

The Effect of Verbal Plus Picture and Verbal only Information on Immediate Retention of Maritime Vocabulary

Jeihn Novita Christanty Budiman*, Nindy Nource Ganap
Politeknik Pelayaran Sulawesi Utara, Minahasa Selatan, Indonesia
*jeihnnovita@gmail.com

Abstract

English proficiency is a crucial skill for maritime professionals, as effective communication plays a significant role in ensuring safety and operational efficiency. However, acquiring and retaining maritime-specific vocabulary remains a challenge for many cadets. This study investigates the effectiveness of verbal-plus-picture and verbal-only instructional methods in enhancing the immediate retention of maritime English vocabulary. Additionally, it examines whether gender and prior English course experience influence vocabulary retention outcomes. Employing an experimental post-test research design, this study involved 200 cadets from Politeknik Pelayaran Sulawesi Utara, who were randomly assigned into two groups. The experimental group received instruction through a combination of verbal and pictorial learning approaches, while the control group received verbal-only instruction. A post-test was administered immediately after the intervention to measure vocabulary retention. Independent samples t-tests were conducted to compare the mean scores between the two groups, and multiple linear regression analysis was applied to evaluate the impact of gender and prior English course experience on vocabulary retention. The results indicate that cadets who received verbal-plus-picture instruction demonstrated significantly higher vocabulary retention compared to those in the verbal-only group ($p\text{-Value} < 0.001$). The mean post-test score for the experimental group was 67.65, while the control group scored 56.45, confirming the effectiveness of multimodal learning in maritime English education. However, gender and prior English course experience were found to have no statistically significant impact on vocabulary retention ($p\text{-Value} = 0.500$ and $p\text{-Value} = 0.258$, respectively). These findings support the Dual Coding Theory (DCT), which posits that integrating verbal and visual stimuli enhances learning and recall. The study highlights the importance of incorporating multimodal instructional strategies into maritime English training programs to optimize vocabulary acquisition.

Keywords: Learning Method; Vocabulary Retention; Maritime Cadets; Maritime English; Multimodal Learning

Abstrak

Kemampuan berbahasa Inggris merupakan keterampilan penting bagi para profesional maritim, karena komunikasi yang efektif berperan signifikan dalam menjamin keselamatan dan efisiensi operasional. Namun, penguasaan dan retensi kosakata spesifik maritim masih menjadi tantangan bagi banyak taruna. Penelitian ini mengevaluasi efektivitas metode pembelajaran verbal-plus-gambar dan verbal-saja dalam meningkatkan retensi langsung kosakata bahasa Inggris maritim. Selain itu, penelitian ini juga menganalisis apakah faktor jenis kelamin dan pengalaman kursus bahasa Inggris sebelumnya mempengaruhi hasil retensi kosakata. Dengan menggunakan desain penelitian eksperimen post-test, penelitian ini melibatkan 200 taruna dari Politeknik Pelayaran Sulawesi Utara yang secara acak dibagi menjadi dua kelompok. Kelompok eksperimen menerima pembelajaran dengan kombinasi pendekatan verbal dan visual,

sementara kelompok kontrol menerima instruksi secara verbal saja. Setelah intervensi, post-test dilakukan untuk mengukur retensi kosakata. Uji *t* independen digunakan untuk membandingkan skor rata-rata antar kelompok, sedangkan analisis regresi linear berganda diterapkan untuk menilai pengaruh jenis kelamin dan pengalaman kursus bahasa Inggris terhadap retensi kosakata. Hasil penelitian menunjukkan bahwa taruna yang menerima pembelajaran verbal-plus-gambar memiliki retensi kosakata yang secara signifikan lebih tinggi dibandingkan dengan kelompok yang hanya menerima instruksi verbal ($p < 0.001$). Rata-rata skor post-test kelompok eksperimen adalah 67,65, sedangkan kelompok kontrol memperoleh skor rata-rata 56,45, yang mengonfirmasi efektivitas pembelajaran multimodal dalam pendidikan bahasa Inggris maritim. Namun, jenis kelamin dan pengalaman kursus bahasa Inggris sebelumnya tidak menunjukkan pengaruh yang signifikan terhadap retensi kosakata ($p = 0.500$ dan $p = 0.258$). Temuan ini mendukung *Dual Coding Theory (DCT)* yang menyatakan bahwa integrasi rangsangan verbal dan visual dapat meningkatkan pembelajaran dan daya ingat. Studi ini menekankan pentingnya mengintegrasikan strategi pembelajaran multimodal dalam program pelatihan bahasa Inggris maritim guna mengoptimalkan perolehan kosakata. Penelitian lebih lanjut disarankan untuk mengeksplorasi dampak jangka panjang dari retensi kosakata serta peran berbagai bentuk rangsangan visual dalam memaksimalkan hasil pembelajaran.

