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The Effect of Self-Efficacy on Academic Performance: The Mediating Role of Adaptation and Motivation in Seafaring Students

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Abstract

This study examined the mediating roles of academic adaptation and motivation in the relationship between self-efficacy and academic performance among seafaring students. A quantitative research design using Structural Equation Modeling (SEM) with a Partial Least Square (PLS) approach was employed to analyze data collected from 284 Polytechnic Bumi Akpelni, selected from a population of 976 students across four maritime programs. Results revealed that while self-efficacy did not directly influence academic performance, it had a significant indirect effect through academic adaptation. Academic adaptation strongly mediated the relationship between self-efficacy and academic performance, whereas motivation, surprisingly, showed no significant mediating effect. The findings highlight the crucial role of adaptation capabilities in maritime education, suggesting that high self-efficacy primarily enhances academic performance by enabling better adaptation to the unique demands of maritime education. While this study provides valuable insights for maritime institutions in developing student support programs, its cross-sectional nature and single-institution focus suggest the need for longitudinal studies across multiple maritime institutions to better understand these relationships over time.

Keywords: *Self-Efficacy, Academic Adaptation, Maritime Education, Academic Performance, Student Motivation.*

Introduction

Academic performance in higher education is important in shaping students' future careers and professional development. Understanding the factors influencing academic performance is particularly important in the maritime education, where students (cadets) must adapt to unique academic and practical training demands. Self-efficacy, a student's belief in their ability to perform the behaviors necessary to attain a particular performance, has emerged as an important factor in academic achievement. High self-efficacy is more likely to engage in deeper learning strategies, which in turn leads to improved academic outcomes (Chen et al., 2023a).

The maritime education environment presents different challenges for students, requiring them to balance theoretical knowledge with practical skills while adapting to the institution's highly disciplined culture. At Politeknik Bumi Akpelni, as at many maritime education institutions across Indonesia, cadets must navigate these challenges while preparing for careers in the global maritime industry. Students who demonstrate high levels of academic adaptation tend to experience lower levels of burnout and higher academic performance (Noronha et al., 2024). This adaptability is often mediated by self-efficacy, as students who believe in their abilities are more likely to adapt effectively to changing circumstances and academic challenges (She et al., 2023).

Motivation, especially intrinsic motivation, also significantly contributes to academic performance. It has been shown that intrinsically motivated students tend to engage more deeply with their studies, leading to better retention of knowledge and skills (Jaramillo-Mediavilla et al., 2024). Moreover, the interaction between self-efficacy and motivation suggests that students who believe in their abilities are more likely to be motivated to succeed, creating a positive feedback loop that improves academic performance (Feraco et al., 2023). The importance of providing strong support systems that foster resilience and adaptability among students, especially those in specialized fields such as sailing (Moosa & Aloka, 2023).

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This research makes a novel contribution to the existing literature by focusing on the specific context of maritime education in Indonesia, thus providing relevant insights for maritime education institutions and stakeholders. By examining the nuances of self-efficacy, adaptation, and motivation in this specific educational context, this study aims to offer tailored recommendations to improve academic performance among seafaring students. This study analyzes the influence of self-efficacy on academic performance through the mediating role of academic adaptation and motivation among seafaring students, with the ultimate goal of improving educational outcomes in maritime education institutions.

Theoretical Analysis and Research Hypothesis

Self-Efficacy and Academic Performance

Self-efficacy, as defined by Bandura, refers to an individual's belief in his or her ability to perform the behaviors necessary to bring about the attainment of a particular performance (X. Liu et al., 2024). This concept is particularly important in educational settings, where students' perceptions of their abilities can significantly impact motivation, engagement, and academic success. Students with higher academic self-efficacy tend to achieve better academic results (Alhadabi & Karpinski, 2020; Alzabidi et al., 2024).

H1. Self-efficacy has a positive effect on academic performance.

Self-Efficacy and Academic Adaptation

Academic self-efficacy increases student motivation and resilience, leading to better academic outcomes and adaptation strategies (Wang et al., 2022). The positive correlation between high self-efficacy and academic success reinforces the idea that self-efficacy is an important predictor of academic performance (Majeed, 2022). Students with high adaptability are less likely to experience academic burnout, suggesting that adaptability and self-efficacy are interconnected factors that contribute to academic success (Bulfone et al., 2022; Xie et al., 2019).

H2. Self-efficacy has a positive effect on academic adaptation.

