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Exploring the Influence of Self-Regulated Learning, Instructor Support, and Campus Climate on Maritime Competence: Examining the Moderating Role of Psychological Well-Being

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ABSTRACT

This study aimed to examine the effects of self-regulated learning, instructor support, and campus climate on maritime competence among maritime cadets, with psychological well-being as a moderating variable. The study employed a quantitative explanatory research design. The population consisted of 670 students from Cohorts VII, VIII, IX, and X at Politeknik Pelayaran Sumatera Barat, Indonesia. A pilot test was conducted with 100 cadets, while the main study involved 570 respondents. Data were collected using a five-point Likert-scale questionnaire and analyzed through Structural Equation Modeling–Partial Least Squares (SEM-PLS) using SmartPLS 3. The findings revealed that instructor support had a positive and significant effect on maritime competence. In contrast, self-regulated learning, campus climate, and psychological well-being did not have significant direct effects on maritime competence. Furthermore, psychological well-being did not moderate the relationships between self-regulated learning, instructor support, campus climate, and maritime competence. These findings indicate that instructor support is the most influential factor in enhancing cadets' maritime competence within maritime vocational higher education. This study contributes theoretically by extending the understanding of maritime competence through the integration of individual, instructional, environmental, and psychological factors into a single structural model. Practically, the findings provide valuable insights for maritime higher education institutions to strengthen instructor competence and instructional quality in order to improve maritime competence among cadets.

Keywords: Self-Regulated Learning, Instructor Support, Campus Climate, Maritime Competence, Psychological Well-Being.

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INTRODUCTION

Maritime competence is the primary learning outcome of maritime vocational higher education, as it reflects students' readiness to perform professional duties in accordance with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) (Ghosh et al., 2025). Students enrolled in the Nautical Study Program are expected to acquire competencies in navigation, deck operations, cargo handling, and the implementation of maritime safety procedures (Mashartanto et al., 2024). Students in the Marine Engineering Study Program are required to master competencies related to the operation, maintenance, and repair of ship machinery systems to ensure the reliable performance of engine operations during voyages (Yanti et al., 2025). Meanwhile, students in the Sea Transportation Study Program are expected to develop competencies in shipping

documentation, port administration, maritime logistics, and human capital management within shipping companies and port organizations (Hasnur et al., 2026). These diverse competency requirements indicate that maritime education extends beyond technical proficiency to encompass managerial capabilities, communication skills, decision-making, and leadership competencies required in the contemporary maritime industry.

Despite being the primary objective of maritime education, previous studies have demonstrated that the achievement of maritime competence is influenced by students' ability to regulate their own learning, commonly referred to as self-regulated learning (Uddin & Siska, 2026). Maritime education requires students to independently integrate theoretical instruction, laboratory practice, simulator training, and onboard practical experience, making self-regulated learning a critical determinant of learning success (Purwantini et al., 2026). Students with low levels of self-regulated learning often encounter difficulties in setting learning goals, managing study time, monitoring their academic progress, and continuously evaluating their learning outcomes (Xu et al., 2023). Recent empirical studies have consistently reported that self-regulated learning positively contributes to academic achievement, problem-solving ability, practical skills, and the acquisition of professional competencies (Cheng et al., 2024). Within the context of maritime education, students who effectively manage their learning strategies, reflect on their learning outcomes, and maintain intrinsic learning motivation are more likely to achieve the competencies required by the STCW-based curriculum (Lo et al., 2024). These findings suggest that self-regulated learning represents an important internal factor that facilitates the development of maritime competence among maritime cadets.

In addition to students' internal characteristics, instructor support has also been recognized as an important determinant of maritime competence. Within maritime education, instructors serve not only as knowledge providers but also as facilitators, mentors, academic advisors, and professional role models who guide students throughout both theoretical instruction and practical training (Nazarwin et al., 2026). Previous studies have demonstrated that effective instructor support enhances students' learning motivation, academic engagement, self-confidence, and learning satisfaction, ultimately leading to improved learning outcomes (Y. Li, 2025). Constructive feedback, continuous academic guidance, and effective communication enable students to develop a deeper understanding of maritime knowledge and practical skills (Brown et al., 2024). In maritime vocational education, instructor support is particularly essential for bridging theoretical concepts with hands-on experiences in laboratories, simulators, and operational environments that closely resemble real shipboard conditions.

