Attitude Behavior Tendencies and Knowledge Orientation as Antecedents of Maritime English Learning: Practical Implications for the International Maritime Industry

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Abstract

Maritime English is a crucial element in the international maritime industry, enabling effective communication and ensuring safety at sea. Considering the importance of English proficiency in the maritime context, this study aims to develop an effective learning model using the Maritime English Reconstruction (MER) approach. This model is designed to enhance the effectiveness of maritime English learning through the application of relevant and contextual reconstruction techniques. The study examines the influence of attitude behavior tendencies, knowledge orientation, and the mediating role of MER on learning effectiveness. This research employs a quantitative method with data collection techniques through simple random sampling. The respondents in this study are final-year students majoring in maritime studies from various state universities in Jakarta and Semarang, Indonesia, with 248 valid questionnaires analyzed. Data analysis is conducted using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 3 software. The results of the study indicate that attitude behavior tendencies and knowledge orientation have a significant influence on MER and learning effectiveness. Furthermore, MER is proven to act as a significant mediator in the relationship between attitude behavior tendencies and learning effectiveness, as well as between knowledge orientation and learning effectiveness. These findings suggest that the MER method plays a vital role in improving the results of maritime English learning by enhancing the application of relevant and contextual reconstruction techniques.

Keywords: Attitude Behavior Tendencies, Knowledge Orientation, Maritime English Reconstruction, Learning Effectiveness

1. Introduction

The maritime industry is one of the key sectors that can support a country's economic growth. As the largest archipelagic country in the world, Indonesia has immense maritime potential (Saunders et al., 2020; Sartini, 2020). One crucial element in supporting the maritime industry is the mastery of maritime English, which plays a critical role in international communication. Maritime English is the language used in various maritime activities, such as navigation, safety, port operations, and maritime logistics (Ahmmed et al., 2020; Bullock & Westbrook, 2021). Daily operations on ships, including navigation, cargo handling, and maintenance, often require communication in English. Efficient communication enhances operational coordination and efficiency. Moreover, the maritime industry is inherently international, with ships, crews, and ports spanning across different countries. English serves as the common language, facilitating clear communication between diverse nationalities. Thus, Proficiency in maritime English can enhance the efficiency and safety of maritime operations, as well as open up international job opportunities.

However, the teaching of Maritime English in Indonesia still faces various challenges in an ever-evolving era. Maritime English holds a vital role in the maritime world as it is the backbone for maintaining safety and communication efficiency between ships, ports, and various related parties (Tenieshvili, 2021; Wang, 2023). In maritime operations, especially when sailing in the vast ocean, the ability to communicate confidently and clearly is paramount. Mastery of maritime English enables crew members to interact effectively with international colleagues, port representatives, and maritime professionals from various countries (Zhou et al., 2021).

Previous research has revealed some antecedents of the proficiency in maritime English by combing behavioral and knowledge aspects. Behavioral tendencies, such as motivation, discipline, and activeness, influence how seriously learners engage in the learning process (Abdullah et al., 2020; Kilpi et al., 2021). Learners who are highly motivated and disciplined tend to be more consistent in studying, completing tasks on time, and actively participating in discussions and simulations, all of which enhance their communication skills in a maritime context. Positive attitudes, such as confidence, perseverance, and openness to criticism, also have a significant impact (Fan & Yang, 2023). Confident learners are more willing to communicate in English, even if they make mistakes initially. Perseverance in practicing repeatedly helps achieve fluency (Abd Razak et al., 2022). Openness to criticism allows learners to continually improve and accept constructive feedback, which is essential in developing necessary language skills. Learners' knowledge orientation regarding the

importance of Maritime English in their careers also plays a significant role. A good understanding of the relevance and benefits of mastering Maritime English makes learners more motivated and focused in their studies (Dewan et al., 2023).