Self-Efficacy and Academic Motivation

Self-efficacy plays an important role in shaping academic motivation. Students who believe in their abilities are more likely to engage in academic tasks and persist in overcoming challenges (Habib et al., 2023; Shrestha & Tuladhar, 2021). Self-efficacy improves academic performance (Basileo et al., 2024; Haji Vosoogh et al., 2022). The interaction between self-efficacy and motivation is particularly evident across a range of student populations, where self-efficacy has been linked to levels of intrinsic and extrinsic motivation (Shrestha & Tuladhar, 2021). Fostering self-efficacy can be a strategic approach to improving motivation and academic performance in various educational settings.

H3. Self-efficacy has a positive effect on motivation.

Adaptation and Academic Performance

Adaptation plays an important role in shaping academic performance among college students (Andersen, 2024; MacCann et al., 2020; Shahzadi et al., 2024). Adaptability and resilience among college students are critical to improving academic performance. In addition, academic adaptability is directly linked to reduced study burnout and increased perseverance, indicating that students who can adjust to academic demands are more likely to succeed (Chen et al., 2023b; Dima et al., 2022). Overall, fostering adaptability in students is critical to improving their engagement and academic success across a range of educational contexts (Noronha et al., 2024; Xie et al., 2019).

H4. Academic adaptation positively influences academic performance.

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Motivation and Academic Performance

Motivation plays an important role in shaping academic performance among college students. Motivation significantly improves academic outcomes (Shala et al., 2024; Steinmayr et al., 2019; Wu et al., 2020). Intrinsic motivation had a moderate positive effect on academic performance, while extrinsic motivation showed negligible influence (Liu et al., 2020). In addition, self-efficacy, closely related to motivation, also contributes to better academic performance by encouraging students to set higher goals and persevere through challenges (Gill & Aujla, 2024). In addition, the interaction between motivation and learning engagement is critical; motivated students tend to engage more deeply with lessons, leading to improved academic outcomes (Shala et al., 2024; Steinmayr et al., 2019; Wu et al., 2020).

H5. Motivation positively affects academic performance.

Mediating Impact of Adaptation

Self-efficacy and academic performance can be mediated by academic adjustment. Students with higher self-efficacy are better equipped to adapt to academic challenges, leading to improved performance. Self-efficacy increases students' confidence in their abilities, which in turn promotes better academic engagement and performance outcomes (Alzabidi et al., 2024; Meng & Zhang, 2023). Academic self-efficacy is positively correlated with academic performance, with academic engagement serving as an important mediator in this relationship (Meng & Zhang, 2023). Similarly, personal characteristics such as self-efficacy shape students' academic goals, which in turn affect performance (Alhadabi & Karpinski, 2020; Wang et al., 2022).

H6. Academic adaptation mediates the relationship between self-efficacy and academic performance.

Mediating Impact of Motivation

Motivation is important in the relationship between self-efficacy and academic performance. Self-efficacy, or belief in one's abilities, significantly affects motivation, which in turn affects academic outcomes (Alhadabi & Karpinski, 2020). Self-efficacy is positively correlated with motivation and academic performance, emphasizing the mediating role of learning engagement (Wu et al., 2020). Motivation is critical to self-efficacy, as motivated individuals are more likely to utilize abilities effectively, leading to better academic outcomes (Haidari et al., 2023; Shamdas, 2023).

H7. Motivation mediates the relationship between self-efficacy and academic performance.

Conceptual Model

Based on the theoretical analysis and previous research findings, a conceptual framework was developed to examine the relationships between self-efficacy, academic performance, and the mediating roles of adaptation and motivation in maritime education. This framework integrates several theoretical perspectives, including Bandura's self-efficacy theory, Baker and Siryk's concept of academic adaptation, and Alderfer's ERG theory of motivation, to understand the complex pathways through which psychological factors influence academic achievement in seafaring students.