Maritime competence is also influenced by the quality of the campus climate, which serves as a supportive learning environment for competency development. A positive campus climate is reflected not only in the availability of adequate learning facilities but also in the establishment of a safe, collaborative, disciplined, and academically supportive atmosphere that promotes students' professional development (Widiatmaja et al., 2026). Previous studies have reported that a positive campus climate enhances student engagement, learning motivation, psychological comfort, and academic achievement (Li, 2024). The availability of laboratories, simulators, libraries, educational technologies, and high-quality academic services provides students with greater opportunities to develop their competencies effectively (Hernandez et al., 2024). Conversely, an unfavorable campus climate may hinder the learning process, reduce student participation, and diminish the effectiveness of competency acquisition.

Beyond academic and environmental factors, psychological well-being has emerged as an important psychological factor contributing to the development of students' maritime competence (Nazarwin et al., 2026). Maritime education is widely recognized for its demanding academic workload, intensive practical training, and strict disciplinary environment, requiring students to maintain positive psychological conditions in order to successfully complete the educational process (Kurniawan et al., 2025). Previous studies have consistently shown that students with higher levels of psychological well-being are more resilient when facing academic challenges, demonstrate stronger learning motivation, possess better emotional regulation, and exhibit greater academic engagement than students with lower levels of psychological well-being (Okocha et al., 2026). Positive psychological well-being also enables students to adapt

more effectively to the learning environment, overcome academic challenges, and maintain consistent academic and practical performance (Sun & Liu, 2023). Conversely, poor psychological well-being may reduce students' concentration, decision-making ability, learning effectiveness, and overall professional competency achievement.

Although previous studies have confirmed the relationships between self-regulated learning, instructor support, campus climate, psychological well-being, and learning success in higher education, several important research gaps remain. First, most previous studies have examined these variables independently, providing only a limited understanding of the integrated factors influencing maritime competence (Robinson, 2023). Second, research on maritime competence has largely been conducted within the context of general higher education, whereas empirical studies focusing specifically on maritime vocational institutions remain relatively scarce (Fan & Yang, 2023). Third, limited evidence exists regarding the moderating role of psychological well-being in explaining the relationships between self-regulated learning, instructor support, campus climate, and maritime competence, particularly within maritime education (Stoffels et al., 2023). Fourth, empirical studies conducted in Indonesian maritime higher education institutions remain limited, despite Indonesia being one of the world's largest archipelagic nations with substantial demand for highly competent maritime professionals (Belabyad et al., 2026). Addressing these research gaps, the present study aims to examine the effects of self-regulated learning, instructor support, and campus climate on students' maritime competence, while investigating the moderating role of psychological well-being among students at Politeknik Pelayaran Sumatera Barat. The findings are expected to contribute both theoretically and practically to the advancement of maritime vocational higher education. Based on the research objectives, the following hypotheses were proposed:

H1: Self-regulated learning has a significant effect on maritime cadets' maritime competence.
H2: Instructor support has a significant effect on maritime cadets' maritime competence.
H3: Campus climate has a significant effect on maritime cadets' maritime competence.
H4: Psychological well-being has a significant effect on maritime cadets' maritime competence.
H5: Psychological well-being moderates the relationship between self-regulated learning and maritime cadets' maritime competence.
H6: Psychological well-being moderates the relationship between instructor support and maritime cadets' maritime competence.
H7: Psychological well-being moderates the relationship between campus climate and maritime cadets' maritime competence.

METHOD

This study employed a quantitative research design using an explanatory approach. The study population comprised all students from Cohorts VII, VIII, IX, and X at Politeknik Pelayaran Sumatera Barat, totaling 670 students. Prior to the main survey, a pilot study was conducted involving 15% of the total population (100 students) to assess the validity and reliability of the research instrument. The remaining 570 students, who were not involved in the pilot study, constituted the main research sample. Separating the pilot and main samples was intended to minimize measurement bias and to ensure that the research instrument met the required validity and reliability standards before being administered in the primary data collection.