Kata Kunci: *Metode Pembelajaran; Retensi Kosakata; Taruna Pelayaran; Bahasa Inggris Maritim; Pembelajaran Multimodal*

Introduction

Communication in English has a vital role in the maritime business or the nautical and shipping community. The importance of English as a common language is reflected in Menon's words, Ships and seafarers travel worldwide (Menon, 2021). They may fly the flag of one country, have a captain from another country, and a crew of at least 7 to 8 nationalities. Therefore, seafarers, especially those working in multinational environments, are expected to master the language. Hence, teaching English is necessary for aspiring seafarers. The main objective of teaching English to future seafarers is to develop their communicative competence in the language.

After graduation, they should be able to converse both verbally and in writing in English, especially in the marine community or industry. In other words, the graduates will have sufficient knowledge of maritime English to enable them to communicate competently with people in their community. In this way, the ambiguity and confusion that are the leading causes of accidents occurring on board ships and other vessels can be avoided. Learning a foreign language such as English is synonymous with learning its vocabulary. Recent advances in the study of second and foreign languages have brought to light the necessity for non-native speakers to have a solid vocabulary in order to utilise English successfully (Viera, 2017).

Moreover, Min (2013) notes that in order for learners to communicate effectively, they must possess a sufficient vocabulary, independent of their proficiency with grammar and pronunciation. Put another way, nothing can be communicated without sufficient vocabulary knowledge. Like English, maritime English is also built on a basic vocabulary of unique phrases and terms (Menon, 2021). Therefore, aspiring seafarers must be rich in vocabulary to be communicatively competent in maritime English. Therefore, teaching English at Politeknik Pelayaran should focus on acquiring maritime English vocabulary. As stated by Irawati, seafarers with an extensive vocabulary will be more proficient than seafarers with a limited vocabulary (Irawati, 2014).

Thus, being rich in maritime English vocabulary will avoid confusion of meaning and help one better understand the register of words (for example, one can distinguish general English words from maritime English). Meanwhile, The English vocabulary of seafarers in general, and maritime English vocabulary, can be improved in various ways. One is using different stimuli types to help cadets encode information in their brains more effectively, making it easier to remember later on. According to Dual Coding Theory (DCT), research conducted by Paivio (1986); Najjar (1995) and Reed (2010) demonstrated that the integration of both coding methods leads to greater learning effectiveness.

Kurniawan et al., (2022) discovered a strong correlation between DCT and learning results. However, studies conducted by Aryanto (2020); Li et al., (2022); Samburskiy (2020); and Yanasugondha (2017) did not see any statistically significant variation in English vocabulary learning comprehension between groups that focused on verbal-only, nonverbal-only, and mixed verbal and nonverbal approaches. Furthermore, Eysenck and Keane (2005); Sweller (1988) assert that the combination of text and visuals can produce negative outcomes in specific circumstances. One such detrimental effect is the redundancy effect (in this case, adding pictures to written text or adding written text to pictures means adding unnecessary information).

According to Clark and Paivio (1991), the Dual Coding Theory sheds light on how humans perceive and act by dissecting the intricate web of verbal and nonverbal representations that are modality-specific. According to Sadoski (2005), there are two separate but related codes that people use when thinking one for words and one for mental images. There are spoken and non-spoken methods of processing data. The mental comprehension of the phrase dog by an individual upon seeing a picture of a dog is one example of this (Mayer and Anderson, 1991). The theory of dual coding relies on logogens and imagens.