The development of an effective learning model is one solution to improve Maritime English proficiency in Indonesia. One approach that can be used is Maritime English Reconstruction (MER). This approach aims to reconstruct the teaching methods of Maritime English by integrating various interactive and contextual learning techniques (Del Mundo et al., 2022). The MER approach incorporates the use of simulations, case studies, and practical exercises relevant to real-life situations in the maritime industry. Thus, learners are expected not only to understand the theory but also to be able to apply it in their daily work contexts (Wang et al., 2023). Additionally, this approach emphasizes the importance of active learner involvement in the learning process, which can develop better and more confident communication skills. Therefore, the objective of this research is to analyze the influence of attitude behavior tendencies and knowledge orientation on the effectiveness of maritime English learning, as well as to analyze the mediating role of the Maritime English Reconstruction (MER) approach.

2. Literature Review

Maritime English is the language used in the international maritime industry, with specific vocabulary and expressions unique to the field. Effective communication in Maritime English is crucial for ensuring safety at sea, as clear and timely communication can prevent accidents and misunderstandings (Griffioen et al., 2021). Additionally, Maritime English serves as an essential communication tool in maritime education and knowledge, facilitating the transfer of necessary knowledge and skills for safe and efficient maritime operations (Ahmmed et al., 2020). In the era of globalization, the need for proficiency in English is becoming increasingly urgent. English functions as the lingua franca in the maritime industry, enabling maritime professionals from various countries to interact and collaborate effectively. Mastery of English not only broadens job opportunities on foreign-flagged ships but also enhances competitiveness in an increasingly competitive global market (Yang et al., 2022; Sellberg et al., 2021).

Behavioral tendencies and attitudes play a crucial role in determining the effectiveness of Maritime English learning. Behaviors such as motivation, discipline, and activeness can significantly impact learning outcomes. Learners with high motivation are more enthusiastic about engaging in the learning process, strive harder to understand the material, and participate more actively in discussions and exercises (Tenieshvili, 2021; Del Mundo et al., 2022). This strong motivation helps maintain focus and persistent effort, even when facing difficulties. Discipline is also a key factor, as it creates a stable learning routine, which is essential for achieving a deep understanding and good communication skills in Maritime English (Abd Razak et al., 2022). Learner attitudes also have a significant impact; confidence encourages learners to speak up and make mistakes, which is a crucial part of the learning process. Perseverance helps them keep trying despite challenges, while openness to criticism allows them to receive feedback and improve themselves (Liu et al., 2020; Hartati et al., 2021).

Students' knowledge orientation refers to their understanding and awareness of the importance of the material being studied, significantly impacting the effectiveness of Maritime English learning (Susanti, 2023). Understanding the significance of Maritime English makes students realize that Maritime English is not just a subject but a vital skill (Vidhiasi & Syihabuddin, 2022). Good communication skills in Maritime English can enhance safety at sea, facilitate efficient operations, and open job opportunities on foreign-flagged vessels (Zhou et al., 2021). This awareness motivates students to study more seriously and strive to master the language. Knowledge orientation also helps students connect the material learned with real-life situations in the maritime industry. Additionally, a good knowledge orientation encourages students to continuously seek additional information (Saunders et al., 2020; Ahmmed et al., 2020).

The Maritime English Reconstruction (MER) approach has great potential to enhance the effectiveness of Maritime English learning. This approach focuses on reconstructing teaching methods by integrating interactive and contextual learning techniques, enabling students to understand and apply the language effectively in real-world maritime situations (Nesaratnam et al., 2020). One of the main aspects of MER is the use of simulations. Through simulations, students can experience realistic maritime situations, such as emergency communication at sea, navigation, and port procedures (James et al., 2018). These experiences allow them to apply the specific vocabulary and expressions of Maritime English in contexts similar to real life, thereby enhancing their understanding and communication skills. Simulations also help students build confidence in using the language in professional settings (Griffioen et al., 2021; Tenieshvili, 2021).

