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# A Notion-Based Visual Marine Engineering Dictionary for Maritime English Learning

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***Abstract:*** *Effective communication is fundamental to ensuring safety and operational efficiency in maritime environments. However, maritime cadets frequently encounter difficulties in mastering the technical Maritime English vocabulary required for engine room operations. This study aimed to develop a Notion-based visual marine engineering dictionary integrating images of engine room components, audio pronunciations, and contextual phrases aligned with Standard Marine Communication Phrases (SMCP) to support Maritime English learning. The research adopted a Research and Development (R&D) approach using the ADDIE instructional design model, consisting of the stages of Analysis, Design, Development, Implementation, and Evaluation. The developed product was implemented with 38 marine engineering cadets at Politeknik Maritim Negeri Indonesia. Feasibility evaluation results showed mean scores ranging from 4.00 to 4.50, which were categorized as Good to Very Good. In addition, 85.0% of participants reported that the visual dictionary helped improve their understanding of marine engineering terminology. These findings indicate that the Notion-based visual dictionary is a feasible learning medium with positive potential to support cadets' acquisition of technical Maritime English vocabulary in maritime vocational education. Nevertheless, the study was limited to a relatively small sample from a single maritime institution, indicating the need for broader implementation and further evaluation studies.*

***Keywords:*** *Maritime English, Multimedia Learning, Notion Platform, SMCP, Visual Dictionary*

**Abstrak:** Komunikasi yang efektif sangat penting untuk menjamin keselamatan dan efisiensi operasional di lingkungan maritim. Namun, taruna maritim masih mengalami kesulitan dalam menguasai kosakata teknis Maritime English, khususnya dalam operasi ruang mesin. Penelitian ini bertujuan untuk mengembangkan kamus visual teknik permesinan kapal berbasis Notion yang mengintegrasikan gambar komponen ruang mesin, audio pelafalan teknis, dan frasa kontekstual berbasis Standard Marine Communication Phrases (SMCP) untuk mendukung pembelajaran Maritime English. Penelitian ini menggunakan pendekatan Research and Development (R&D) dengan model ADDIE yang meliputi tahap Analysis, Design, Development, Implementation, dan Evaluation. Produk yang dikembangkan diimplementasikan kepada 38 taruna teknik permesinan kapal di Politeknik Maritim Negeri Indonesia. Hasil evaluasi kelayakan menunjukkan nilai rata-rata 4,00–4,50 yang termasuk dalam kategori baik hingga sangat baik. Selain itu, sebanyak 85.0% peserta menyatakan bahwa kamus visual membantu meningkatkan pemahaman mereka terhadap terminologi teknik permesinan kapal. Temuan ini menunjukkan bahwa kamus visual berbasis Notion merupakan media pembelajaran yang layak dan berpotensi mendukung penguasaan kosakata teknis Maritime English pada pendidikan vokasi maritim. Namun demikian, penelitian ini masih terbatas pada jumlah peserta yang relatif kecil dan konteks satu institusi maritim sehingga diperlukan implementasi dan evaluasi lanjutan dalam cakupan yang lebih luas.

**Kata Kunci:** Maritime English, Pembelajaran Multimedia, Platform Notion, SMCP, Kamus Visual

## INTRODUCTION

Communication is a critical determinant of safety and operational efficiency in maritime environments. Ships typically operate with multinational crews, making English the primary language for onboard communication(L. I. Sari & Sari, 2020; Sartini et al., 2025). Ineffective communication may lead to misinterpretation of operational instructions, thereby increasing the risk of accidents and operational errors. Research conducted by Gabedava and Hu demonstrated that cultural and linguistic differences among crew members contribute significantly to communication breakdowns and maritime accidents(Gabedava & Hu, 2025).

To address this challenge, the International Maritime Organization (IMO) introduced the Standard Marine Communication Phrases (SMCP) as a standardized linguistic framework designed to reduce ambiguity in maritime communication. However, effective use of SMCP requires not only general English proficiency but also mastery of technical maritime terminology, particularly in engine room operations where communication accuracy is essential (International Maritime Organization, 2001).