In the language system, logogens are specialized units that react to both external stimuli and internally produced mental representations. These units are specific to the senses of sight and sound, for example. Specific to a single modality, images are units of the nonverbal system that respond either externally to stimuli or internally to previously engaged mental representations (Sadoski and Paivio, 2001). According to Richards and Schmidt (2002), vocabulary refers to a collection of lexemes, which encompasses individual words, compound words, and idioms. This definition demonstrates that vocabulary encompasses not only individual words, but also groups of words known as lexical chunks (Barcroft et al., 2011).

The significance of vocabulary in foreign language acquisition stems from the fact that, as highlighted by Nation, vocabulary is not a goal in and of itself. An extensive lexicon enhances the ability to effectively engage in listening, speaking, reading, and writing tasks (Hirsh and Nation, 1992; Laufer, 1989; Nation, 2015; Staehr, 2008). When it comes to understanding what you read, having a strong vocabulary is likely the most important component. Hilde van Zeeland highlights that while vocabulary knowledge is not the sole determinant of listening abilities, it undeniably plays a significant part in their development (Hilde van Zeeland, 2012).

Likewise, the mastery of vocabulary is universally recognised as the most essential factor in one's proficiency to communicate in a foreign language. Rie Koizumi (2013) contends that among the five elements (namely, accent, understanding, fluency, grammar, and vocabulary), vocabulary is the sole determinant of the disparity between beginner and intermediate level learners. All five elements have an impact on the disparity in skill levels among learners at the intermediate level and beyond, but vocabulary frequently stands out as the distinguishing characteristic. A person's vocabulary

comprehension has a significant correlation with their total language competency, whether they are a native speaker or a language student. According to Moore (2022) Maritime English is a globally accepted standard that has its own set of regulations, structures, and vocabulary.

Maritime English enhances communication essential for efficient and secure ship operations. Proficiency in Maritime English is crucial for seafarers and their colleagues in the industry. Maritime English serves as a global language that is comprehensible to all individuals working in the worldwide maritime sector. It is undeniable that maritime English is the essential language requirement for all seafarers. It fulfils social, technical, and everyday needs. Maritime English encompasses standardised frameworks and specialised terminology that guarantee effectiveness in day-to-day operations and appropriate handling of emergencies. It is frequently employed in inter-vessel, inter-vessel, and on-board communications.

The fundamental objective of this system is to guarantee the secure operation of vessels through enhanced internal and external communication. On the other hand, the maritime industry operates in a highly globalized environment where effective communication is paramount for ensuring safety, efficiency, and compliance with international regulations. Maritime English, recognized as the lingua franca of seafarers, plays a crucial role in facilitating seamless interactions among multinational crews. The International Maritime Organization (IMO) has developed the Standard Marine Communication Phrases (SMCP) to mitigate miscommunication risks that could lead to operational errors, navigation hazards, and safety incidents.

Despite this standardization, mastering and retaining maritime-specific vocabulary remains a challenge, particularly for cadets in training institutions preparing to enter the professional field. Meanwhile, vocabulary retention is a fundamental aspect of language proficiency, particularly in specialized domains such as maritime communication. In high-stakes environments like ship operations, misunderstanding or failure to recall critical terms can lead to severe consequences, including navigational errors, ineffective distress signaling, and non-compliance with international safety protocols. Seafarers must not only acquire maritime terminology but also retain it effectively over time to ensure competency in real-world scenarios, such as radio communications, emergency response, cargo handling, and onboard safety drills.

The inability to recall specific terms in high-pressure situations can compromise operational integrity and put lives at risk. Despite the critical nature of maritime vocabulary retention, research on effective instructional strategies tailored to maritime education remains limited. Traditional approaches often emphasize rote memorization, which may not be sufficient for long-term vocabulary retention. Studies in cognitive learning suggest that multimodal learning approaches, such as verbal-plus-picture instruction, enhance memory recall by engaging both verbal and visual cognitive channels, as postulated by Dual Coding Theory (Paivio, 1986). However, the effectiveness of such methods in maritime education remains underexplored.

