

ENHANCING CRITICAL THINKING, COMMUNICATION SKILLS, AND SUSTAINABILITY AWARENESS THROUGH MARITIME ENGLISH INSTRUCTION

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Abstract

This study aims to examine the effectiveness of sustainability-based Maritime English instruction in enhancing cadets' critical thinking, communication skills, and sustainability awareness. A mixed-methods design was employed involving 62 cadets from a maritime institution. One class (19 cadets) was used for instrument try-out, while the remaining 43 cadets participated in the main study. Data were collected through a Likert-scale questionnaire, classroom observations, and semi-structured interviews. The instrument was validated using corrected item-total correlation and demonstrated high reliability (Cronbach's Alpha = 0.96). The normality test indicated that all data were normally distributed ($p > 0.05$). The quantitative findings revealed high levels of critical thinking ($M = 4.12$) and communication skills ($M = 4.05$), as well as very high sustainability awareness ($M = 4.28$). Correlation analysis showed strong positive relationships among the variables. The qualitative analysis further identified key themes of engagement, confidence, and sustainability awareness, indicating that students were actively involved, more confident in communication, and more aware of environmental responsibilities. These findings suggest that sustainability-based Maritime English instruction provides a meaningful and contextual learning experience that enhances cognitive, linguistic, and affective domains. However, the study is limited by its descriptive design and relatively small sample size. Future research is recommended to employ experimental approaches and broader samples to strengthen the generalizability of the findings.

Keywords – critical thinking, communication skills, sustainability, Maritime English

Introduction

The rapid development of the maritime industry in the era of globalization has increased the demand for effective communication among seafarers. English plays a crucial role as the lingua franca in maritime operations, particularly in ensuring safety, coordination, and efficiency. However, the teaching of Maritime English is often limited to linguistic aspects, with less emphasis on developing higher-order thinking skills and contextual understanding.

Critical thinking has become an essential competency in maritime professions, as seafarers are frequently required to analyze situations, evaluate risks, and

make decisions under pressure. According to Peter A. Facione (2015), critical thinking involves skills such as analysis, evaluation, and inference. In addition, communication skills are equally important in maritime contexts, especially in emergency situations where clear and effective interaction is required. The communicative competence framework proposed by Michael Canale and Merrill Swain (1980) emphasizes the importance of meaningful communication and interaction in language learning.

Furthermore, sustainability has emerged as a global concern, particularly in maritime activities that directly impact marine ecosystems. The United Nations

(2015) introduced the Sustainable Development Goals (SDGs), including Goal 14 (Life Below Water), which highlights the importance of protecting marine environments. Integrating sustainability into education is essential to prepare students to become responsible professionals who are aware of environmental issues (Tilbury, 2011).

Previous studies have shown that contextual and problem-based learning approaches can enhance students' critical thinking and communication skills. For instance, David R. Krathwohl (2002) emphasized the importance of higher-order thinking in learning processes, while Rod Ellis (2003) highlighted that communicative and task-based approaches improve language proficiency. In addition, communicative and interactive learning approaches have been widely recognized as effective in improving students' engagement and speaking performance (Richards & Rodgers, 2014; Harmer, 2007).

However, despite these findings, there is still a limited number of studies that specifically integrate sustainability, critical thinking, and communication skills within the context of Maritime English instruction. Most existing research tends to focus on general English learning or isolated skill development without considering interdisciplinary integration.

Therefore, this study aims to investigate the effectiveness of sustainability-based Maritime English instruction in enhancing cadets' critical thinking, communication skills, and sustainability awareness. This study is expected to contribute to the development of more contextual and meaningful English language teaching practices, particularly in maritime education.

Methodology

This study employed a mixed-methods design combining quantitative and qualitative approaches to provide a comprehensive understanding of the research problem. Mixed-methods research allows the integration of numerical data and in-depth insights, enabling a more complete analysis of educational phenomena (Creswell & Plano Clark, 2018).

The participants consisted of 62 cadets from three classes at a maritime institution. One class, consisting of 19 cadets, was used as a try-out group to test the validity and reliability of the research instrument, while the remaining two classes (43 cadets) were involved in the main study. This separation was intended to avoid bias and testing effects, ensuring the credibility of the data.