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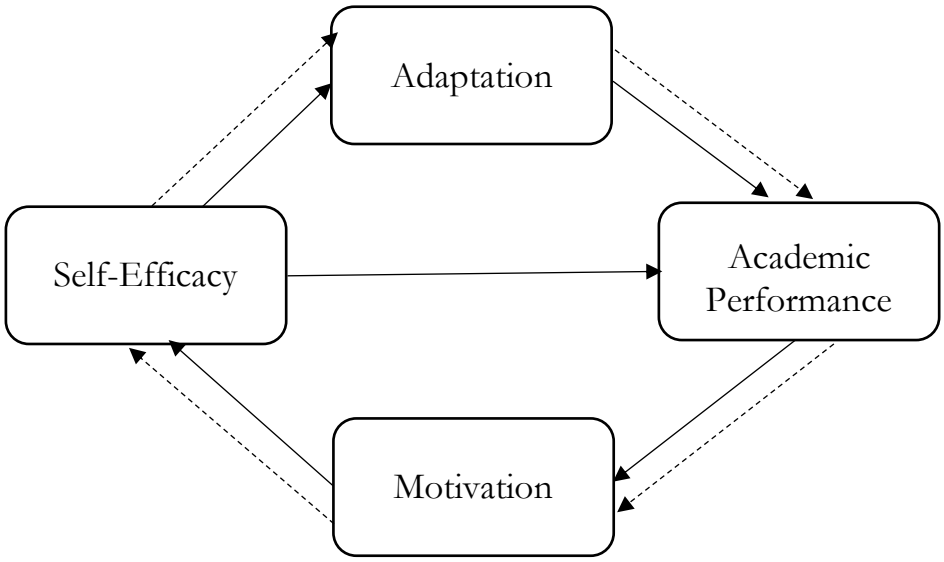

Figure 1. Conceptual Model

Figure 1 illustrates this study's conceptual model, depicting direct and indirect relationships between the variables. The model proposes that self-efficacy may influence academic performance through multiple pathways. The solid line represents the direct relationship between self-efficacy and academic performance, while the dashed lines indicate potential indirect effects through two mediating variables: adaptation and motivation. The model suggests that self-efficacy might enhance academic performance directly through increased confidence and capability beliefs and indirectly by facilitating better academic adaptation and increasing student motivation. Academic adaptation is conceptualized as students' ability to adjust to the unique demands of maritime education, while motivation represents their drive and persistence in academic pursuits. These mediating variables are hypothesized to serve as crucial mechanisms to transform self-efficacy beliefs into actual academic performance outcomes in the maritime education context.

Materials and Methods

Research Design

This study employed a quantitative research design using path analysis to examine direct and indirect relationships between self-efficacy, academic adaptation, motivation, and academic performance. The study utilized Structural Equation Modeling (SEM) with a Partial Least Square (PLS) approach using PLS 3 software. This method was chosen because it allows for simultaneous testing of measurement and structural models (construct validity and reliability).

Sampling and Data Collection

The population comprises 976 seafaring students at Politeknik Bumi Akpelni across four major programs: Marine Transportation, Port and Logistics Management, Ship Operations Engineering Technology, and Ship Engineering Technology. Using Slovin's formula with a 5% error margin, a sample size of 284 students was determined:

$n = N/(1+N.e^2)$ $n = 976/ (1+(976) (0.05)^2)$ $n = 284$

Data collection was conducted using a questionnaire with a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire measured:

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1. Academic Performance (6 indicators based on Bernardin & Russell theory)
2. Academic Adaptation (4 indicators based on Baker & Siryk theory)
3. Motivation (3 indicators based on Alderfer's ERG theory)
4. Self-Efficacy (3 indicators based on Bandura's theory)

Data Analysis Technique

The data analysis in this study was conducted using Structural Equation Modeling (SEM) with Partial Least Square (PLS) approach. This technique was chosen for its ability to handle complex predictive models and its suitability for theory development research. The analysis process began with testing the measurement model (outer model) to ensure the validity and reliability of the research constructs. This included examining convergent validity through factor loadings and Average Variance Extracted (AVE), assessing discriminant validity via cross-loading examination, and evaluating reliability through composite reliability and Cronbach's alpha measures.

Following the measurement model validation, the structural model (inner model) was evaluated to assess the relationships between variables. This phase involved analyzing the R-Square values to determine the model's predictive power, examining path coefficients to understand the strength and direction of relationships, and calculating effect sizes to measure the impact of predictor variables. The model's overall fit was assessed using the Goodness of Fit Index (GoF) and its predictive relevance through Q^2 values.

The final analysis phase involved hypothesis testing using the bootstrapping method to examine direct and indirect effects. Direct relationships were tested by examining t-statistics and p-values, with significance determined at the 0.05 level. The Sobel test assessed the significance of indirect relationships through the mediating variables for mediating effects. All analyses were performed using Smart PLS 3.0 software, providing comprehensive tools for measurement validation and structural model testing.