Given the operational significance of maritime vocabulary retention and the potential benefits of multimodal learning, this study aims to examine the comparative effectiveness of verbal-plus-picture instruction versus verbal-only instruction in improving cadets' vocabulary retention. Additionally, this research investigates whether individual factors such as gender and prior English course experience influence vocabulary retention outcomes. By addressing these research gaps, the findings aim to provide empirical evidence supporting the integration of multimodal teaching strategies in maritime education, ensuring that future seafarers are well-equipped with the linguistic proficiency necessary for safe and effective communication at sea.

Method

This study employs an experimental research design with a quantitative approach to assess the effectiveness of different instructional methods on the immediate retention of maritime vocabulary. The research was conducted at Politeknik Pelayaran Sulawesi Utara, involving 200 second-semester cadets as the primary data source. The cadets were randomly assigned into two groups: the experimental group (100 cadets), which received verbal-plus-picture instruction, and the control group (100 cadets), which received verbal-only instruction. The random sampling technique was applied to ensure an unbiased selection process. The research instrument used in this study was a post-test assessment, designed to evaluate the immediate retention of maritime English vocabulary after the instructional intervention.

The data collection process involved administering the post-test immediately after the intervention, ensuring that retention was measured without external influences. The collected data were analyzed using independent samples t-tests to compare the mean scores between the two groups and determine whether the differences were statistically significant. Furthermore, multiple linear regression analysis was performed to examine the impact of gender and prior English course experience on vocabulary retention. The data analysis was conducted using Python-based statistical software, ensuring high accuracy in statistical computations. This methodological approach was designed to generate empirical insights into the effectiveness of multimodal instructional strategies, thereby providing a data-driven foundation for improving maritime English education and enhancing vocabulary acquisition among cadets.

Results And Discussion

1. Descriptive Statistics

The data in this research represents the scores of cadets' English learning results following the implementation of both verbal-visual and verbal-only teaching techniques. The treatment was administered to two cohorts, namely the experimental group and the control group, each consisting of 100 cadets. Each group received distinct treatments over two separate meetings. The initial experimental group received language pertaining to ship components using verbal and pictorial means, whereas the control group was provided with ship component vocabulary solely through verbal instruction. Both the experimental group and control group were assigned the same topic and lesson plan.

The intervention involved utilizing cards that contained letters of one primary color (red, blue, or green) arranged into a word on a white sheet of paper. This treatment was conducted to measure immediate recall of maritime English vocabulary among participants in the experimental and control groups, each session consisting of 25 vocabulary words. Here is the treatment sequence:

- a. Subjects were given a sequence of red cards (10 vocabulary words), blue cards (10 vocabulary words), and green cards (5 vocabulary words) for 5 minutes, and during this time, the subject was asked to remember the word listed on the card given.
- b. Take a short break of 2 minutes.
- c. The subject was given another card in the order of blue, green, and red for 5 minutes, and during this time, the subject was asked to remember the word listed on the card given.
- d. 2-minutes break.
- e. The subject was given another card in the order of green, red, and blue for 5 minutes, and during this time, the subject was asked to remember the word listed on the card given.
- f. 2-minutes break.

This section presents the actual dataset obtained from the experiment, including descriptive statistics and inferential analyses. The data compares post-test scores of cadets who received verbal-only instruction versus those who received verbal-plus-picture instruction. Additionally, gender and prior English course experience are examined as independent variables. The actual post-test scores for both groups are summarized in Table 1 below:

Table 1. Descriptive Statistics of Post-Test Scores

Group	N	Mean	Std. Dev.	Min	50%	75%	Max
Control	100	56.45	7.92	40.21	55.89	61.28	72.39
Experimental	100	67.65	6.05	55.78	67.72	71.43	83.12

The dataset comprises 200 cadets, evenly divided into two groups, with 100 cadets in the experimental group receiving verbal-plus-picture instruction and 100 cadets in the control group receiving verbal-only instruction. The mean post-test score for the experimental group was 67.65, while the control group scored lower, with a mean of 56.45. This disparity suggests that the integration of visual elements alongside verbal instruction can substantially enhance vocabulary retention. Moreover, the standard deviation in the experimental group (6.05) was lower than that of the control group (7.92), indicating that cadets in the experimental group demonstrated more consistent performance with reduced variability in their scores.

