

The Vocabulary Profile in Maritime English Textbooks: A Comprehensive Content Analysis

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Abstract

This study investigated the vocabulary profile of the Maritime English (ME) textbook *Effective Communication at Sea: Mastering SMCP for Maritime Safety and Efficiency* (Batu, 2024). Employing a mixed-methods corpus content analysis, a 35,000-token corpus was processed through AntConc to determine lexical frequency across K1, K2, and K3 (off-list/technical) levels, alongside a qualitative semantic audit of polysemic terms and SMCP alignment. Results reveal a distinctive lexical distribution of 72.5% K1, 8.0% K2, and 19.5% K3 tokens, indicating a high technical density optimized for vocational training. Grammatical analysis shows a heavy dominance of nouns (60%) and verbs (30%), reflecting the action-oriented nature of maritime commands. The study confirmed the presence of critical polysemic shifts in high-frequency words (e.g., *bridge*, *draft*, *head*), where meanings deviate drastically from general English. Finally, qualitative evaluation confirms that the textbook achieves high functional integration of IMO-mandated Standard Marine Communication Phrases (SMCP) across both internal and external communication categories. These findings establish a data-driven "70-10-20" vocabulary profile model for the design and audit of vocational maritime instructional materials.

1. Introduction

The global shipping industry is a complex ecosystem that relies fundamentally on English as the operational and communication *lingua franca* among seafarers of diverse nationalities. The use of English as the medium of interaction onboard ships is not just a matter of convenience, but of safety, formalized under the STCW (Standards of Training,

Certification and Watchkeeping for Seafarers) Convention by the International Maritime Organization (IMO). This regulation mandates that all seafarers, regardless of their rank, possess adequate English language proficiency.

However, maritime accident investigation reports indicate a strong causal link between communication failures and human error. Studies show that up to 80% of incidents at sea can be attributed to human factors, with *miscommunication* topping the list of contributing causes. This miscommunication often stems from insufficient vocabulary mastery, particularly when technical maritime terms are misinterpreted using their meanings in General English (e.g., '*course*' meaning 'navigational direction' instead of 'academic path'). In response to this challenge, the IMO introduced the Standard Marine Communication Phrases (SMCP) a codified set of standardized phrases and sentences designed to ensure clear, concise, and unambiguous communication, especially under stress or emergency conditions.

Textbooks serve as the primary representation of linguistic input for learners. Therefore, the quality and relevance of the vocabulary presented must be rigorously evaluated to ensure the material is aligned with international competency demands (IMO/STCW) and real-world work practices (Widdowson, 1978).

Vocabulary profile analysis is a crucial methodological tool in the context of English for Specific Purposes (ESP). By mapping the frequency and type of words (Nation, 2001), researchers can assess whether the textbook provides a sufficient *General Service List* (GSL) foundation while simultaneously enriching the necessary technical vocabulary. If the textbook fails to achieve this balance, learners will lack both the ability for basic social communication (K1) and the comprehension of specific operational instructions (K3/SMCP). This research aims to provide an in-depth empirical evaluation of the vocabulary profile of an ME textbook, thereby confirming its lexical relevance.

Based on the background above, this study has the following objectives:

1. To identify the type and relative frequency of the vocabulary profiles used in the Maritime English textbook (technical, SMCP, and general).
2. To analyze the lexical, semantic, and grammatical characteristics, including the identification of polysemic words, within the ME textbook's vocabulary.
3. To evaluate the degree of adequacy and integration of the Standard Marine Communication Phrases (SMCP) and other technical maritime vocabulary within the analyzed textbook, referencing IMO standards.
4. To formulate the pedagogical implications of these findings for the teaching of Maritime English in Indonesian vocational schools.

The Vocabulary Profile refers to the division of words within a corpus into layers based on usage frequency. According to Nation (2001), the common divisions include: K1 (high-frequency words, GSL), K2 (mid-frequency words, AWL), and K3 (low-frequency/technical words). In the context of ESP, the main focus is on the percentage of K3, which should ideally be higher than in general materials to indicate a specific focus (Xie, 2010; Yu & Renandya, 2021). Such an evaluation is vital for vocational institutions, as

highlighted in the study by Wiranty et al. (2024) concerning the word knowledge level of vocational high school students.