Case studies are another component of MER that supports learning. By analyzing case studies drawn from real incidents in the maritime industry, students can learn how Maritime English is used in various operational and managerial situations. This not only enriches their knowledge but also provides insights into best practices and effective communication strategies. The MER approach also emphasizes practical exercises relevant to the needs of the maritime industry (Dirgeyasa, 2018). These exercises are designed to actively engage students, encouraging them to speak, listen, read, and write in Maritime English. Active engagement is essential for strengthening language skills and ensuring students are prepared to face communication challenges in the international maritime environment (Cui, 2021; Shi & Fan, 2021). Additionally, MER encourages students to participate in collaborative learning processes. Group discussions, joint projects, and team-based learning activities help create a dynamic and supportive learning environment. This collaboration enriches the learning experience, allowing students to learn from each other, share knowledge, and build interpersonal communication skills (Rahmawati, 2021; Hsu, 2023). The Maritime English Reconstruction (MER) approach can enhance students' language skills and prepare them to communicate confidently and competently in the global maritime industry.

H1. Attitude behavior tendencies has a significant influence on the Maritime English Reconstruction (MER) approach.

H2. Attitude behavior tendencies has a significant influence on learning effectiveness.

H3. Knowledge orientation has a significant influence on the Maritime English Reconstruction (MER) approach.

H4. Knowledge orientation has a significant influence on learning effectiveness.

H5. The Maritime English Reconstruction (MER) approach has a significant influence on learning effectiveness.

H6. The Maritime English Reconstruction (MER) approach mediates the relationship between attitude behavior tendencies and learning effectiveness.

H7. The Maritime English Reconstruction (MER) approach mediates the relationship between knowledge orientation and learning effectiveness.
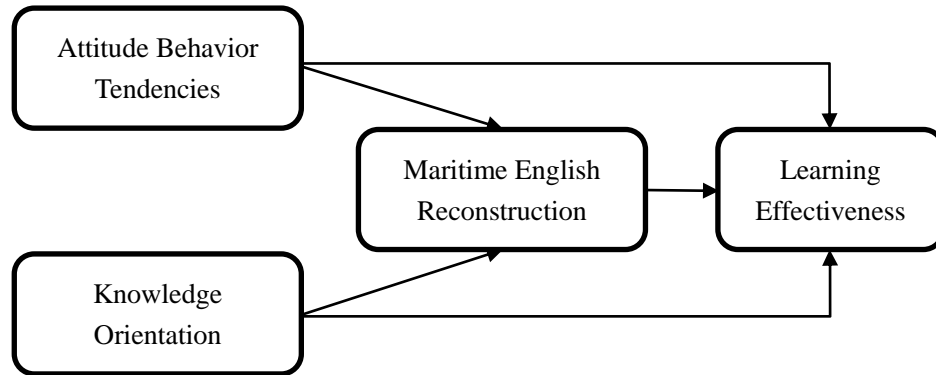

Figure 1. Theoretical Framework

3. Research Method

This study employs a quantitative method with data collection through simple random sampling using a 7-point scale questionnaire to capture respondents' perceptions. The questionnaire consists of questions covering indicators for each latent variable: attitude behavior tendencies and knowledge orientation as independent variables, the Maritime English Reconstruction (MER) approach as a mediating variable, and learning effectiveness as the dependent variable. The research sample comprises final-year students majoring in maritime studies from various public universities in Jakarta and Semarang, Indonesia. A total of 500 questionnaires were distributed, but only 287 were successfully collected, yielding a relatively high response rate of 57.40%. After collection, the questionnaires were examined using SPSS 25 to identify any errors or omissions. At this stage, it was found that 28 questionnaires were incomplete and 11 were damaged and therefore unusable for analysis. Thus, the number of questionnaires that could be analyzed was 248.

In this study, a sample size of 248 respondents was deemed adequate for several reasons. A pre-data collection power analysis confirmed sufficient statistical power to detect hypothesized effects confidently. Comparable studies in Waqar et al. (2023), and Juliana et al. (2023) using PLS-SEM have successfully employed similar sample sizes for exploring complex models with multiple latent variables and relationships. Based on preliminary data and theoretical considerations regarding effect sizes, our sample size is robust for capturing meaningful relationships without requiring a larger cohort. Additionally, the sample's homogeneity and the precision of our measurement instruments further support its adequacy in addressing the complexities inherent in our research questions.