Additionally, the minimum score in the experimental group was 55.78, compared to 40.21 in the control group, highlighting a broader range of lower scores among cadets who underwent verbal-only instruction. When analyzing the median score for the experimental group was 67.72, whereas the control group's median was 55.89, reinforcing the idea that the experimental group consistently outperformed the control group. Additionally, the maximum score in the experimental group reached 83.12, while in the control group, the highest score was 72.39.

This difference highlights how cadets exposed to visual support in learning maritime vocabulary achieved higher levels of performance than those relying solely on verbal instruction. Overall, these descriptive statistics strongly suggest that verbal-plus-picture instruction contributes positively to the immediate retention of maritime vocabulary, leading to more uniform and higher overall test performance compared to verbal-only instruction. This condition is also emphasized by the figure from the Box Plot below:

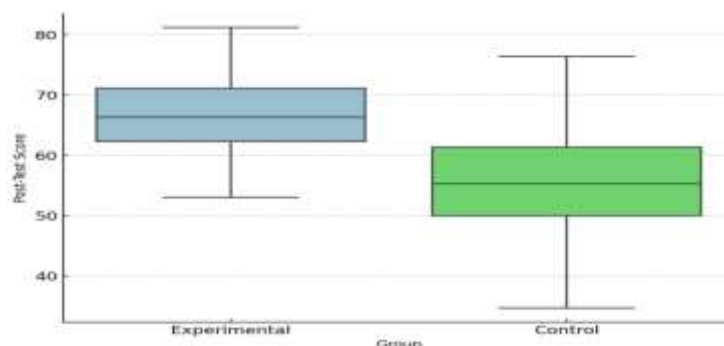


Figure 1. Distribution of Post-Test Scores Across Groups

Figure 1 illustrates the distribution of post-test scores for both the experimental group (verbal-plus-picture instruction) and the control group (verbal-only instruction). The boxplot reveals that the median score of the experimental group is visibly higher than that of the control group, reinforcing the trend observed in the descriptive statistics. The interquartile range (IQR) for the experimental group is narrower, indicating that the scores within this group are more consistent and less dispersed compared to the control group.

In contrast, the control group exhibits a wider spread of scores, suggesting greater variability in retention outcomes among cadets who received verbal-only instruction. Additionally, the whiskers of the experimental group are shorter, signifying that most cadets in this group performed within a relatively stable range of scores, with fewer extreme values.

On the other hand, the control group has a more extended lower whisker, indicating that several cadets scored significantly lower compared to their peers, suggesting that verbal-only instruction may not be as effective in ensuring uniform learning outcomes. Furthermore, the presence of higher outliers in the experimental group suggests that some cadets excelled considerably under the multimodal learning approach, whereas the control group lacks such high-performing outliers, reinforcing the potential benefits of incorporating pictorial elements in maritime vocabulary instruction. Overall, Figure 1 visually supports the statistical findings, demonstrating that verbal-plus-picture instruction leads to higher and more consistent vocabulary retention, while verbal-only instruction results in greater variability and lower overall performance among cadets. This visualization provides clear empirical evidence in favor of integrating visual elements into maritime English learning to optimize vocabulary acquisition and retention.

2. Comparison of Learning Outcomes between Experimental and Control Classes

To assess the effectiveness of verbal-plus-picture instruction in comparison to verbal-only instruction, an independent samples t-test was performed to determine whether there was a statistically significant difference in post-test scores between the experimental and control groups. The experimental group achieved a significantly higher mean post-test score (Mean = 67.65, Std. Dev. = 6.05) compared to the control group (Mean = 56.45, Std. Dev. = 7.92), indicating that multimodal learning has a strong positive effect on vocabulary retention. The results of the Levene's test for equality of variances are presented in Table 2 below:

Test	Statistic	p-Value
Levene's Test	9.057	0.0029

Since the p-value is below 0.05, this result confirms that the variances between the two groups are not equal. Therefore, the t-test was conducted under the assumption of unequal variances to ensure the accuracy of the statistical analysis. The independent samples t-test results are detailed in Table 3 below.