ME vocabulary is a subset of ESP. Lexically, ME is characterized by:

- a) **Strict Technical Terminology:** Words referring to specific parts of the ship, navigation equipment, and specific operations (e.g., *bulkhead, azimuth, bollard*).
- b) **Functional Polysemic Words:** General English words that take on a special and critical meaning at sea. For example, "clear" at sea often means "no navigational obstruction," not just "clean" in general.
- c) **Focus on Nouns and Verbs:** Since maritime communication is command-oriented and involves rapid identification, the vocabulary tends to be dominated by nouns (objects) and verbs (actions), consistent with the taxonomy of notional syllabi (Wilkins, 1976).

SMCP is not just a vocabulary list; it is a structured communication system mandated by the IMO. Its purpose is to replace potentially ambiguous natural language with standardized, simplified language to maximize clarity. SMCP is divided into two sections: Part A for external communication (Ship-to-Ship, Ship-to-Shore) and Part B for internal communication (on-board). The phrases are built upon a minimal set of grammar and vocabulary (IMO, 2001). The adequate integration of SMCP into instructional materials is a direct measure of a textbook's compliance with safety standards.

Previous studies analyzing ESP textbook vocabulary have often focused on high-frequency word lists. For example, Smith (2018) noted that a low percentage of GSL words could hinder learners' foundational understanding. However, few studies have combined quantitative corpus analysis (K1, K2, K3 frequency) with qualitative analysis of semantic shifts (polysemy) and rigorous evaluation of SMCP integration. This research provides a more holistic assessment, addressing the research gap by combining all three analytical aspects to provide a comprehensive evaluation of the textbook's lexical content.

1.1 The Gap in Lexical Input Theory (Frequency vs. Criticality)

Current ESP textbook research often relies on the "Frequency Principle"—the idea that the most frequent words (GSL) are the most important. However, in high-stakes maritime environments, a rare word (K3) might be more critical for survival than a common one (K1).

- a) **The Gap:** There is a lack of empirical data determining the optimal ratio between general linguistic foundations (K1/K2) and specialized safety mandates (K3) in vocational materials.
- b) **Study Contribution:** This research establishes a benchmark ratio (72.5% to 19.5%), proving that "operational criticality" can and should dictate the lexical profile of an ESP textbook.

1.2 The Gap in Semantic Shift Research (Polysemy)

While general linguistics studies polysemy, ESP research often neglects how prior general knowledge interferes with technical acquisition.

- a) The Gap: Most studies treat technical vocabulary as "new" words to be learned. There is a significant gap in understanding how textbooks manage "Semantic Interference"—where a student knows the word "*Bridge*" or "*Draft*" but must "unlearn" the general meaning to operate safely at sea.
- b) Study Contribution: By mapping these semantic shifts, this study identifies polysemy as a safety risk factor and evaluates whether textbooks provide the "contextual anchors" necessary to prevent cognitive errors.

3. The Gap in SMCP Alignment (Regulatory vs. Pedagogical)

There is a disconnect between regulatory compliance (IMO standards) and applied linguistics (textbook design).

- a) The Gap: Previous research often looks at "Maritime English" as a broad category, failing to measure how strictly a textbook adheres to the restricted grammar and standardized syntax of the SMCP. We lack a model for evaluating if SMCP is treated as a "list to memorize" or a "system to use."
- b) Study Contribution: This research provides a qualitative-quantitative audit of SMCP integration, demonstrating how standardized phrases can be woven into a communicative curriculum without losing their regulatory precision.

2. Methods

This study utilizes a mixed-methods approach, primarily a qualitative design employing a corpus content analysis method. Content analysis was selected as it allows the researcher to make replicable and valid inferences from the data by systematically processing textual content (Weber, 1990). The data was first processed quantitatively for word frequency, then interpreted qualitatively to determine semantic function, grammatical role, and compliance with SMCP standards.

The primary data source (corpus) is the Maritime English textbook, *Effective Communication at Sea: Mastering SMCP for Maritime Safety and Efficiency* (Batu, 2024). The textbook was selected based on its explicit focus on SMCP mastery and its practical use in maritime training institutions. The corpus for analysis included all main text body, dialogues, instructional prompts, and explicit vocabulary lists found within the book. The total size of the corpus was approximately 35,000 running words (tokens).

2.1 Computational Tools and Corpus Processing

The corpus was processed using AntConc (Version 4.2.0; Anthony, 2022), a freeware corpus analysis toolkit for concordancing and text analysis. AntConc was utilized for generating the word frequency lists, identifying keywords, and calculating the total number of tokens (running words) and types (unique words) within the 35,000-word dataset.

For the lexical profiling (K1–K3 categorization), the text was analyzed using the VP-BNC20 (Vocabulary Profiler) tool via Lextutor (Cobb, n.d.). This software compared the textbook corpus against the British National Corpus (BNC) and Corpus of Contemporary American English (COCA) word lists to determine the percentage of high-frequency (K1), mid-frequency (K2), and specialized/off-list (K3/SMCP) vocabulary.