In maritime engineering education, cadets are expected to acquire a substantial range of technical vocabulary related to machinery components, operational procedures, and engineering tools. Nevertheless, many existing Maritime English learning resources remain predominantly text-based and provide limited visual representation of technical objects and operational contexts. As a result, cadets may experience difficulty connecting unfamiliar English terminology with actual visual engine room equipment, despite such associations being fundamental in vocational maritime training(Türkistanli, 2024).

This condition highlights the need for learning media capable of presenting technical vocabulary in more contextual and visually meaningful ways. The effectiveness of visual learning media in supporting vocabulary acquisition and conceptual understanding has been widely discussed in educational research. Multimedia Learning Theory posits that learners achieve deeper understanding when verbal and visual information are integrated through visual and auditory processing channels. By combining images, audio pronunciations, and textual explanations, multimedia-based learning resources can facilitate cadets' comprehension and retention of technical Maritime English vocabulary more effectively (Mayer, 2009).

Moreover, Dual Coding Theory proposes that the simultaneous activation of visual and verbal representations improves memory encoding and conceptual understanding. In technical education domains such as marine engineering, visual representations serve as cognitive anchors that enable learners to establish meaningful connections between technical terminology and the real-world objects they denote(Liu, 2023).

According to Dual Coding Theory, information is processed more effectively when verbal and visual representations are presented simultaneously, as learners are able to store and retrieve information through two interconnected cognitive channels. This principle is particularly relevant in Maritime English learning, where engine cadets are required to understand technical terminology associated with engine room components, machinery systems, and operational procedures. Technical vocabulary in marine engineering is often abstract and difficult to comprehend through text-based explanations alone. Therefore, the integration of images, audio pronunciations, and contextual phrases in the visual dictionary provides multimodal input that facilitates vocabulary retention and conceptual understanding(Liu, 2023). Visual representations function as cognitive

anchors that help learners connect unfamiliar English terminology with real engine room objects and operational contexts.

In addition, competency-based maritime education emphasizes the integration of technical knowledge, communication skills, and industry-relevant competencies to prepare cadets for professional maritime environments (Riyanto et al., 2025; Sartini et al., 2025). Within this framework, the development of a visual dictionary supports engine cadets in learning Maritime English that is directly connected to their technical domain and workplace communication needs, particularly in relation to Standard Marine Communication Phrases (SMCP). As a result, the learning media not only enhances vocabulary acquisition but also contribute to learners' communicative readiness and professional competence in maritime operations.

The study underscores that a competency-based framework effectively aligns maritime engineering education with the evolving demands of the industry through the integration of relevant skills, advanced technologies, and practical assessment methods(Riyanto et al., 2025). In this regard, the use of a visual dictionary supports engine cadets in developing Maritime English closely aligned with their technical domain, thereby enhancing both their linguistic competence and their readiness to operate in real-world maritime contexts.

In response to these identified needs, this study developed a Notion-based visual marine engineering dictionary integrating images, audio pronunciations, and contextual phrases aligned with SMCP standards. The platform was selected for its flexible database structure that enables organized and interactive multimedia learning content to support Maritime English acquisition among marine engineering cadets. Notion is a cloud-based digital workspace that integrates note-taking, database management, and collaboration features into a unified interface. Its modular, database-driven architecture enables users to organize, interlink, and manage content in flexible, dynamic formats, supporting both individual and collaborative knowledge construction(Notion Labs Inc, 2025).

In educational contexts, Notion has been recognized as a versatile tool for structuring digital learning environments and facilitating learner-centered content organization. Its adaptability allows educators to design context-specific learning materials that are particularly relevant for specialized domains such as ESP, where structured vocabulary management and contextualized learning are essential(Permana & Sutriyono, 2025).

Unlike conventional Maritime English learning resources that are predominantly text-based, this study introduces a Notion-based visual marine engineering dictionary integrating images, audio pronunciations, and SMCP-related contextual phrases within an interactive multimedia platform. The novelty of this study lies in the utilization of Notion as a flexible database-driven learning environment specifically designed to support technical Maritime English acquisition for marine engineering cadets.