Test	t-Statistic	df	p-Value
Unequal Variance t-Test	11.009	198	< 0.001

The t-statistic value of 11.009 with 198 degrees of freedom (df) and a p-value of less than 0.001 confirms that the difference in learning outcomes between the two groups is highly significant. Since the p-value is far below the conventional threshold of 0.05, we reject the null hypothesis, which posited no difference between the two instructional methods. This confirms that verbal-plus-picture instruction significantly enhances maritime vocabulary retention compared to verbal-only instruction. The findings of this study align with previous research on multimodal learning and vocabulary retention. The results support Paivio's Dual Coding Theory (1986), which posits that learning is enhanced when verbal and visual representations are processed simultaneously.

Similar findings have been reported in the field of second language acquisition, where studies by Mayer and Anderson (1991); Najjar (1995) have demonstrated that multimodal learning improves comprehension and recall. However, this study extends previous research by specifically applying these findings to the teaching of maritime

English, a specialized domain with high-stakes communication requirements. Unlike traditional language learning settings, maritime English requires rapid and precise recall of technical vocabulary, where miscommunication can lead to safety risks and operational inefficiencies in accordance with Standard Marine Communication Phrases (SMCP). The statistically significant impact of multimodal instruction observed in this study suggests that integrating visual elements into maritime English training programs can improve long-term retention and proficiency.

In maritime education, effective vocabulary retention is crucial for safety and operational efficiency. Previous research by Moore (2022) emphasized that retaining maritime vocabulary is essential for seafarers to respond appropriately in emergency situations. The findings of this study extend this understanding by showing that visual reinforcement enhances retention, making multimodal learning a valuable instructional strategy in maritime English training. Furthermore, the statistical significance of these findings suggests that integrating visual aids into maritime vocabulary instruction can substantially improve retention and learning efficiency.

Given the importance of effective communication in maritime operations, it is recommended that maritime education institutions adopt multimodal teaching strategies to enhance vocabulary acquisition and long-term retention among cadets. Finally, the hypothesis testing results confirm that verbal-plus-picture instruction is a superior method for improving maritime vocabulary retention, reinforcing the need for educational frameworks that incorporate visual elements alongside verbal instruction.

3. Effect of Verbal and Picture and Picture Only Learning Methods on Immediate Retention of Maritime Vocabulary of Seafarers Candidate

A multiple linear regression was performed to analyze the effects of instructional method, gender, and prior English course experience on post-test scores.

$$\text{Post-Test Score} = \beta_0 + \beta_1 (\text{Group}) + \beta_2 (\text{Gender}) + \beta_3 (\text{English Course}) + \varepsilon$$

Table 4. Multiple Regression Analysis Results

Variable	Coefficient	Std. Error	t-Value	p-Value
Constant	56.69	1.38	40.95	<0.001
Group (Experimental = 1, Control = 0)	11.18	1.02	10.99	<0.001
Gender (Male = 1, Female = 0)	-0.90	1.34	-0.68	0.500
English Course Experience (Yes = 1, No = 0)	-1.26	1.11	-1.13	0.258

The impact of instructional methods on the immediate retention of maritime vocabulary was analyzed using multiple linear regression. The findings confirm that the verbal-plus-picture learning method significantly enhances vocabulary retention compared to the verbal-only method. The regression analysis results indicate that the learning method variable is statistically significant (p-Value < 0.001), with a coefficient of 11.18, suggesting that cadets who received verbal-plus-picture instruction scored, on average, 11.18 points higher than those who received verbal-only instruction. These results reinforce the Dual Coding Theory Paivio (1986), which states that integrating verbal and visual information enhances learning and recall.

Moreover, the analysis explored the influence of gender and prior English course experience on vocabulary retention. The regression findings, presented in Table 4, show that gender does not have a significant impact on learning outcomes ($p\text{-Value} = 0.500$), meaning that the effectiveness of the teaching method is consistent across male and female cadets. Similarly, prior English course experience does not significantly contribute to vocabulary retention ($p\text{-Value} = 0.258$), indicating that past exposure to English learning does not necessarily lead to better retention of maritime vocabulary. The constant coefficient (56.69, $p\text{-Value} < 0.001$) suggests that even without considering any independent variables, cadets' baseline scores are relatively high.