The research instrument consisted of a structured questionnaire using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire items were developed based on the indicators of each research construct, ensuring that every variable was represented by statements reflecting its underlying dimensions. Data were collected online using Google Forms, facilitating efficient questionnaire distribution to respondents. The online survey also enabled respondents to complete the questionnaire flexibly without disrupting their academic activities. Before distribution, the questionnaire was systematically developed and underwent content validity assessment to ensure its relevance to the research objectives. The questionnaire blueprint is presented in Table 1.

Table 1. Pilot Questionnaire

No.	Variable	Indicator	Questionnaire Item
1	Self-Regulated Learning (X1) (Radovic et al., 2024)	Learning Planning	I regularly plan my learning activities to achieve the targeted maritime competencies.
		Learning Monitoring	I regularly monitor my understanding of course materials and maritime practical training.
		Learning Strategy Use	I apply appropriate learning strategies to effectively understand maritime theory and practical activities.
		Self-Reflection and Evaluation	I evaluate my learning outcomes to improve my performance in subsequent learning activities.
		Motivation Regulation	I remain motivated to study even when facing difficult maritime subjects or practical training.
2	Instructor Support (X2) (Kulachai et al., 2025)	Academic Guidance	Instructors provide academic guidance that helps me understand maritime theory and practical training.
		Constructive Feedback	Instructors provide clear and constructive feedback on my academic performance and practical work.
		Motivational Support	Instructors encourage me to continuously improve my abilities and achieve maritime competencies.
		Learning Facilitation	Instructors facilitate learning through appropriate teaching methods and learning resources that support maritime competency development.
		Instructor Accessibility	Instructors are approachable and willing to assist me whenever I encounter difficulties in learning or practical training.
3	Campus Climate (X3) (Berhanu & Sewagegn, 2024)	Supportive Academic Environment	The academic environment at my institution supports my learning and the development of my maritime competencies.
		Positive Social Relationships	I experience positive relationships with fellow cadets, instructors, and administrative staff during the learning process.
		Institutional Support	My institution provides adequate services and support to facilitate my academic success.
		Safe and Inclusive Environment	I feel safe and comfortable participating in academic and practical activities on campus.
		Learning Facilities	The learning facilities available at my institution support the development of my maritime competencies.
4	Maritime Competence (Y) (Ghosh & Emad, 2025)	Maritime Knowledge	I possess adequate knowledge of maritime concepts, procedures, and regulations relevant to my field of study.
		Technical Skills	I am capable of performing practical tasks and operating equipment in accordance with the required maritime competencies.
		Safety Awareness and Compliance	I am able to apply occupational safety procedures and comply with maritime operational standards during learning and

No.	Variable	Indicator	Questionnaire Item
			practical activities.
		Problem-Solving Competence	I am capable of analyzing and solving problems encountered during maritime practical training appropriately.
		Professional Adaptability	I am able to adapt to technological developments, operational procedures, and professional demands in the maritime industry.
5	Psychological Well-Being (Z) (Khatri et al., 2024)	Academic Well-Being	I am able to cope effectively with the academic demands of both theoretical and practical learning in maritime education.
		Emotional Well-Being	I am able to manage pressure and remain calm when facing challenging assignments or practical activities.
		Social Well-Being	I maintain positive relationships with instructors and fellow cadets throughout the learning process.
		Sense of Purpose	I have clear goals for developing my competencies as a future maritime professional.
		Resilience	I am able to recover quickly and remain motivated after experiencing difficulties or setbacks during my studies.

Source: Research Instrument (2026)

Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 3 software. The analysis consisted of two stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). The measurement model assessment included tests of convergent validity, discriminant validity, and construct reliability, while the structural model evaluation examined the coefficient of determination (R^2), effect size (f^2), and hypothesis testing. The findings from these analyses were subsequently used to evaluate the proposed hypotheses and to draw the conclusions of the study.

RESULT AND DISCUSSION

A pilot test of the research instrument was conducted with 100 maritime cadets who were not included in the main research sample. The critical value of the Pearson Product-Moment correlation coefficient at a significance level of $\alpha = 0.05$ for $n = 100$ ($df = n - 2$) was 0.1966. An item was considered valid if its correlation coefficient (r-value) was greater than or equal to the critical value ($r \geq 0.1966$) at the 0.05 significance level. The reliability criterion specified that a Cronbach's Alpha coefficient of 0.70 or higher indicated acceptable internal consistency. Instrument validity and reliability were examined using SPSS version 24.0. The results of the validity and reliability analyses are presented in Table 2..