The research instrument was a Likert-scale questionnaire developed based on established theoretical frameworks. The questionnaire items were constructed using a five-point Likert scale ranging from strongly disagree to strongly agree, which is widely used in educational research to measure attitudes and perceptions (Likert, 1932). The indicators of critical thinking were adapted from Peter A. Facione (2015), while communication skills were based on the communicative competence framework proposed by Michael Canale and Merrill Swain (1980). Sustainability awareness indicators were derived from the framework of the United Nations (2015).

Prior to the main data collection, the instrument was tested using the try-out group to examine its validity and reliability. The validity of the instrument was analyzed using corrected item-total correlation, while reliability was measured using Cronbach's Alpha. According to Hair et al. (2019), an item is considered valid if the correlation value exceeds 0.30, and an instrument is

considered reliable if Cronbach's Alpha is greater than 0.70.

Data were collected through questionnaire distribution, classroom observations, and semi-structured interviews. The use of multiple data sources allows triangulation, which enhances the validity of qualitative findings (Creswell, 2014).

In addition, a normality test was conducted using the Kolmogorov–Smirnov test to determine whether the data were normally distributed. A significance value greater than 0.05 indicates that the data are normally distributed (Ghozali, 2018).

The quantitative data were analyzed using descriptive statistics, particularly mean scores, to determine the level of each variable. Furthermore, correlation analysis was conducted to examine the relationships among variables. Meanwhile, qualitative data obtained from observations and interviews were analyzed using thematic analysis to identify patterns and interpretations of students' learning experiences.

Finding and Discussion

Instrument Validity and Reliability

Prior to the main data collection, the questionnaire was tested using a try-out group consisting of 19 cadets to ensure the quality of the research instrument. The validity test was conducted using corrected item-total correlation. The results revealed that all items had correlation coefficients ranging from 0.70 to 0.86, which are significantly higher than the minimum threshold of 0.30 (Hair et al., 2019). This indicates that each item has a strong relationship with the overall construct and is capable of measuring the intended variables effectively.

A closer examination shows that the critical thinking items (CT1–CT8) consistently demonstrated strong correlations (0.77–0.84), indicating that the items effectively capture students' analytical and evaluative abilities. The communication skills items (CS1–CS6) also showed stable correlations (0.70–0.80), suggesting that the items reliably represent students' communicative performance. Meanwhile, the sustainability awareness items (SA1–SA6) produced the highest correlation values (0.82–0.86), indicating that students' responses to these items were highly consistent and strongly aligned with the construct.

The reliability test using Cronbach's Alpha yielded a value of 0.96, which indicates excellent internal consistency. According to Hair et al. (2019), a value above 0.90 reflects a very high level of reliability. This suggests that the instrument is highly stable and produces consistent results across items. Although extremely high reliability may indicate potential redundancy, in this context it reflects the strong coherence among the constructs being measured, particularly due to the integrated nature of sustainability, communication, and critical thinking in the learning process.

Normality Test

The normality test was conducted using the Kolmogorov–Smirnov test to examine whether the data were normally distributed. The results showed that all variables had significance values greater than 0.05, indicating that the data followed a normal distribution (Ghozali, 2018).

This result implies that the data meet the assumptions required for parametric statistical analysis. Moreover, the normal distribution of the data suggests that students' responses were relatively

homogeneous and did not show extreme deviations. This strengthens the reliability of the findings and indicates that the observed patterns are representative of the overall population.

Critical Thinking

The results showed that the mean score of critical thinking was 4.12, which falls into the high category. This indicates that students demonstrated a strong ability to analyze problems, evaluate alternatives, and make decisions in maritime-related contexts.

This finding can be attributed to the use of sustainability-based learning materials, which provide authentic and meaningful contexts. When students engage with real-world issues such as marine pollution, environmental protection, and ship safety, they are required to apply higher-order thinking skills rather than simply recalling information.

From a cognitive perspective, this finding supports the framework proposed by Peter A. Facione (2015), which emphasizes that critical thinking involves analysis, evaluation, and inference. The learning activities in this study encouraged students to actively interpret information, compare different viewpoints, and justify their reasoning.