These results suggest that instructional methods play a more crucial role in learning outcomes than individual background characteristics. The findings have important pedagogical implications, reinforcing the need for multimodal instructional approaches in maritime English education. Given the highly technical nature of maritime communication, incorporating visual elements alongside verbal instruction can lead to more effective vocabulary retention and improved communication skills for cadets. Therefore, maritime institutions should prioritize the adoption of visual-enhanced instructional strategies to optimize maritime English learning outcomes.

The results from Table 4 confirm that while instructional methods significantly influence learning outcomes, gender and prior English course experience do not contribute substantially to variation in post-test scores. The high $t\text{-value}$ (10.988) for the learning method variable reinforces that verbal-plus-picture instruction has a strong positive effect on vocabulary retention. Future research could explore long-term retention effects and investigate whether alternative visual stimuli further improve learning effectiveness. Expanding this study to different maritime institutions with larger and more diverse cadet samples could also provide deeper insights into the generalizability of these findings.

The significantly higher retention rates in the experimental group suggest that the visual cues provided alongside verbal explanations strengthened cognitive associations, leading to better recall. The lower variability in scores within the experimental group also indicates that this method provided a more uniform learning experience, reducing disparities in performance among cadets. In Addition, the lack of significant influence from gender and prior English course experience on retention outcomes suggests that the instructional method itself plays a more critical role in vocabulary retention than individual demographic factors. This aligns with findings by Hulstijn and Laufer (2001), who observed that well-designed instructional strategies are more impactful than prior language exposure in vocabulary acquisition.

Conclusions

The findings of this study provide strong empirical evidence that verbal-plus-picture instruction significantly enhances maritime vocabulary retention compared to verbal-only methods. The statistical analysis confirms that cadets exposed to multimodal learning strategies performed significantly better, with an average increase of 11.18 points in post-test scores compared to those who received only verbal instruction. These results support Dual Coding Theory, emphasizing the role of both verbal and visual stimuli in improving information retention. Furthermore, the analysis indicates that gender and prior English course experience do not significantly influence vocabulary retention, reinforcing the idea that effective instructional methods outweigh individual background characteristics in determining learning success.

The findings have crucial pedagogical implications, particularly for maritime education institutions. Given that maritime communication relies heavily on standardized terminology, it is essential to implement effective vocabulary acquisition strategies to ensure cadets achieve proficiency. This study highlights the importance of incorporating visual aids alongside verbal instruction, which can lead to more consistent and higher vocabulary retention rates. Consequently, maritime training programs should consider integrating multimodal learning approaches into their curriculum to optimize learning outcomes. Future research could explore the long-term retention effects of multimodal instruction, investigating whether the observed improvements persist over time. Additionally, expanding the study to a larger and more diverse population of maritime cadets could provide further insights into the generalizability of these findings. By continuing to develop evidence-based teaching methodologies, maritime education can better equip future seafarers with the linguistic proficiency necessary for effective communication and operational safety at sea.