Table 2. Instrument Validity and Reliability Results

No	Variable	Code	r-count	Cronbach's Alpha
1	Self-Regulated Learning (X1)	SRL1	0.764	
		SRL2	0.641	
		SRL3	0.697	
		SRL4	0.487	
		SRL5	0.820	
2	Instructor Support (X2)	IS1	0.762	
		IS2	0.802	
		IS3	0.784	

No	Variable	Code	r-count	Cronbach's Alpha
		IS4	0.695	
		IS5	0.754	
3	Campus Climate (X3)	CC1	0.743	0.968 (N of items = 25)
		CC2	0.786	
		CC3	0.703	
		CC4	0.828	
		CC5	0.784	
4	Maritime Competence (Y)	MC1	0.697	
		MC2	0.754	
		MC3	0.778	
		MC4	0.784	
		MC5	0.762	
5	Psychological Well-Being (Z)	PWB1	0.585	
		PWB2	0.691	
		PWB3	0.798	
		PWB4	0.778	
		PWB5	0.723	

Source: SPSS Result (2026)

Table 2 indicates that all questionnaire items measuring Self-Regulated Learning, Instructor Support, Campus Climate, Maritime Competence, and Psychological Well-Being produced correlation coefficients exceeding the critical r-value (0.1966), indicating that all measurement items were valid and suitable for use in the main survey. Furthermore, the overall Cronbach's Alpha coefficient of 0.968 (> 0.70) demonstrates excellent internal consistency, confirming that the research instrument was highly reliable and appropriate for data collection in the primary study.

Before presenting the SmartPLS analysis results, the demographic characteristics of the respondents are described to provide an overview of the research sample serving as the basis for subsequent analyses. The respondents' demographic profile is presented according to gender, batch, study program, and competency level. The frequency and percentage distributions for each category are summarized in Table 3.

Table 3. Respondent Demographic Characteristics

Characteristics	Categori	Frequency (n)	Percentage (%)
Gender	Male	471	82.63 %
	Female	99	17.37 %
Batch	VII	176	30.87 %
	VIII	132	23.16 %
	IX	104	18.25 %
	X	158	27.72 %
Study Program	Nautical	245	42.98 %
	Technology Nautical	146	25.62 %
	Sea Transportation	179	31.40 %
Competency Level	D-III	406	71.22 %
	D-IV	164	28.78 %
Total		**570**	**100%**

Source: G-Form Result (2026)

Prior to evaluating the structural model, the PLS algorithm was executed to examine the outer loadings of the measurement indicators. Outer loadings indicate the extent to which each observed indicator reflects its corresponding latent construct and therefore provide an initial assessment of indicator reliability and convergent validity. In other words, higher loading values indicate that the measurement items adequately represent the intended latent

constructs. In accordance with commonly accepted guidelines, outer loading values should exceed the minimum threshold of 0.50, with values above 0.70 considered preferable. The outer loading results are presented in Table 4.

Table 4. Outer Loading Result

Indicator	X1	X2	X3	Y	Z
SRL1	0.815				
SRL2	0.776				
SRL3	0.796				
SRL4	0.742				
SRL5	0.839				
IS1		0.832			
IS2		0.865			
IS3		0.792			
IS4		0.785			
IS5		0.830			
CC1			0.853		
CC2			0.759		
CC3			0.794		
CC4			0.823		
CC5			0.813		
MC1				0.847	
MC2				0.862	
MC3				0.804	
MC4				0.807	
MC5				0.829	
PWB1					0.718
PWB2					0.769
PWB3					0.816
PWB4					0.808
PWB5					0.822

Source: PLS Algorithm Result (2026)

Table 4 shows that all indicators across the five research constructs exhibit outer loading values exceeding the recommended minimum threshold of 0.50. These findings indicate that each indicator adequately reflects its respective latent construct and therefore satisfies the criterion for convergent validity.