Therefore, data analysis was conducted using Partial Least Square-Structure Equation Modeling (PLS-SEM) with the help of SmartPLS 3 software. This method was chosen to analyze the relationships between the variables in the study, namely attitude behavior tendencies and knowledge orientation, the MER approach, and learning effectiveness. Through this approach, the study aims to understand the extent to which attitude behavior tendencies and knowledge orientation influence the effectiveness of Maritime English learning through the MER approach as a mediator. This analysis provides in-depth insights into the factors contributing to the success of Maritime English learning among maritime students and the effectiveness of the MER approach in enhancing their language competence.

4. Result

In this study, the Partial Least Square-Structure Equation Modeling (PLS-SEM) method was applied to analyze the relationships between latent variables and their indicators, as well as to test the model involving mediation variables. The process began with constructing the measurement model, which assesses how the indicators of each latent variable, namely attitude behavior tendencies, knowledge orientation, Maritime English Reconstruction (MER), and learning effectiveness, perform. Reliability and validity tests were then conducted to measure the reliability and validity of the latent variables. The structural model was analyzed to test the causal relationships between the latent variables. Hypothesis testing was carried out using T Statistics and P Values to determine the significance of the relationships. The R Square measure provides an overview of how well the independent variables explain the variability of the dependent variable, while the F Square

measure assesses the contribution of each variable to the model.

Table 1. Standard Loading Factor

Latent Variable	Indicator	Std. Loading Factor
Attitude Behavior Tendencies	ABT1	0.854
	ABT2	0.897
	ABT3	0.769
	ABT4	0.838
Knowledge Orientation	KNO1	0.850
	KNO2	0.887
	KNO3	0.876
	KNO4	0.910
	KNO5	0.880
Maritime English Reconstruction	MER1	0.903
	MER2	0.905
	MER3	0.853
	MER4	0.929
Learning Effectiveness	LEE1	0.757
	LEE2	0.749
	LEE3	0.790
	LEE4	0.840
	LEE5	0.844

In the testing of standard loading factors, an indicator is considered reliable in measuring a latent variable if the obtained standard loading factor value is greater than 0.7. Table 1 shows the contribution of each indicator in measuring the latent variables. For the variable attitude behavior tendencies, the indicator ABT1 has a loading factor value of 0.854, indicating a strong contribution to measuring this latent variable. The indicator ABT2 has the highest loading factor value of 0.897, making it the strongest indicator among the others. Indicator ABT3, with a loading factor value of 0.769, shows a fairly strong contribution. Indicator ABT4 has a loading factor value of 0.838, which also indicates a strong and reliable contribution in measuring this latent variable.

For the latent variable knowledge orientation, the indicator KNO1 has a loading factor value of 0.850, showing a strong contribution to measuring this latent variable. Indicator KNO2 has a loading factor value of 0.887, indicating that KNO2 is highly reliable and contributes significantly to measuring this latent variable. Indicator KNO3 has a loading factor value of 0.876, also showing a strong and reliable contribution in measuring knowledge orientation. Indicator KNO4 has the highest loading factor value of 0.910, making it the strongest indicator among all the indicators used. Indicator KNO5 has a loading factor value of 0.880, showing a strong and fairly reliable contribution in measuring knowledge orientation.

For the indicators measuring the latent variable Maritime English Reconstruction (MER), the indicator MER1 has a loading factor value of 0.903, indicating a very strong contribution to measuring this latent variable. The indicator MER2, with a loading factor value of 0.905, is slightly higher than MER1, showing that MER2 is also very strong and reliable in measuring this latent variable. Indicator MER3 has a loading factor value of 0.853, indicating a strong and significant contribution to measuring the MER approach. Indicator MER4 has the highest loading factor value of 0.929, making it the strongest indicator among all the indicators used.