References

- Aryanto, C. B. (2020). Do You Remember The Words? Dual-Coding Method On Long-Term Memory. *Jurnal Psikologi*, 19(4), 314-22.
- Barcroft, J., Sunderman, G., & Schmitt, N. (2011). *The Routledge Handbook Of Applied Linguistics*. Oxfordshire: Routledge.
- Clark, J. M., & Paivio, A. (1991). Dual Coding Theory And Education. *Educational Psychology Review*, 3(3), 149-210.
- Eysenck, M. W., & Keane, M. T. (2005). *Cognitive Psychology: A Student's Handbook*. London: Psychology Press.
- Erawati, I. (2014). The Effects of Vocabulary Mastery on Comprehending Maritime English Texts: A Case Study of Seafarers of Nautical Class. *Magister Scientiae*, (35), 33-46.
- Hirsh, D., & Nation, I. S. P. (1992). What Vocabulary Size Is Needed To Read Unsimplified Texts For Pleasure?. *Reading in a Foreign Language*, 8(2), 689-696.
- Hulstijn, J. H., & Laufer, B. (2001). Some Empirical Evidence For The Involvement Load Hypothesis in Vocabulary Acquisition. *Language Learning*, 51(3), 539-558.
- Koizumi, R., & In'nami, Y. (2013). Knowledge And Speaking Proficiency Among Second Language Learners From Novice To Intermediate Levels. *Journal of Language Teaching And Research*, 4(5), 900-913.
- Kurniawan, C., Kusumaningrum, S. R., Lam, K. F. T., & Surahman, E. (2022). Improving Language Teaching And Learning Process With Dual Coding Theory Approaches. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 7(8), 281-289.
- Laufer, B. (1989). *Special Language: From Humans Thinking To Thinking Machines*. Bristol: Multilingual Matters.
- Li, W., Yu, J., Zhang, Z., & Liu, X. (2022). Dual Coding or Cognitive Load? Exploring the Effect of Multimodal Input on English as a Foreign Language Learners' Vocabulary Learning. *Frontiers in Psychology*, 13, 1-11.
- Mayer, R. E., & Anderson, R. B. (1991). Animations Need Narrations: An Experimental Test Of A Dual-Coding Hypothesis. *Journal of Educational Psychology*, 83(4), 484-490.
- Menon, A. (2021). What is Maritime English and Why It Is Important? *Life at Sea*. <https://www.marineinsight.com/life-at-sea/what-is-maritime-english-and-why-it-is-important/>

- Min, Y. K. (2013). Vocabulary Acquisition: Practical Strategies for ESL Students. *Journal of International Students*, 3(1), 64-69.
- Moore, T. (2022). What Is Maritime English and Why Do You Need It? *Searates Blog*. <https://www.searates.com/blog/post/what-is-maritime-english-and-why-do-you-need-it>
- Najjar, L. J. (1995). *Dual Coding As A Possible Explanation For The Effects Of Multimedia On Learning (GIT-GVU-95-29)*. Atlanta: Georgia Institute of Technology, Graphics, Visualization and Usability Center.
- Nation, I. S. P. (2006). How Large A Vocabulary Is Needed For Reading And Listening?. *Canadian Modern Language Review*, 63(1), 59-82.
- Nation, I. S. P. (2015). Principles Guiding Vocabulary Learning Through Extensive Reading. *Reading in a Foreign Language*, 27(1), 136-145.
- Paivio, A. (1986). *Mental Representations: A Dual Coding Approach*. England: Oxford University Press.
- Reed, S. K. (2010). *Cognition: Theories and Applications*. Wadsworth, Cengage Learning: Belmont, CA, USA.
- Richards, J. C., & Schmidt, R. W. (2002). *Longman Dictionary of Language Teaching and Applied Linguistics*. Oxfordshire: Routledge.
- Sadoski, M. (2005). A Dual Coding View Of Vocabulary Learning. *Reading and Writing Quarterly*, 21(3), 221-238.
- Sadoski, M., & Paivio, A. (2001). *Imagery and Text A Dual Coding Theory of Reading and Writing*. Oxfordshire: Routledge.
- Samburskiy, D. (2020). The Effect of a Dual Coding Technique on Idiom Interpretation in ESL/EFL Learners. *International Journal of Instruction*, 13(3), 187-206.
- Stæhr, L. S. (2008). Vocabulary Size And The Skills Of Listening, Reading And Writing. *Language Learning Journal*, 36(2), 139-152.
- Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science*, 12(2), 257-285.
- Viera, R. T. (2017). The Importance Of Vocabulary Knowledge In The Production Of Written Texts: A Case Study On EFL Language Learners. *Revista Tecnológica ESPOL-RTE*, 30(3), 89-105.
- Yanasugondha, V. (2017). A Study of English Vocabulary Learning Using the Dual Coding Theory. *LEARN Journal: Language Education and Acquisition Research Network*, 10(1), 165-175.
- Zeeland, H. V., & Schmitt, N. (2013). Lexical Coverage In L1 And L2 Listening Comprehension: The Same Or Different From Reading Comprehension?. *Applied Linguistics*, 34(4), 457-479.