The dictionary was developed by utilizing Notion's database management features to present visual marine engineering terminology systematically. Each lexical entry includes: (a) an image of the engine room components and hand tools, (b) a concise definition, (c) a function, (d) audio pronunciation of the technical term, (e) a contextual phrase related to SMCP maritime communication, and (f) a practical side to confirm the correct pronunciation. Notion's functionalities, including image embedding, audio integration, and hyperlinks, support a learner-centered approach, enabling cadets to engage with technical vocabulary through multiple modalities. The database structure facilitates the systematic organization of entries and ensures efficient access through filtering and linked pages. This study also constitutes part of the broader

Polimarlish.id development roadmap, a game-based Maritime English learning platform previously developed by the researcher (D. W. Sari et al., 2025).

Based on the foregoing background, the present study was guided by the following research objectives: (1) to develop a Notion-based visual marine engineering dictionary integrating images, audio pronunciations, and contextual SMCP-related phrases to support Maritime English learning for marine engineering cadets; and (2) to evaluate the feasibility and effectiveness of the developed visual dictionary in terms of content suitability, media usability, and students' vocabulary comprehension.

## METHOD

This study employed a Research and Development (R&D) approach following the framework proposed by Borg et al. (Borg, W. R. Gall, M. D., Gall, 2003; Setuju et al., 2020), using the ADDIE instructional design model, which encompasses the stages of Analysis, Design, Development, Implementation, and Evaluation. This methodological framework was selected for its systematic and iterative nature, which ensures that each developmental stage is informed by empirical data and theoretical principles. The ADDIE model has been widely validated across diverse educational settings, including online and blended learning environments, demonstrating its adaptability and effectiveness in producing learner-centred instructional materials(Hew et al., 2016; Thi, 2021).

The participants comprised 38 maritime engineering cadets (engine cadets) enrolled at Politeknik Maritim Negeri Indonesia, consisting of 27 cadets from the D4 Marine Engineering Technology program and 11 from the D3 Marine Engineering program. These cadets were concurrently enrolled in Maritime English and Applied English courses, making them an appropriate and representative sample for this study.

The primary outcome of this study is the development of a visual marine engineering dictionary utilizing the Notion platform, namely VocabLab Visual Dictionary. Notion functions as a cloud-based digital workspace that integrates note-taking, database management, and collaborative features within a single interface. Its modular, database-driven architecture allows for the flexible organization, interconnection, and management of content, thereby facilitating both individual and collaborative processes of knowledge construction. In educational contexts, Notion has been recognized as a versatile tool for structuring digital learning environments and facilitating learner-centered content organization. Its adaptability allows educators to design context-specific learning materials that are particularly relevant for specialized domains such as ESP, where structured vocabulary management and contextualized learning are essential (Permana & Sutriyono, 2025; Putra, 2021).

The dictionary was developed by utilizing Notion's database management features to present visual marine engineering terminology systematically. Each lexical entry includes: (a) an image of the engine room machinery components and hand tools, (b) a concise definition, (c) function of each component, (d) audio pronunciation of the technical term, (e) a contextual phrase related to SMCP maritime communication, and (e) an additional recorded-audio-hyperlink to confirm the correct pronunciation. Notion's functionalities, including image embedding, audio integration, and hyperlinks, support a learner-centered approach that enables cadets to engage with technical vocabulary through multiple modalities.

Data were collected using four instruments: structured observation, semi-structured interviews, questionnaires, and documentation. Quantitative data obtained from questionnaires were

analysed using a five-point Likert scale with the scoring system presented in Table 1 (South et al., 2022).