For the indicators measuring the latent variable learning effectiveness, indicator LEE1 has a loading factor value of 0.757, showing a fairly strong contribution to measuring learning effectiveness. Indicator LEE2 has a loading factor value of 0.749, indicating a significant contribution. Indicator LEE3 has a loading factor value of 0.790, showing a stronger contribution compared to LEE1 and LEE2, and indicating that LEE3 is a reliable indicator in measuring learning effectiveness. LEE1 has a loading of 0.757, which is above the threshold of 0.7, indicating that it reliably represents its latent construct. This suggests that the corresponding manifest variable effectively captures the variability of its intended construct, ensuring measurement reliability. Indicator LEE4, with a loading factor value of 0.840, shows a very strong and significant contribution to measuring this latent variable. Indicator LEE5 has the highest loading factor value of 0.844, making it the strongest indicator among all the indicators used.

Table 2. Reliabilities and Validity

Latent Variable	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Attitude Behavior Tendencies	0.863	0.907	0.906	0.707
Knowledge Orientation	0.928	0.931	0.945	0.776
Maritime English Reconstruction	0.920	0.921	0.943	0.807
Learning Effectiveness	0.862	0.894	0.897	0.636

In the reliability test, a variable is considered reliable and dependable if the values for Cronbach's Alpha, rho_A, or Composite Reliability are greater than 0.7. The results in Table 2 show that for the variable attitude behavior tendencies, Cronbach's Alpha is 0.863, rho_A is 0.907, and Composite Reliability is 0.906. These values indicate that this variable is highly reliable, with all indicators used to measure this variable being consistent and dependable. The variable knowledge orientation demonstrates very high reliability with a Cronbach's Alpha of 0.928, rho_A of 0.931, and Composite Reliability of 0.945. This indicates strong internal consistency among its indicators, making this variable's measurement very reliable and valid. The variable Maritime English Reconstruction (MER) also shows very high reliability, with Cronbach's Alpha of 0.920, rho_A of 0.921, and Composite Reliability of 0.943. These values indicate that the MER approach is measured with high consistency among its indicators, making it highly reliable. For the variable learning effectiveness, Cronbach's Alpha is 0.862, rho_A is 0.894, and Composite Reliability is 0.897. These values show that the indicators used to measure learning effectiveness are consistent and reliable.

In validity testing, a variable with an Average Variance Extracted (AVE) value greater than 0.6 has a high level of validity. The validity test results in Table 2 show that the variable attitude behavior tendencies have an AVE value of 0.707. This value indicates that more than 70% of the variability explained by the indicators can be attributed to the latent variable attitude behavior tendencies. The variable knowledge orientation shows very good validity with an AVE value of 0.776. This value indicates that nearly 78% of the variability explained by the indicators can be attributed to the latent variable knowledge orientation. The variable Maritime English Reconstruction (MER) has an AVE value of 0.807, which is the highest among all the latent variables tested. This value shows that more than 80% of the variability is explained, indicating that the indicators used to measure the MER approach are very valid and reliable. For the variable learning effectiveness, the AVE value is 0.636, indicating that more than 63% of the variability is explained, and the indicators used are sufficiently valid in representing this latent variable.
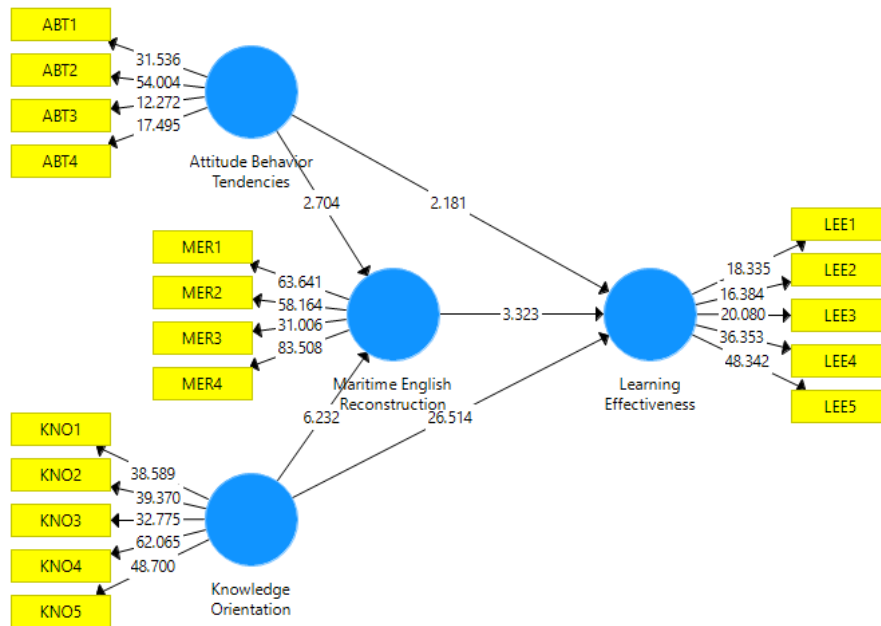