Furthermore, this result aligns with the taxonomy revision proposed by David R. Krathwohl (2002), which highlights the importance of higher-order thinking processes such as analyzing and evaluating. The integration of problem-based tasks in Maritime English instruction appears to facilitate these cognitive processes effectively.

In addition, the collaborative nature of classroom discussions also contributed to the development of critical thinking. Through peer interaction, students were

exposed to diverse perspectives, which challenged them to refine their reasoning and arguments. This indicates that both content (sustainability issues) and pedagogy (discussion-based learning) play a crucial role in enhancing critical thinking.

Communication Skills

The findings revealed that the mean score of communication skills was 4.05, categorized as high. This suggests that students were able to effectively express ideas, interact with peers, and use appropriate maritime terminology during learning activities.

The improvement in communication skills can be explained by the use of interactive and communicative learning approaches. Students were actively engaged in discussions, presentations, and problem-solving tasks, which required them to use English in meaningful contexts. This type of engagement promotes not only linguistic accuracy but also fluency and strategic competence.

This finding supports the communicative competence framework proposed by Michael Canale and Merrill Swain (1980), which emphasizes that language learning should focus on meaningful interaction rather than isolated grammar instruction.

Moreover, the results are consistent with previous studies by Rod Ellis (2003), which highlight that task-based and communicative approaches significantly improve students' speaking skills. The integration of sustainability topics further enhances this process by providing relevant and engaging content, which increases students' motivation to participate in communication.

Another important finding is that students were able to maintain communication

even when they lacked vocabulary. This indicates the development of strategic competence, which is essential in real-life communication, particularly in maritime contexts where misunderstandings can have serious consequences.

Sustainability Awareness

The results indicated that the mean score of sustainability awareness was 4.28, which falls into the very high category. This demonstrates that students developed a strong awareness of environmental issues and their responsibilities as future maritime professionals.

The high level of sustainability awareness can be attributed to the integration of environmental topics into the learning process. By discussing real issues such as marine pollution and environmental degradation, students were able to connect theoretical knowledge with real-world implications.

This finding aligns with the framework introduced by the United Nations (2015), particularly Sustainable Development Goal 14, which emphasizes the importance of protecting marine ecosystems. The results also support previous research (Tilbury, 2011), which suggests that sustainability education can significantly enhance students' environmental awareness and responsibility.

Furthermore, the integration of sustainability into language learning creates a dual learning outcome: students not only improve their English skills but also develop values and attitudes toward environmental protection. This indicates that Maritime English can serve as a powerful medium for interdisciplinary education.

Qualitative Findings

In addition to the quantitative results, qualitative data obtained from classroom observations and semi-structured interviews were analyzed using thematic analysis to identify recurring patterns in students' learning experiences (Creswell, 2014). The analysis resulted in three major themes: engagement, confidence, and sustainability awareness.

Theme 1: Engagement

Students demonstrated a high level of engagement during sustainability-based learning activities. Classroom observations showed that students actively participated in discussions, particularly when dealing with real-world maritime issues such as marine pollution and ship safety. This finding indicates that contextual and problem-based learning can increase student engagement, as students are more involved when learning materials are relevant to their real-life context (Harmer, 2007).

Theme 2: Confidence

Interview data revealed that students experienced increased confidence in using English during classroom interactions. Many students reported that discussion-based activities helped them express ideas more freely and reduced anxiety in speaking. One participant stated that "discussion activities improve confidence in speaking English and make learning more interesting." This suggests that interactive learning environments support the development of communicative competence and confidence in language use (Richards & Rodgers, 2014).

Theme 3: Sustainability Awareness

Students also demonstrated a strong awareness of environmental issues. They showed concern about marine pollution and recognized their future responsibilities as seafarers. One participant mentioned that "learning through real maritime issues helps us

understand how to think critically and act responsibly.” This finding confirms that integrating sustainability topics into language learning can effectively promote environmental awareness and responsibility (Tilbury, 2011).