**Table 1. Likert Scale Scoring System**

| Score | Category | Mean Score Range | Category |
|---|---|---|---|
| 5 | Strongly Agree | 4.21 – 5.00 | Very Good |
| 4 | Agree | 3.41 – 4.20 | Good |
| 3 | Neutral | 2.61 – 3.40 | Fair |
| 2 | Disagree | 1.81 – 2.60 | Poor |
| 1 | Strongly Disagree | 1.00 – 1.80 | Very Poor |

The mean score for each aspect was calculated using the formula: $\bar{X} = \Sigma x / N$, and subsequently interpreted according to the five-category scale presented in Table 1.

Qualitative data obtained from observations and interviews were analyzed through descriptive analysis, whereby recurring themes and patterns in cadets' responses were identified and interpreted in relation to the research objectives.

## RESULT AND DISCUSSION

The development of the visual marine engineering dictionary followed the five stages of the ADDIE model (Sahaat et al., 2020). The results of each stage are presented sequentially below.

### Analysis Stage

The analysis stage aimed to identify the learning needs of maritime cadets and the challenges they encounter in acquiring maritime technical vocabulary. Classroom observations during Maritime English and Applied English sessions revealed that cadets frequently struggled to identify and correctly name marine engineering tools and components in English. Although cadets possessed practical familiarity with engine room equipment, they were unable to consistently recall or accurately pronounce the corresponding English terminology.

Furthermore, a review of existing learning resources indicated that these materials were predominantly text-based and lacked visual representations and pronunciation support. These findings established the need for a learning medium that integrates visual representation and pronunciation support to enhance cadets' comprehension of marine engineering vocabulary.

### Design Stage

Drawing on the evidence of the needs analysis, a prototype of the visual marine engineering dictionary was designed using the Notion platform. The dictionary was organized into categories directly relevant to engine room learning contexts, including engine tools and main engine components. Each entry was designed to include: a visual image of the relevant equipment or component, a concise definition, audio pronunciation, and a contextual phrase drawn from maritime communication scenarios. The user interface was designed using Notion's database and listing view features, enabling intuitive navigation and access to content.

### Development Stage

According to the needs analysis, a prototype of the visual marine engineering dictionary was designed using the Notion platform. The dictionary was organized into categories directly relevant

to engine room learning contexts, including engine tools and main engine components. Each entry was designed to incorporate: a visual image of the relevant equipment or component, a concise definition, pronunciation audio, and a contextual phrase drawn from maritime communication scenarios. The user interface was designed using Notion's database and listing view features, enabling intuitive navigation and content access.

**Implementation Stage**

The visual dictionary was implemented during Maritime English learning sessions involving all 38 maritime engineering cadets. Cadets were introduced to the dictionary and provided with guidance on navigating the platform. They were subsequently asked to explore the lexical entries, engage with the pronunciation audio, and identify the functions of selected engine room components. Observations throughout the implementation phase indicated high levels of student engagement with the learning media.

**Evaluation Stage**

The evaluation stage involved the systematic collection of feedback from both cadets and maritime engineering instructors to assess the feasibility of the developed learning media. Questionnaire results indicated that the majority of cadets considered the visual dictionary effective in supporting their comprehension of marine engineering terminology. Expert validation feedback from maritime engineering instructors yielded constructive recommendations, including revision of the visual representation of a turbocharger component to ensure technical precision.

**Feasibility Evaluation Results**

The feasibility of the Notion-based visual marine engineering dictionary was assessed through a questionnaire administered to all 38 student participants. The questionnaire employed a five-point Likert scale to measure perceptions across four dimensions: accessibility, usability, visual clarity, and overall usefulness. The results are summarized in Table 2.