Table 5. Konstruk Reliabilitas & Validitas

Variable	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
X1	0.853	0.856	0.895	0.631
X2	0.879	0.880	0.912	0.675
X3	0.868	0.875	0.904	0.654
Y	0.887	0.888	0.917	0.689
Z	0.848	0.863	0.891	0.620

Source: PLS Algorithm Result (2026)

Table 5 demonstrates that the values of Cronbach's Alpha, rho_A, and Composite Reliability for all constructs exceed the recommended threshold of 0.70, indicating satisfactory construct reliability. In addition, the Average Variance Extracted (AVE) values for all constructs are greater than 0.50, confirming adequate convergent validity. The discriminant validity assessment is presented in Table 6.

Table 6. Fornell-Larcker Result

	X1	X2	X3	Y	Z
X1	0.900				
X2	0.811	0.837			

X3	0.809	0.832	0.830		
Y	0.801	0.828	0.714	0.787	
Z	0.770	0.821	0.696	0.750	0.747

Source: PLS Algorithm Result (2026)

Table 6 shows that the square root of the Average Variance Extracted (AVE) for each construct, Self-Regulated Learning (0.900), Instructor Support (0.837), Campus Climate (0.830), Maritime Competence (0.787), and Psychological Well-Being (0.747), is greater than the corresponding inter-construct correlations. These findings confirm that all constructs satisfy the Fornell-Larcker criterion for discriminant validity, indicating that each construct is empirically distinct and adequately differentiated from the other constructs included in the research model. The coefficient of determination (R^2) is subsequently presented in Table 7.

Table 7. R-Square Result

	R Square	R Square Adjusted
MC (Y)	0.713	0.710

Source: PLS Algorithm Result (2026)

The R^2 results indicate that Self-Regulated Learning, Instructor Support, Campus Climate, Psychological Well-Being, and their interaction effects jointly explain approximately 71% of the variance in Maritime Competence, while the remaining variance is explained by factors not included in the proposed research model. The effect size (f^2) results are presented in Table 8.

Table 8. F-Square Result

	Maritime Competence (Y)
X1	0.000
X2	0.256
X3	0.001
Z	0.001

Source: PLS Algorithm Result (2026)

The f^2 analysis indicates that only Instructor Support demonstrates a moderate effect on Maritime Competence (f^2 = 0.256), whereas Self-Regulated Learning (f^2 = 0.000), Campus Climate (f^2 = 0.001), and Psychological Well-Being (f^2 = 0.001) exhibit negligible effect sizes. These findings suggest that Instructor Support contributes substantially more to the variance in Maritime Competence than the other independent variables included in the structural model. Figure 1 illustrates the structural model and path coefficients of the proposed research framework.