Figure 2. Hypothesis framework

Table 3. Hypothesis Testing

Hypothesis	Std. Deviation	T Statistics	P Values	Information
Attitude Behavior Tendencies -> Maritime English Reconstruction	0.069	2.704	0.007	Significant
Attitude Behavior Tendencies -> Learning Effectiveness	0.038	2.181	0.030	Significant
Knowledge Orientation -> Maritime English Reconstruction	0.072	6.232	0.000	Significant
Knowledge Orientation -> Learning Effectiveness	0.029	26.514	0.000	Significant
Maritime English Reconstruction -> Learning Effectiveness	0.048	3.323	0.001	Significant
Attitude Behavior Tendencies -> Maritime English Reconstruction -> Learning Effectiveness	0.014	2.068	0.039	Significant
Knowledge Orientation -> Maritime English Reconstruction -> Learning Effectiveness	0.022	3.154	0.002	Significant

Hypothesis testing is based on T Statistics (> 1.96) and P Values (0.05) to determine the significance of relationships between variables. The results of the hypothesis testing in Table 3 show that for the first hypothesis, which tests the effect of attitude behavior tendencies on

Maritime English Reconstruction, the T-statistic value is 2.704 with a p-value of 0.007. The p-value being less than 0.05 indicates that the effect of attitude behavior tendencies on Maritime English Reconstruction is statistically significant. The second hypothesis, which examines the effect of attitude behavior tendencies on learning effectiveness, shows a T-statistic value of 2.181 and a p-value of 0.030. This means that the relationship is significant, indicating that attitude behavior tendencies have a significant impact on learning effectiveness. Supporting the findings of English et al. (2020) and Abd Razak et al. (2022), this result highlights the importance of considering attitude and behavior aspects in the Maritime English learning process. Training and educational programs that integrate elements of motivation, positive attitudes, and effective behavioral strategies can improve Maritime English learning outcomes and enhance communication skills in the maritime industry context. This approach may also be useful for generally improving learning effectiveness, which impacts better mastery of skills and knowledge.

The third hypothesis, which tests the effect of knowledge orientation on Maritime English Reconstruction (MER), shows a very high T-statistic value of 6.232 and a p-value of 0.000, indicating that this effect is highly significant. The fourth hypothesis, which examines the effect of knowledge orientation on learning effectiveness, shows an exceptionally high T-statistic value of 26.514 and a p-value of 0.000, affirming that knowledge orientation has a very substantial impact on learning effectiveness. These findings are consistent with Dirgeyasa (2018) and Vidhiasi & Syihabuddin (2022), which emphasize the importance of knowledge orientation in the learning process. Educational and training institutions should consider ways to enhance learners' knowledge orientation, such as by providing engaging, relevant, and challenging materials. This can be achieved by designing training programs that focus not only on technical content but also on strategies to motivate learners and stimulate interest in the learning material. Thus, improving knowledge orientation will contribute to better language mastery and learning effectiveness.