**Table 2 Feasibility Evaluation Results**

| Variable | Mean Score | Percentage | Category |
|---|---|---|---|
| Ease of Access | 4.17 | 83.4% | Good |
| Navigation and Usability | 4.00 | 80.0% | Good |
| Visual Relevance | 4.50 | 90.0% | Very Good |
| Overall Usefulness | 4.25 | 85.0% | Very Good |

The ease-of-access aspect obtained a mean score of 4.17. It shows that cadets perceived the developed dictionary as highly accessible across multiple devices, including computers and mobile phones. This result suggests that the platform successfully supported flexible and practice-oriented learning, which is essential in vocational maritime education. The high accessibility rating also reflects the effectiveness of the platform design in facilitating autonomous learning and continuous exposure to Maritime English vocabulary beyond classroom settings. In line with Ahmad's and Rahmawati's perspective on mobile learning, accessible digital platforms can foster more personalized and self-directed learning experiences. Therefore, the accessibility of the Notion-based platform contributes not only to its technical feasibility but also to its pedagogical potential in supporting independent Maritime English learning (Abduljawad & Ahmad, 2023; Rahmawati et al., 2026).

In vocational education settings, flexible access to learning resources is particularly important because learners often require repeated exposure to technical terminology beyond formal classroom sessions. The present findings indicate that the platform's accessibility may facilitate continuous learning practices and increase cadets' opportunities to interact with Maritime English vocabulary in self-directed contexts.

Although the navigation and usability aspect achieved a mean score of 4.00, cadets generally perceived the organizational structure of the visual dictionary as clear and manageable. The dictionary systematically integrated visual representations, concise definitions, audio pronunciations, contextual SMCP-related phrases, and pronunciation practice features, enabling cadets to interact actively with technical terminology. Nevertheless, interview findings revealed that, even though the platform was considered functional and accessible, several participants expected more visually engaging and interactive elements to sustain motivation during learning activities. This distinction between functional usability and affective engagement indicates that the platform has met fundamental usability standards but still requires improvements in visual attractiveness and interactivity. The findings align with multimedia learning principles emphasizing that well-designed visual and interactive elements can enhance learner motivation and cognitive engagement (Maier, 2025).

In technology-enhanced learning environments, interactive elements and attractive visual designs are considered important factors in maintaining learner motivation and promoting deeper cognitive involvement. Therefore, while the developed visual dictionary has fulfilled its fundamental instructional functions, future development should incorporate more dynamic and interactive features to optimize learners' affective engagement.

The findings regarding visual relevance obtained the highest mean score (4.50). The result supports the assumptions of Multimedia Learning Theory and Dual Coding Theory, which argue that learning becomes more effective when verbal and visual information are processed simultaneously (Mayer, 2009). In the context of marine engineering, visual representations function as cognitive anchors that help cadets associate unfamiliar English terminology with actual engine room components and operational contexts. This finding is also consistent with previous studies indicating that multimedia glossaries and visual dictionaries are more effective than text-only materials in supporting specialized vocabulary retention (González Ramírez, 2015; Wang & Tahir, 2020). These findings further support the assumptions of Multimedia Learning Theory and Dual Coding Theory, which emphasize that verbal and visual information processed simultaneously can facilitate deeper learning and long-term vocabulary retention (Mayer, 2009; Paivio, 1991).

The high score of the visual aspect indicates that the engine cadets particularly valued the combination of images and audio features, as reflected in the following responses:

*"The main advantage of VOCABLAB lies in its presentation, which combines text with clear and engaging images. This is highly beneficial, as it allows us to understand the material not only through text but also with visual support." – Vignette SS*

*"The use of images in delivering the material makes the learning process easier." – Vignette NSP*

Furthermore, participants also recommended incorporating simple animations to improve conceptual understanding of complex engine processes:

*"Incorporating simple animations in the engine illustrations and providing language translation features would be beneficial, as they could help users better interpret and understand the content." – Vignette AJ*

This result indicates that static images alone may not sufficiently represent dynamic mechanical processes encountered in marine engineering operations. Animated visualizations may therefore support learners in constructing more accurate procedural and conceptual understanding by illustrating movement, operational sequences, and system interactions more clearly. Collectively, these findings suggest that future development of the visual dictionary should focus on improving both linguistic accessibility and visual interactivity through bilingual support and selective animated features to create a more inclusive and engaging Maritime English learning environment.