Figure 1. Research Path Model

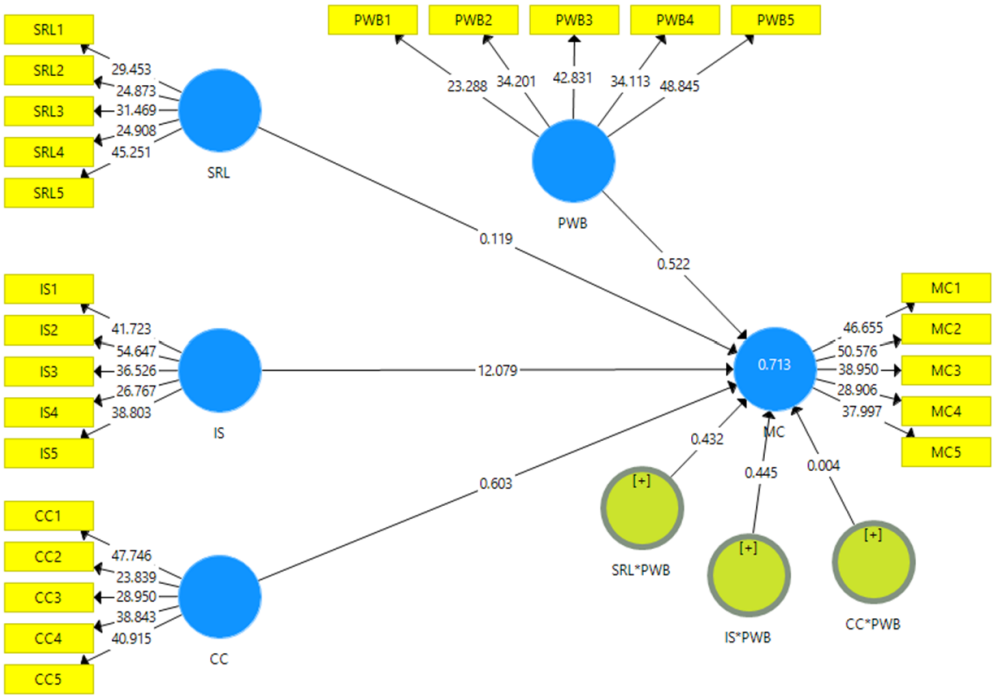

Figure 1 presents the bootstrapping results of the SEM-PLS model, illustrating the relationships among Self-Regulated Learning, Instructor Support, Campus Climate, Psychological Well-Being, and Maritime Competence, including the hypothesized moderating effects. The coefficient of determination (R^2 = 0.713) indicates that 71.3% of the variance in Maritime Competence is explained by Self-Regulated Learning, Instructor Support, Campus Climate, Psychological Well-Being, and the interaction terms included in the model, whereas the remaining 28.7% is attributable to factors beyond the scope of the present study. Moreover, the bootstrapping results show that all measurement indicators achieved high t-statistics for their respective latent constructs, indicating that the indicators adequately represent the constructs being measured. The hypothesis testing results are presented in Table 9.

Table 9. Hypotheses Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
X1 – Y	0.005	0.005	0.039	0.119	0.906
X2 – Y	0.734	0.743	0.061	12.079	0.000
X3 – Y	0.040	0.029	0.066	0.603	0.547
Z – Y	-0.022	-0.020	0.043	0.522	0.602
X1*Z – Y	-0.027	-0.038	0.062	0.432	0.666
X2*Z – Y	-0.053	-0.041	0.119	0.445	0.657
X3*Z – Y	-0.001	0.001	0.126	0.004	0.997

Source: Bootstrapping Result (2026)

Based on the results presented in Table 9 and the significance criterion of $\alpha = 0.05$ ($p < 0.05$), the hypothesis testing revealed that only the effect of Instructor Support on Maritime Competence was statistically significant, with a path coefficient of 0.734, a t-statistic of 12.079, and a p-value of 0.000. In contrast, Self-Regulated Learning did not have a significant effect on Maritime Competence ($p = 0.906 > 0.05$). Similarly, Campus Climate was not significantly associated with Maritime Competence ($p = 0.547 > 0.05$). Furthermore, Psychological Well-Being, as an independent variable, did not significantly influence Maritime Competence ($p = 0.602 > 0.05$). The moderation analysis further indicated that the interaction effects of Self-Regulated Learning × Psychological Well-Being ($p = 0.666$), Instructor Support × Psychological Well-Being ($p = 0.657$), and Campus Climate × Psychological Well-Being ($p = 0.997$) were all statistically insignificant. Therefore, among the seven proposed hypotheses, only one hypothesis was supported, namely the positive effect of Instructor Support on Maritime Competence, whereas the remaining six hypotheses were rejected because they did not satisfy the statistical significance criterion at $\alpha = 0.05$.

The findings indicate that Self-Regulated Learning does not have a significant effect on cadets' maritime competence; therefore, Hypothesis 1 was not supported. This result suggests that cadets' ability to regulate their own learning processes does not directly contribute to the development of maritime competence during their educational training (Hjellvik & Mallam, 2023). One possible explanation is that maritime vocational education places greater emphasis on practical training, simulator-based instruction, laboratory activities, and onboard training than on independent learning (Wiig et al., 2023). Consequently, although cadets may possess effective self-regulated learning strategies, the achievement of maritime competence remains highly dependent on practical experience and instructor guidance throughout the educational process (Vermunt, 2023). These findings are inconsistent with those reported by Karahalil et al., (2025), who concluded that self-regulated learning positively influences learning outcomes because students' ability to plan, monitor, and evaluate their learning enhances academic achievement. The discrepancy may be attributed to differences in the research context, as the study by Karahalil et al., (2025) focused on general educational settings where learning outcomes rely more heavily on independent learning activities, whereas maritime education emphasizes competency-based and practice-oriented instruction (Nystrom & Ahn, 2024). The present findings further suggest that maritime competence is not solely determined by students'

internal learning characteristics but is also influenced by external factors, including the quality of practical instruction, training facilities, and instructor guidance.