Results

Measurement Model Assessment

The measurement model was evaluated through convergent validity, discriminant validity, and reliability tests. Convergent validity was assessed through factor loadings and Average Variance Extracted (AVE). All remaining indicators showed satisfactory loadings after removing items with low loadings (>0.7). The AVE values for all constructs exceeded the threshold of 0.5, as shown in Table 1.

Table 1. Average Variance Extracted (AVE) Values

Construct	AVE
Academic Adaptation	0.623
Motivation	0.565
Self-Efficacy	0.637
Academic Performance	0.507

Reliability Assessment

The reliability assessment demonstrated good internal consistency for all constructs, with Composite Reliability and Cronbach's Alpha values exceeding 0.9, as presented in Table 2.

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Table 2. Reliability Assessment

Construct	Cronbach's Alpha	Composite Reliability
Academic Adaptation	0.953	0.959
Self-Efficacy	0.955	0.961
Academic Performance	0.947	0.953
Motivation	0.939	0.947

Structural Model Assessment

Direct Effects

The structural model was evaluated using path coefficients, t-statistics, and p-values. The hypothesis testing revealed several significant relationships, as shown in Table 3.

Table 3. Path Analysis Results for Direct Effects

Hypothesis	Path	Path Coefficient	t-value	p-value	Result
H1	Self-Efficacy → Academic Performance	0.18	1.71	0.09	Not significant
H2	Self-Efficacy → Academic Adaptation	0.84	34.82	0.00	significant
H3	Self-Efficacy → Motivation	0.77	22.26	0.00	significant
H4	Academic Adaptation → Academic Performance	0.65	6.30	0.00	significant
H5	Motivation → Academic Performance	0.05	0.58	0.56	Not significant

Mediation Analysis

The mediation analysis revealed the following indirect effects

Table 4. Mediation Analysis Results

Hypothesis	Path	Path Coefficient	t-value	p-value	Result
H6	Self-Efficacy → Academic Adaptation → Academic Performance	0.54	6.03	0.00	significant
H7	Self-Efficacy → Motivation → Academic Performance	0.04	0.57	0.57	Not significant

Summary of Hypothesis Testing

H1: Self-efficacy has a positive effect on academic performance.

- Not significant ($\beta = 0.18$, $t = 1.71$, $p = 0.09$)
- The direct effect of self-efficacy on academic performance was not significant.

H2: Self-efficacy positively influences academic adaptation.

- Significant ($\beta = 0.84$, $t = 34.82$, $p < 0.01$)

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- Self-efficacy showed a strong positive effect on academic adaptation.

H3: Self-efficacy positively influences motivation.

- Significant ($\beta = 0.77$, $t = 22.26$, $p < 0.01$)
- Self-efficacy demonstrated a significant positive effect on motivation.

H4: Academic adaptation positively influences academic performance.

- Significant ($\beta = 0.65$, $t = 6.30$, $p < 0.01$)
- Academic adaptation showed a significant positive effect on academic performance.

H5: Motivation positively affects academic performance.

- Not significant ($\beta = 0.05$, $t = 0.58$, $p = 0.56$)
- The direct effect of motivation on academic performance was not significant.

H6: Academic adaptation mediates the relationship between self-efficacy and academic performance.

- Significant ($\beta = 0.54$, $t = 6.03$, $p < 0.01$)
- Academic adaptation significantly mediates the relationship between self-efficacy and academic performance.

H7: Motivation mediates the relationship between self-efficacy and academic performance.

- Not significant ($\beta = 0.04$, $t = 0.57$, $p = 0.57$)
- Motivation does not significantly mediate the relationship between self-efficacy and academic performance.

The results indicate that while self-efficacy does not directly influence academic performance, it has a significant indirect effect through academic adaptation. The mediating role of academic adaptation is crucial in translating self-efficacy into improved academic performance. However, contrary to expectations, motivation neither directly affects academic performance nor mediates the relationship between self-efficacy and academic performance in seafaring students.