Participants' suggestions regarding the inclusion of animated visualizations also align with previous studies emphasizing the effectiveness of dynamic multimedia representations in explaining procedural and mechanical concepts. In technical and vocational education, animated learning materials have been found to improve learners' understanding of operational sequences and system interactions more effectively than static images alone(Guo et al., 2020). For marine engineering cadets, animations may support the development of more accurate mental models of engine room processes by visually illustrating movement, function, and operational mechanisms in real-world contexts.

Additionally, based on the overall usefulness evaluation, 85.0% of participants reported that the visual dictionary improved their understanding of marine engineering terminology. The usefulness aspect obtained a mean score of 4.25, categorized as good, indicating that cadets perceived the developed media as beneficial for supporting Maritime English vocabulary learning. This positive perception suggests that the integration of multimodal elements, including visual representations and audio pronunciation features, contributed to more effective vocabulary acquisition and comprehension. Among these features, audio pronunciation support emerged as an important component in facilitating learners' pronunciation awareness and familiarity with technical terminology. Similar findings were reported by Thi (Thi, 2021), who found that audiovisual learning media improved learners' pronunciation awareness and vocabulary retention more effectively than text-only instruction. Since pronunciation accuracy is operationally significant in maritime communication, the inclusion of audio features enabled cadets not only to recognize technical vocabulary more effectively but also to improve their phonological awareness alongside vocabulary retention.

This finding also aligns with the modality principle of Cognitive Theory of Multimedia Learning (CTML), which emphasizes the effectiveness of combining auditory and visual channels in enhancing comprehension and retention(Mayer, 2009). In this study, cadets reported that the integration of pronunciation audio with visual representations enabled them not only to recognize technical terminology more effectively but also to improve pronunciation accuracy in operational maritime contexts. Moreover, this study also identified several areas requiring further improvement. One recurring concern among cadets involved the exclusive use of English definitions, which some participants perceived as difficult to understand, particularly for learners with lower English proficiency. As one participant stated:

"*This visual dictionary should include key terms along with their translations, so that users who are not yet proficient can better understand the meaning of sentences written in Maritime English." – Vignette VS*

Moreover, this feedback suggests that the current dictionary, while effective in supporting vocabulary recognition and pronunciation, still requires additional linguistic scaffolding to accommodate varying proficiency levels. The inclusion of bilingual terminology may help bridge prior knowledge and new Maritime English vocabulary, thereby improving comprehension without

reducing target-language exposure. This interpretation is supported by research demonstrating that selective first-language mediation can facilitate technical vocabulary acquisition in ESP contexts(Demydenko, 2012).

The result also revealed that some cadets experienced difficulties understanding definitions presented exclusively in English. This result is consistent with previous research emphasizing the importance of linguistic scaffolding in ESP vocabulary instruction, particularly for learners with lower target-language proficiency (Demydenko, 2012). The inclusion of bilingual terminology may help learners connect prior knowledge in their first language with newly acquired Maritime English vocabulary, thereby reducing cognitive load during comprehension processes. In technical learning environments such as marine engineering, bilingual terminology can support function as an instructional bridge that facilitates both conceptual understanding and vocabulary acquisition without diminishing learners' exposure to the target language.

## CONCLUSION

This study developed a Notion-based visual marine engineering dictionary as an instructional medium to support the learning of Maritime English vocabulary in vocational maritime education. Following the systematic stages of the ADDIE instructional design model, the product integrates visual imagery, audio pronunciation, and contextual SMCP phrases to create a multimodal learning resource tailored to the needs of maritime engineering cadets. The feasibility evaluation, conducted with 38 maritime engineering cadets at Politeknik Maritim Negeri Indonesia, yielded mean scores ranging from 4.00 to 4.50, confirming that the product falls within the Good to Very Good category across all evaluated dimensions. Eighty-five percent of participants reported enhanced comprehension of marine engineering terminology attributable to the dictionary's multimodal design. Nevertheless, this study was limited to a relatively small sample from a single maritime institution. Therefore, further studies involving broader participants, bilingual features, animated visualizations, and longitudinal evaluation are recommended to further examine the effectiveness and long-term impact of the developed learning media on cadets' Maritime English competence.

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