2.2 Data Preparation Protocol

To ensure the software provided accurate results, the following normalization steps were performed:

- a) UTF-8 Conversion: The raw text was converted to UTF-8 format to ensure compatibility with AntConc's tokenization engine.
- b) Lemmatization: A lemmatization list was applied to group inflected forms (e.g., *vessel*, *vessels*) as a single lemma, ensuring the frequency counts reflected semantic presence rather than grammatical variation.
- c) Stop-Word Management: While common function words were kept for the K1 count, a customized stop-list was used during the qualitative K3 analysis to filter out non-technical proper nouns (e.g., names of ports or specific characters in dialogues).

2.3 Data collection involved the following critical steps:

- a) Text Transcription: The entire textbook content was accurately transcribed into a single, clean *plain text* file.
- b) Normalization: Non-linguistic elements (punctuation, numbers, proper nouns, and non-content words like chapter headers) were removed to ensure an accurate word count.
- c) Tokenization: The text was tokenized, and word *types* (unique words) were calculated.

2.4 Data analysis was executed in three distinct phases:

2.4.1 Phase 1: Vocabulary Profile Analysis (Quantitative)

Corpus software was utilized to profile the entire token count against established word lists:

- a) K1 (GSL): Words covered by the first 2,000 most frequent English words (West, 1953).
- b) K2 (AWL/Sub-Technical): Words covered by the Academic Word List or commonly found in sub-technical texts.
- c) K3 (Technical/Off-List): Words not covered by K1 or K2, which represent the specialized maritime vocabulary and SMCP content.

2.4.2 Phase 2: Semantic and Grammatical Analysis (Qualitative)

- a) The top 100 most frequent words from the K3 list were manually examined.
- b) A focused investigation was conducted to identify and catalogue polysemic words (K1 words used in a K3-specific meaning).
- c) The K3 word types were categorized by part of speech (noun, verb, adjective, adverb) to establish the grammatical tendency of the specialized vocabulary.

2.4.3 Phase 3: SMCP Compliance and Integration Evaluation (Qualitative)

- a) All explicit and embedded SMCP phrases were extracted and documented.

- b) The extracted SMCP were verified against the official IMO SMCP document to check for accuracy and coverage across all required operational categories (Part A and Part B).
- c) The method of presentation (isolated lists vs. contextualized dialogues/tasks) was assessed to evaluate functional integration.

3. Result

3.1 Composition of the Vocabulary Profile

The quantitative analysis of the corpus yielded the following distribution of vocabulary tokens:

Table.1 Vocabulary Tokens

Vocabulary Category	Number of Tokens	Percentage Coverage	Functional Role
K1 (General Service List/GSL)	25,400	72.5%	Foundation, grammatical function, social interaction
K2 (Academic/Sub-Technical)	2,800	8.0%	Explanatory discourse, academic writing
K3 (Technical/SMCP/Off-List)	6,800	19.5%	Operational commands, technical identification, safety
Total	35,000	100%	

The 72.5% K1 coverage is sufficient for learners to build foundational English skills, allowing them to handle general non-technical communication (e.g., small talk, basic reporting). Crucially, the 19.5% K3 rate confirms the textbook's strong vocational focus. Compared to typical EFL or EAP materials, where K3 rarely exceeds 10-15%, this elevated percentage validates the textbook as specialized ME material dedicated to specific operational terminology. The most frequent K3 terms were overwhelmingly technical nouns and verbs: *vessel, bridge, starboard, port, rudder, engine, anchor, radar, distress*.

3.2 Semantic Analysis and Polysemic Vocabulary

The analysis of semantics highlighted the complexity introduced by polysemic words—K1 words repurposed with critical technical meanings. The effective treatment of these terms is essential for safety.

Table.2 Semantic Analysis and Polysemic Vocabulary

Word	General Meaning (GSL/K1)	Technical Maritime Meaning (K3)	Potential Safety Risk
Bridge	A structure spanning a river/gap	The Ship's Command Centre/Navigating Platform	Misunderstanding location of senior officers/control
Draft	A sketch or rough outline (text/drawing)	Depth of the ship's hull submerged in water	Miscalculation of water depth/grounding risk
Course	A path or academic subject	The specific direction or <i>bearing</i> the ship is headed	Navigational error leading to collision
Head	Part of the body	A toilet on board a ship (or the bow/front)	Confusing parts of the ship structure or location

The textbook successfully addressed this risk by embedding these polysemic words within context-specific dialogues and tasks, forcing learners to recognize the semantic shift. This instructional strategy is key to minimizing critical misinterpretation at sea.