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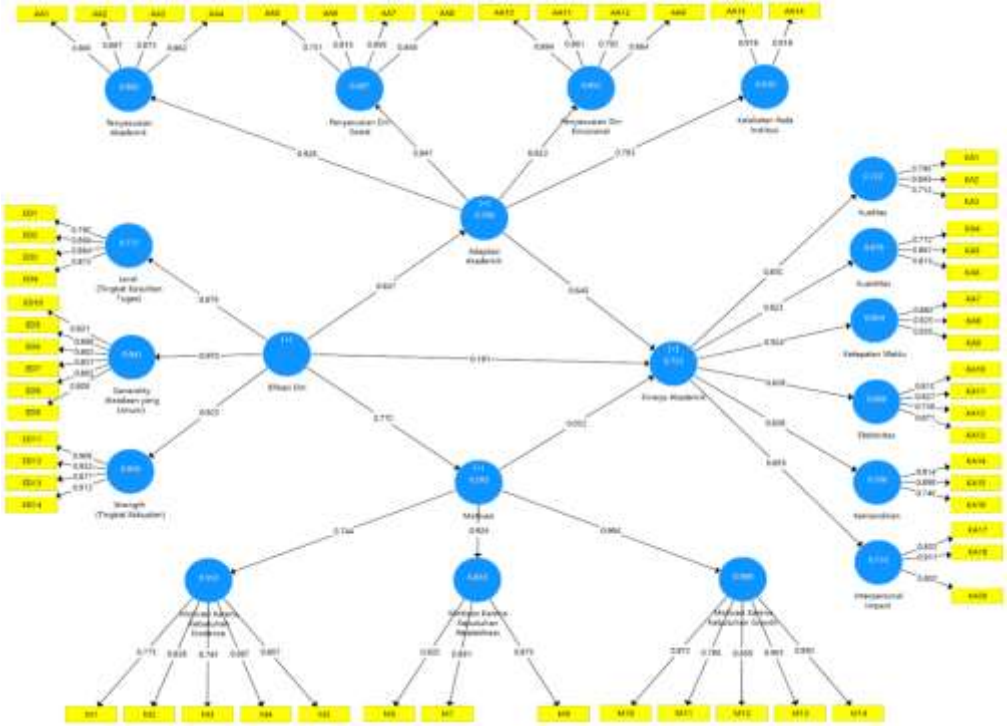

Figure 1. The Final Structural Model

The structural equation modeling (SEM) Smart PLS analysis revealed complex relationships among the study variables. Figure 1 presents the final structural model, illustrating the measurement model (outer model) and the constructs' structural relationships (inner model). The model demonstrates a hierarchical structure where self-efficacy influences academic performance directly and indirectly through academic adaptation and motivation.

The structural model depicts four main constructs: Self-Efficacy, Academic Adaptation, Motivation, and Academic Performance. Each construct is measured through multiple dimensions and indicators, as the yellow boxes represent observed variables. The blue circles represent latent variables (constructs and their dimensions). The paths between constructs show standardized path coefficients, indicating the strength and direction of relationships.

Self-efficacy is measured through three dimensions: Level (difficulty level), Generality (general conditions), and Strength. Academic Adaptation comprises four dimensions: Academic Adjustment, Social Adjustment, Emotional Adjustment, and Institutional Attachment. Motivation is assessed through three dimensions based on ERG theory: Existence Needs, Relatedness Needs, and Growth Needs. Finally, Academic Performance is evaluated through six dimensions: Quality, Quantity, Timeliness, Effectiveness, Independence, and Interpersonal Impact.

The numerical values on the paths represent standardized path coefficients, indicating the strength of relationships between variables. For instance, the model shows a strong path coefficient (0.84) from Self-Efficacy to Academic Adaptation, suggesting a robust positive relationship. Similarly, the relationship between Academic Adaptation and Academic Performance shows a substantial path coefficient (0.65), indicating a significant positive effect.

This comprehensive model visualization helps understand the complex interplay between students' self-efficacy beliefs, adaptation to academic life, motivation levels, and academic performance in maritime education.

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Discussion

This study analyzed the relationships among self-efficacy, academic adaptation, motivation, and academic performance among seafaring students. The findings reveal some important insights regarding how self-efficacy influences academic performance in maritime education.