In the fifth hypothesis, which tests the effect of Maritime English Reconstruction on learning effectiveness, the T-statistic value is 3.323 with a p-value of 0.001. This indicates that Maritime English Reconstruction has a significant impact on learning effectiveness. The results of the sixth hypothesis, which examines the mediating effect of Maritime English Reconstruction on the relationship between attitude behavior tendencies and learning effectiveness, show a T-statistic value of 2.068 with a p-value of 0.039. This means that Maritime English Reconstruction plays an important role as a mediator in the relationship between attitude behavior tendencies and learning effectiveness. The seventh hypothesis, which tests the mediating effect of Maritime English Reconstruction on the relationship between knowledge orientation and learning effectiveness, has a T-statistic value of 3.154 and a p-value of 0.002. This indicates that Maritime English Reconstruction acts as a significant mediator in the relationship between knowledge orientation and learning effectiveness.

These findings have important implications for the design and implementation of Maritime English training programs. Programs adopting the Maritime English Reconstruction approach can offer a more immersive and contextual learning experience, which, in turn, enhances learning effectiveness. Additionally, to improve the effectiveness of Maritime English learning, it is also crucial to ensure that the reconstruction methods are applied effectively. By using methods that simulate real-world situations and focus on practical applications, learners can acquire better skills in Maritime English, improving their ability to communicate effectively in professional environments. It is important for educators and training providers to incorporate the reconstruction approach into the curriculum and ensure that the methods used are relevant to the needs of the maritime industry.

Table 4. R Square

Latent Variable	R Square	R Square Adjusted
Maritime English Reconstruction	0.290	0.281
Learning Effectiveness	0.804	0.800

The R Square test results in Table 4 show that for the Maritime English Reconstruction variable, the R Square value is 0.290 and the Adjusted R Square value is 0.281. An R Square value of 0.290 indicates that 29% of the variability in the Maritime English Reconstruction variable can be explained by the independent variables in the model. The slightly lower Adjusted R Square value of 0.281 suggests that, after accounting for the number of variables in the model, the proportion of explained variability is still significant but more conservative. This indicates that the model has a moderate ability to explain the variability in Maritime English Reconstruction.

On the other hand, the learning effectiveness variable shows a very high R Square value of 0.804, with an Adjusted R Square value of 0.800. An R Square value of 0.804 indicates that 80.4% of the variability in learning effectiveness can be explained by the independent variables in the model. The slightly lower Adjusted R Square value of 0.800 suggests that, although more conservative, the model remains highly effective in explaining the variability in learning effectiveness. This indicates that the model has an excellent ability to explain the factors influencing learning effectiveness.

Table 5. f-square

Latent Variable	Maritime English Reconstruction	Learning Effectiveness
Attitude Behavior Tendencies	0.043	0.03
Knowledge Orientation	0.247	2.147
Maritime English Reconstruction		0.09

The f-square test results in Table 5 show that for the Maritime English Reconstruction variable, the effect size of the attitude behavior tendencies variable is 0.043, indicating a small effect size. This means that the attitude behavior tendencies variable contributes relatively little to the variability in Maritime English Reconstruction. Meanwhile, the knowledge orientation variable has an effect size of 0.247,

indicating a medium effect size. This suggests that knowledge orientation has a significant contribution to the variability in Maritime English Reconstruction. For the learning effectiveness variable, the effect size of the attitude behavior tendencies variable is 0.030, which also indicates a small effect size. This shows that the contribution of attitude behavior tendencies to the variability in learning effectiveness is relatively minor. However, the knowledge orientation variable exhibits a very large effect size of 2.147, indicating a very significant contribution to the variability in learning effectiveness.