3.3 Grammatical Profile of Technical Vocabulary

The grammatical analysis of the K3 word types revealed a distinct distribution, which is highly consistent with the functional needs of ME:

Table.3 grammatical analysis of the K3 word

Part of Speech	Percentage of K3 Word Types	Functional Purpose
Nouns	60%	Naming equipment, ship parts, status (e.g., <i>propeller, ballast, clear water</i>)
Verbs	30%	Commands, actions, procedures (e.g., <i>maneuver, heave up, disembark, drop anchor</i>)
Adjectives/Adverbs	10%	Modifiers of state or action (e.g., <i>gale-force, immediately, cautiously</i>)

The heavy dominance of nouns and verbs confirms that the textbook's lexical focus is on action and object identification, which are the pillars of operational communication (Wilkins, 1976). This structure ensures that learners quickly acquire the core vocabulary needed to understand commands and give concise reports, prioritizing functional utility over descriptive language.

3.4 Evaluation of SMCP Compliance and Integration

The qualitative evaluation confirmed that the textbook provides a comprehensive and functionally integrated coverage of the SMCP.

- a) **Integration and Contextualization:** SMCP phrases were found to be integrated into thematic units (e.g., "Distress and Safety" unit uses phrases like "*I am not under command*" or "*I require medical assistance*"). This method is superior to simple list presentation, promoting communicative proficiency.
- b) **Compliance with IMO Categories:** The textbook covers all major official SMCP categories (Part A and Part B), including external communication (distress, urgency, routine), and internal communication (engine room, cargo operations, anchoring).
- c) **Adequacy:** The coverage is highly adequate, suggesting that students who master the content would be compliant with the STCW requirements for communication competency, significantly reducing the risk of language-related accidents

4. Discussion

Vocabulary profile analysis is a crucial methodological tool in the context of English for Specific Purposes (ESP). By mapping the frequency and type of words (Nation, 2001), researchers can assess whether the textbook provides a sufficient *General Service List* (GSL) foundation while simultaneously enriching the necessary technical vocabulary. If the textbook fails to achieve this balance, learners will lack both the ability for basic social communication (K1) and the comprehension of specific operational instructions (K3/SMCP). This research aims to provide an in-depth empirical evaluation of the vocabulary profile of an ME textbook, thereby confirming its lexical relevance.

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Adequacy: The coverage is highly adequate, suggesting that students who master the content would be compliant with the STCW requirements for communication competency, significantly reducing the risk of language-related accidents.

5. Conclusion

This research concludes that the Maritime English textbook, *Effective Communication at Sea: Mastering SMCP for Maritime Safety and Efficiency*, presents a vocabulary profile that is relevant, specialized, and functionally balanced, thereby effectively supporting the learning objectives of Maritime English.

1. Vocabulary Profile: The corpus analysis demonstrated an optimal balance: sufficient General Service List (K1) words to establish a functional linguistic base (72.5%) and a robust percentage of specific technical vocabulary (K3: 19.5%) to fulfill vocational needs.
2. Lexical and Grammatical Features: The textbook effectively manages the challenge of polysemy by contextualizing critical maritime terms. The grammatical structure of the technical vocabulary, dominated by nouns and verbs, aligns perfectly with the command-and-report nature of communication at sea.
3. SMCP Adequacy: The integration of the Standard Marine Communication Phrases (SMCP) is both comprehensive and accurate, ensuring that the material is fully compliant with IMO standards for safe operational communication.

6. Pedagogical Implications and Recommendations

The *findings* of this research offer crucial implications for ME instructors and curriculum developers in vocational settings:

1. For Instructors: Teachers must explicitly teach the concept of polysemy, dedicating instructional time to contrasting the general and technical meanings of high-risk terms (e.g., *bridge*, *draft*, *head*). Emphasis should be placed on pronunciation and prosody of SMCP to ensure clarity under pressure.
2. For Textbook Developers: Future ME instructional materials should maintain this balance between GSL (K1) and specialized vocabulary (K3). Developers should continue to integrate SMCP through high-fidelity simulations, role-plays, and authentic communicative tasks to facilitate practical mastery.
3. For Training Institutions: The curriculum must ensure that vocabulary mastery is assessed not only through passive written tests but also through active, operational performance evaluations (e.g., using simulators to test SMCP command execution), ensuring effective transfer of linguistic knowledge to real-world maritime practice.

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