Contrary to expectations, this study did not find a significant direct effect of self-efficacy on academic performance. This finding is in contrast to previous research. Students with higher academic self-efficacy tend to show better academic results due to increased confidence in the ability to succeed in academic tasks (Hayat et al., 2020; Lei et al., 2022; Meng & Zhang, 2023). This relationship is supported by evidence showing that self-efficacy influences student motivation and engagement, leading to improved academic performance (Bhati et al., 2022; Boahene et al., 2019; Meng & Zhang, 2023). In addition, self-efficacy has been shown to mediate the effects of various factors, such as anxiety and social support, on academic performance (Alemany-Arrebola et al., 2020; Mahmood et al., 2023; Xu et al., 2023). Conversely, some studies suggest that the relationship between self-efficacy and academic performance may not always be direct. For example, certain interventions aimed at increasing self-efficacy did not result in statistically significant improvements in academic performance (Foulstone & Kelly, 2019). In addition, academic self-efficacy can sometimes interact negatively with stressors, leading to decreased performance under pressure (Gao et al., 2023).

The main finding of this study is the significant mediating role of academic adaptation in the relationship between self-efficacy and academic performance. The results show that self-efficacy affects academic performance primarily through its influence on students' ability to adapt to the academic environment. Self-efficacy, defined as an individual's belief in his or her abilities, directly affects academic outcomes (Usán Supervía & Quílez Robres, 2021). Students with high self-efficacy are more likely to engage in adaptive behaviors, such as effective study strategies and seeking help when needed, thus increasing academic success (Ugwuanyi et al., 2020).

Interestingly, the relationship between motivation and academic performance showed an unexpected pattern. Although self-efficacy showed a strong positive relationship with motivation, this study found that motivation did not directly affect or mediate the relationship between self-efficacy and academic performance. Ronquillo-Elvina found no significant correlation between extrinsic motivation and academic performance, indicating that external rewards do not necessarily improve academic outcomes (Ronquillo-Elvina & Quirap, 2024). Similarly, Supervía et al. reported that extrinsic motivational factors did not significantly affect academic performance, suggesting that reliance on external motivators may not be beneficial (Supervía et al., 2019). However, Wu et al. highlighted that although self-efficacy is a significant predictor of academic performance, it works in conjunction with motivation, with learning engagement as an important mediator (Wu et al., 2020). This contrasts with findings from Shukla, who noted that academic motivation accounted for only a small difference in performance, further emphasizing the limited role of motivation in direct academic achievement (Shukla, 2023).

The results suggest that the pathway from self-efficacy to academic success is not direct but through crucial academic adaptation mechanisms. This understanding has important implications for how maritime institutions approach student development and support. The emphasis should be on developing self-efficacy and adaptability rather than on either aspect alone. The results suggest that successful academic performance in this context relies heavily on students' ability to adapt to these specific demands, with self-efficacy as a foundational resource enabling effective adaptation.

Conclusions

The study provides valuable insights into the complex relationships between psychological factors and academic performance in maritime education. The findings demonstrate that self-efficacy influences academic performance primarily through indirect pathways, specifically through academic adaptation, rather than directly. Academic adaptation is a crucial mediating mechanism, transforming students' self-

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efficacy beliefs into improved academic performance. While self-efficacy enhances student motivation, motivation alone does not significantly impact academic performance in the maritime education context. The maritime education environment may present unique challenges that require specific adaptation strategies beyond general academic self-efficacy.

Practical Implications of Research

The findings of this study have significant implications for maritime education institutions. Educational programs should be designed to enhance students' adaptive capabilities alongside technical skills, with particular attention to integrating adaptation support mechanisms into the curriculum. Maritime institutions would benefit from developing comprehensive student support services focusing on academic adaptation, including mentoring programs that pair experienced students with newcomers. Faculty development should emphasize training in supporting student adaptation and implementing teaching strategies that promote adaptive learning.

Limitations and Future Research

Several limitations of the current study should be acknowledged. The cross-sectional nature of the research limits causal inferences, while the sample is limited to one maritime institution, which may affect generalizability. The reliance on self-reported measures also presents potential data accuracy and objectivity limitations.

Future research directions should include longitudinal studies to track changes in adaptation and performance over time and comparative studies across different maritime institutions. Additional research is needed to explore specific adaptation challenges in maritime education and the role of industry requirements in shaping academic adaptation needs. Studies incorporating qualitative data would provide deeper insights into the adaptation process, while research in different cultural contexts could illuminate the role of cultural factors in maritime education adaptation.

The changing nature of the maritime industry, particularly regarding technological advancement, suggests a need for ongoing research into how these changes affect student adaptation requirements. Additionally, investigating gender-specific adaptation patterns in maritime education could provide valuable insights for supporting diverse student populations. This research contributes significantly to understanding the complex relationship between psychological factors and academic performance in maritime education while highlighting the crucial role of academic adaptation in student success.

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