., Zulkifli, H., & Hamzah, M. I. (2024). Evaluation of content validity and face validity of secondary school Islamic education teacher self-assessment instrument. *Cogent Education*, 11(1), 2308410. <https://doi.org/10.1080/2331186X.2024.2308410>
- Melani, M., Sutedja, E., Irianti, S., Herawati, D. M. D., & Pramartira, A. Y. (2025). Development of a website-based E-module for midwifery care for neonates, infants, and toddlers: A mixed-method study. *Social Sciences & Humanities Open*, 12(3), 101993. <https://doi.org/10.1016/j.ssaho.2025.101993>
- Mohammad, A. M., Sohaimi, N. A. F. B., Menhat, M. N. S., & Ariffin, E. H. (2026). Adoption of social media as a learning technology in maritime education. *Maritime Technology and Research*, 8(1), 281935. <https://doi.org/10.33175/mtr.2026.281935>
- Morariu, A., Tsvetkova, A., Hellström, M., Bolbot, V., & Virtanen, S. (2025). Investigating educational solutions in the field of autonomous shipping at Finnish Universities. *Transportation Research Interdisciplinary Perspectives*, 31(3), 101402. <https://doi.org/10.1016/j.trip.2025.101402>
- Nakashima, T., Kureta, R., & Khastgir, S. (2025). Addressing systemic risks in autonomous maritime navigation: A structured STPA and ODD-based methodology. *Reliability Engineering and System Safety*, 261(3), 111041. <https://doi.org/10.1016/j.res.2025.111041>
- Park, M., & Lee, W. (2025). Comprehensive review of shipboard maintenance management strategies artificial intelligence. *Results in Engineering*, 27(6), 106671. <https://doi.org/10.1016/j.rineng.2025.106671>
- Phanphichit, T., & Bartusevičienė, I. (2025). Transfer of learning in general and simulator environments: A comprehensive systematic literature review of influencing factors. *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 9(3-4), 2563441. <https://doi.org/10.1080/25725084.2025.2563441>
- Phanphichit, Thammawan, & Bartusevičienė, I. (2024). Perspectives of stakeholders on onboard training: A thematic analysis of qualitative interviews. *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 8(4), 2408698. <https://doi.org/10.1080/25725084.2024.2408698>
- Pruyn, J. (2024). The use of digital games in academic maritime education: a theoretical framework and practical applications. *Maritime Policy and Management*, 51(4), 558-571. <https://doi.org/10.1080/03088839.2023.2174608>
- Ridwan, A., & Ulfa, S. M. (2018). *English for maritime: A supplementary material for vocational maritime school*. Bangkalan: STKIP PGRI Bangkalan Press.
- Sartini, S., Triyono, S., & Triastuti, A. (2025). Unveiling maritime English communication needs for seafarer: Strategic reformation for classroom instructional design. *Maritime Technology and Research*, 7(2), 271921. <https://doi.org/10.33175/mtr.2025.271921>
- Siska, S. Y., Mashartanto, A. A., & Pranata, W. (2024). *Maritime English for ratings forming*. Medan: PT Media Penerbit Indonesia.
- Siska, S. Y., Silen, A. P., & Nugraha, M. A. P. (2024). *General Maritime English for sea transportation*. In PT. Media Penerbit Indonesia. Medan: PT Media Penerbit Indonesia.

- Symes, S., Blanco-davis, E., Fairclough, S., Yang, Z., Wang, J., & Shaw, E. (2025). An investigation of the effect of fatigue on ship engine room operators using fNIRS. *Ocean Engineering*, 327(3), 120352. <https://doi.org/10.1016/j.oceaneng.2025.120352>
- Türkistanlı, T. T. (2024). Advanced learning methods in maritime education and training: A bibliometric analysis on the digitalization of education and modern trends. *Computer Applications in Engineering Education*, 32(1), e22690. <https://doi.org/10.1002/cae.22690>
- Tusher, H. M., Munim, Z. H., & Nazir, S. (2024). An evaluation of maritime simulators from technical, instructional, and organizational perspectives: a hybrid multi-criteria decision-making approach. *WMU Journal of Maritime Affairs*, 23(2), 165-194. <https://doi.org/10.1007/s13437-023-00318-1>
- Veltsin, N., Chountalas, P. T., Koutsouki, E., Karvounidi, M. D., & Foustieris, A. E. (2025). Modeling human critical success factors for maritime safety: A DEMATEL approach. *Safety Science*, 189(8), 106886. <https://doi.org/10.1016/j.ssci.2025.106886>
- Vlachopoulos, D., & Makri, A. (2024). A systematic literature review on authentic assessment in higher education: Best practices for the development of 21st century skills, and policy considerations. *Studies in Educational Evaluation*, 83(11), 101425. <https://doi.org/10.1016/j.stueduc.2024.101425>
- Yi, S., Jung, M., & Lee, S. (2025). Adapting to change: International maritime education and training for future seafarers: Focusing on the comprehensive review of the STCW convention and code of the 10th session of the IMO HTW. *Journal of International Maritime Safety, Environmental Affairs, and Shipping*, 9(2), 2464486. <https://doi.org/10.1080/25725084.2025.2464486>
- Yin, J., Khan, R. U., Afzaal, M., Almalki, H. M., Khasawneh, M. A. S., & Sulaie, S. A. (2025). Quantitative risk assessment of speech acts and lexical factors in maritime communication failures and accidents. *Safety Science*, 191(1), 106968. <https://doi.org/10.1016/j.ssci.2025.106968>