Overall, the findings are consistent with previous research which consistently supports the idea that improving Maritime English skills significantly enhances learning effectiveness and operational safety in maritime environments (James et al., 2018). Studies have highlighted how better communication through Maritime English can lead to smoother operations and reduced risks at sea (James et al., 2018; Abdullah et al., 2020). It's been shown that proficiency in Maritime English is crucial for effective communication and teamwork among maritime professionals, which improves overall efficiency and safety (Dewan et al., 2023; Vidhiasi & Syihabuddin, 2022). These studies emphasize the importance of targeted language training in maritime education, suggesting it can enhance learning outcomes and professional skills (Nesaratnam et al., 2020; Fan & Yang, 2023).

5. Conclusion

The research findings indicate that all tested hypotheses yielded significant results, revealing important relationships between attitude behavior tendencies, knowledge orientation, Maritime English Reconstruction, and learning effectiveness. Attitude behavior tendencies have a significant impact on the implementation of Maritime English Reconstruction methods and on learning effectiveness. This suggests that positive attitudes and behaviors of learners contribute to better use of reconstruction methods and more effective learning outcomes. Additionally, knowledge orientation also significantly affects both aspects. Individuals with high knowledge orientation are more likely to adopt reconstruction methods effectively and achieve better learning outcomes, emphasizing the importance of motivation and in-depth understanding in learning.

In addition to the direct effects, Maritime English Reconstruction has been shown to play a significant mediating role in the relationship between attitude behavior tendencies and learning effectiveness, as well as between knowledge orientation and learning effectiveness. This indicates that the reconstruction method acts as a bridge connecting learners' attitudes and knowledge with learning outcomes, amplifying the positive impact of both factors. These findings imply that the design of Maritime English training programs should focus on developing learners' positive attitudes and knowledge orientation, as well as integrating relevant and practical reconstruction methods. Programs that support the development of proactive attitudes and knowledge orientation will enhance learning effectiveness. Therefore, educational institutions should consider these components when designing and evaluating curricula to ensure that learners can fully benefit from reconstruction methods and achieve optimal learning outcomes.

Moreover, the research findings have significant practical implications for the international maritime industry. The demonstrated relationships between attitude behavior tendencies, knowledge orientation, Maritime English Reconstruction (MER), and learning effectiveness underscore the importance of fostering positive attitudes and a strong knowledge base among maritime professionals. Training programs should prioritize the development of learners' proactive attitudes and a deep understanding of maritime subjects, as these factors significantly enhance the effectiveness of MER methods and overall learning outcomes.

To implement these insights, maritime training institutions and companies should integrate MER techniques into their curricula, ensuring that reconstruction methods are relevant and contextual to real-world maritime scenarios. This approach will help bridge the gap between theoretical knowledge and practical application, leading to more competent and confident maritime professionals. Furthermore, companies should invest in continuous professional development programs that encourage positive behavior tendencies and a knowledge-oriented mindset. This can be achieved through workshops, simulations, and real-life scenario training that promote critical thinking and problem-solving skills.

While the study's findings highlight significant relationships between attitude behavior tendencies, knowledge orientation, Maritime English Reconstruction (MER), and learning effectiveness, several limitations warrant consideration. The research relies on self-reported data from a single study snapshot, potentially overlooking changes in attitudes and orientations over time. Furthermore, the study's focus on a specific demographic or educational context may limit generalizability across diverse maritime settings. Additionally, the reliance on cross-sectional data precludes establishing causal relationships among variables. Future studies should adopt a longitudinal approach to investigate how attitude behavior tendencies and knowledge orientation evolve over the course of students' education in maritime English. Such research would provide comprehensive insights into the long-term influence of these factors on learning effectiveness, potentially uncovering dynamic trends and shifts that a single-point snapshot cannot capture. Addressing this gap would enhance the practical implications of findings, guiding ongoing curriculum development and improving educational outcomes in maritime English education.

Authors' contributions

VFA = conceptualization and methodology development, data curation and investigation, manuscript drafting, manuscript review and editing, and supervision. FT= research conceptualization and methodology design, data analysis and software development contribution, visualization and findings validation, and manuscript review and editing. All authors contributed equally to the study.

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