The results demonstrate that Instructor Support has a positive and statistically significant effect on cadets' maritime competence; therefore, Hypothesis 2 was supported. This finding indicates that higher levels of instructor support are associated with greater levels of maritime competence among cadets (Leino et al., 2024). Within maritime education, instructors perform multiple roles beyond knowledge transmission, serving as mentors, facilitators, evaluators, and professional supervisors throughout both theoretical instruction and practical training (Tusher et al., 2024). Effective academic guidance, constructive feedback, and continuous supervision during laboratory and simulator training enable cadets to develop a more comprehensive understanding of maritime concepts and their practical applications (Daiz & Vinco-garcia, 2024). These findings are consistent with those of Ma et al., (2024), who reported that instructor support significantly enhances students' learning outcomes by increasing motivation, learning engagement, and self-confidence. The consistency between the two studies highlights the importance of high-quality instructor–student interactions in improving educational outcomes in higher education (Christopoulos & Stylios, 2024). In maritime education specifically, the instructor's role becomes even more critical because competency development requires continuous demonstration, supervision, and performance evaluation in authentic learning environments.

The findings further indicate that Campus Climate does not have a significant effect on cadets' maritime competence; therefore, Hypothesis 3 was not supported. This result suggests that cadets' perceptions of the campus environment do not directly contribute to the development of maritime competence (Vilhunen et al., 2025). One possible explanation is that most competency development occurs through standardized practical training, simulator exercises, laboratory sessions, and field-based learning experiences, thereby reducing the direct influence of the overall campus environment (Phan & Le, 2025). Moreover, the semi-military educational system implemented in maritime polytechnics creates a relatively uniform learning environment for all cadets, limiting variations in perceptions of campus climate. These findings differ from those reported by Moges et al., (2025), who found that campus climate positively influences academic achievement through enhanced student engagement. The discrepancy may be explained by differences in the research context and dependent variables, as the previous study examined academic achievement, whereas the present study focused on maritime competence, which primarily emphasizes professional practical skills (Laranjeira & Teixeira, 2025). Nevertheless, campus climate remains an important supporting factor in creating a conducive learning environment, even though it does not exert a direct influence on maritime competence.

The results also reveal that Psychological Well-Being does not significantly affect cadets' maritime competence; therefore, Hypothesis 4 was not supported. This finding suggests that cadets' psychological well-being is not a direct determinant of maritime competency development (Phanphichit & Bartusevičienė, 2024). In maritime vocational education, competence is primarily assessed through mastery of knowledge, technical skills, and practical performance in accordance with the STCW, making psychological well-being less directly reflected in competency assessments (Mori & Manuel, 2024). Furthermore, the structured and disciplined training system implemented in maritime education ensures that all cadets undergo similar educational experiences regardless of differences in their psychological well-being (Yi et al., 2025). These findings are not entirely consistent with those of Sanchez-Gonzalez et al., (2024), who reported that student well-being contributes positively to academic success in higher education. This inconsistency may be explained by differences in the dependent variable, as the previous study focused on academic success, whereas the present study examined maritime competence, which emphasizes professional and practice-based performance (Şenbursa et al., 2024). The findings nevertheless indicate that psychological well-being remains important for students' overall development; however, its influence on maritime competence is likely indirect, operating through factors such as learning motivation, academic engagement, or academic resilience rather than through a direct effect.

The findings indicate that Psychological Well-Being does not moderate the relationship between Self-Regulated Learning and cadets' Maritime Competence; therefore, Hypothesis 5 was not supported. This result suggests that cadets' level of psychological well-being neither strengthens nor weakens the relationship between self-regulated learning and maritime competence (Starup et al., 2024). The finding implies that the effectiveness of self-regulated learning in maritime education is influenced more by the quality of practical learning experiences than by students' psychological conditions (Xue et al., 2024). In maritime vocational education, successful competency development is largely determined by students' participation in laboratory activities, simulator-based training, and field practice conducted in accordance with established competency standards (Liu et al., 2024). These findings differ from those reported in several higher education studies, which have shown that psychological well-being strengthens the effectiveness of students' learning strategies in improving academic achievement (Kim, 2024). This discrepancy may be explained by the distinctive characteristics of maritime education, which emphasize the development of professional competencies rather than academic performance alone (Konstantinidis, 2024). Furthermore, the level of psychological well-being among the participating cadets was likely relatively homogeneous because all respondents were exposed to the same educational system, training programs, and academic activities.