Overall, these themes indicate that sustainability-based Maritime English instruction enhances not only cognitive and linguistic aspects but also students’ affective engagement and awareness. The qualitative findings support and enrich the quantitative results, providing deeper insight into how and why the learning approach is effective.

Correlation Analysis

The correlation analysis revealed strong positive relationships among the variables. Critical thinking was strongly correlated with communication skills ($r = 0.78$) and sustainability awareness ($r = 0.82$), while communication skills were also strongly correlated with sustainability awareness ($r = 0.80$).

These findings indicate that the three variables are interconnected and mutually reinforcing. Students with higher critical thinking skills tend to communicate more effectively and demonstrate greater awareness of sustainability issues.

This relationship can be explained by the nature of the learning process. Critical thinking enables students to analyze and understand complex issues, while communication skills allow them to express their ideas effectively. At the same time, sustainability awareness provides meaningful content that stimulates both cognitive and communicative engagement.

Overall Discussion

The findings of this study demonstrate that sustainability-based Maritime

English instruction contributes significantly to the development of critical thinking, communication skills, and sustainability awareness. However, beyond confirming positive outcomes, it is important to critically examine how these variables interact within the learning process.

First, the strong performance in critical thinking ($M = 4.12$) suggests that contextual learning environments play a crucial role in promoting higher-order thinking. Rather than relying on traditional language instruction, the integration of real-world maritime issues encourages students to engage in analytical and evaluative processes. This supports the argument of Peter A. Facione (2015) that critical thinking is best developed through active problem-solving rather than passive learning. However, it should also be noted that the study did not employ experimental comparison, which limits the ability to determine causal effects.

Second, the improvement in communication skills highlights the effectiveness of interaction-based learning. The findings align with the communicative competence framework proposed by Michael Canale and Merrill Swain (1980), emphasizing meaningful communication. Nevertheless, the results also suggest that students relied on strategic competence when facing vocabulary limitations, indicating that language proficiency may still need further development.

Third, the very high level of sustainability awareness ($M = 4.28$) indicates that integrating environmental issues into language instruction is effective. However, awareness does not necessarily translate into long-term behavioral change. As highlighted by Tilbury (2011), sustainability education should go beyond awareness and promote sustainable

practices. Therefore, future learning designs should incorporate more action-oriented activities.

Moreover, the strong correlations among variables suggest that critical thinking, communication skills, and sustainability awareness are interconnected. This indicates that learning processes that integrate content and language can simultaneously develop multiple competencies. However, the use of correlational analysis limits the interpretation of causal relationships among variables.

In terms of qualitative findings, the emergence of themes such as engagement, confidence, and awareness further supports the effectiveness of the learning approach. These findings indicate that students not only improved academically but also developed positive attitudes toward learning. However, qualitative data were limited to a small number of participants, which may affect the generalizability of the findings.

Overall, this study highlights the potential of interdisciplinary and contextual approaches in Maritime English instruction. Nevertheless, further research using experimental designs and larger samples is needed to strengthen the validity and generalizability of the findings.

Conclusions

This study concludes that sustainability-based Maritime English instruction effectively enhances cadets' critical thinking, communication skills, and sustainability awareness. The quantitative findings showed high levels of critical thinking and communication skills, and a very high level of sustainability awareness, while the qualitative findings further revealed key themes of engagement, confidence, and

environmental awareness. Students actively participated in discussion-based activities, demonstrated increased confidence in expressing ideas, and developed a deeper understanding of their responsibilities as future maritime professionals. These findings indicate that integrating real-world sustainability issues into language learning creates a meaningful and interactive learning environment that supports both cognitive and communicative development.

This study also highlights that critical thinking, communication skills, and sustainability awareness are interconnected and mutually reinforcing within a contextual learning framework. However, despite the positive findings, this study is limited by the use of descriptive and correlational analysis as well as a relatively small sample size, which restricts the generalizability and causal interpretation of the results. Therefore, future research is recommended to employ experimental designs and larger samples to further validate the effectiveness of sustainability-based Maritime English instruction. Additionally, future studies may explore the integration of digital learning tools or simulation-based approaches to strengthen both learning outcomes and sustainability practices.

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