The findings further reveal that Psychological Well-Being does not moderate the relationship between Instructor Support and cadets' Maritime Competence; therefore, Hypothesis 6 was not supported (Psaila & Middleton, 2025). This result indicates that the positive contribution of instructor support to maritime competence remains consistent regardless of whether cadets exhibit high or low levels of psychological well-being (Huo, 2023). In other words, the quality of academic guidance, constructive feedback, and instructional mentoring provided by instructors benefits all cadets irrespective of their psychological well-being (Qin & Meng, 2025). This finding suggests that, within maritime vocational education, the instructional role of instructors is more influential than individual psychological factors in shaping professional competence. The present findings are inconsistent with several higher education studies reporting that psychological well-being enhances the effectiveness of academic support in improving students' learning outcomes (Rodríguez-cifuentes et al., 2024). The discrepancy may be attributed to the unique characteristics of maritime education, which adopts a more structured instructional, assessment, and mentoring system than general higher education institutions. Consequently, instructor support remains the primary determinant of maritime competence regardless of cadets' psychological well-being (Omar et al., 2026). These findings underscore the importance of strengthening instructors' professional and pedagogical competencies as a more effective strategy for improving maritime competence than focusing solely on students' psychological well-being.

The results also demonstrate that Psychological Well-Being does not moderate the relationship between Campus Climate and cadets' Maritime Competence; therefore, Hypothesis 7 was not supported. This finding indicates that cadets' psychological well-being does not alter the relationship between their perceptions of the campus climate and the achievement of maritime competence (Emaliana et al., 2025). One possible explanation is that maritime polytechnics implement relatively standardized educational systems, disciplinary regulations, and learning facilities, resulting in limited variation in students' perceptions of the campus climate and, consequently, a negligible impact on competency development (Cedillo et al., 2025). Moreover, the acquisition of maritime competence is influenced more substantially by the successful implementation of practical training and competency-based instruction aligned with the STCW than by students' perceptions of the campus environment (Alya et al., 2025). These findings differ from those of Li et al., (2025), who reported that campus climate enhances academic achievement through increased student engagement. The discrepancy suggests that the mechanism through which campus climate influences professional competency development in maritime vocational education differs from its influence on academic achievement in general higher education settings (Kalata et al., 2026). Overall, the findings

indicate that psychological well-being does not strengthen the contribution of campus climate to the development of cadets' maritime competence.

CONCLUSION

The findings of this study demonstrate that cadets' Maritime Competence at Politeknik Pelayaran Sumatera Barat is significantly influenced by Instructor Support, whereas Self-Regulated Learning, Campus Climate, and Psychological Well-Being do not exhibit significant direct effects on Maritime Competence. Furthermore, Psychological Well-Being was not found to moderate the relationships between Self-Regulated Learning, Instructor Support, Campus Climate, and Maritime Competence, indicating that the proposed moderating effects were not empirically supported. These findings suggest that, within the context of maritime vocational education, the quality of academic guidance, instructional mentoring, and constructive feedback provided by instructors constitutes the most critical factor in developing cadets' professional competence. The results also reinforce the importance of practice-oriented learning, simulator-based training, and field experience supported by competent instructors as defining characteristics of effective maritime education. From a theoretical perspective, this study contributes to the literature by integrating individual, instructional, environmental, and psychological factors into a comprehensive SEM-PLS model of maritime competence. From a practical perspective, the findings provide valuable implications for maritime higher education institutions by highlighting the need to prioritize instructor competency development, enhance instructional quality, and strengthen academic mentoring systems to improve cadets' maritime competence. Future studies are encouraged to extend the proposed model by incorporating additional variables, such as learning motivation, onboard training experience, digital learning, safety culture, and cadet engagement, while also validating the model across different maritime higher education institutions in Indonesia to provide a more comprehensive understanding of the determinants of maritime competence.

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