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The Influence of Students' Engagement on Learning Comprehension of Maritime Insurance Course

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Abstract

This study examines the influence of students' engagement on learning comprehension in the Maritime Insurance course at Politeknik Pelayaran Sumatera Barat. Motivated by concerns about vocational learning effectiveness and graduates' professional readiness, the study's primary objective was to test whether students' engagement affects learning comprehension and to quantify the magnitude of this effect. A quantitative, comparative design was employed using an independent-samples t-test to compare two groups defined by engagement level. The population comprised 153 students enrolled in the Marine Transportation program for the 2025/2026 academic year; samples were selected via quota-based random sampling, yielding two groups of 103 respondents each. The t-test results showed t-calculated = 24.578 versus t-critical = 1.66 with $p < 0.05$, leading to acceptance of the hypothesis that students' engagement significantly influences learning comprehension. Effect-size analysis produced Cohen's d = 3.43, indicating a very large practical effect and substantial mean differences between groups with differing engagement levels. These findings underscore the importance of active learning strategies and interventions that enhance behavioral, emotional, and cognitive engagement to strengthen conceptual mastery and workplace readiness in maritime contexts; practical implications include integrating claims simulations, authentic tasks, and targeted formative feedback. The study recommends future research employing objective outcome measures and longitudinal or experimental designs to improve generalizability and clarify causal mechanisms.

Keywords: Students' Engagement, Learning Comprehension, Maritime Insurance Course

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INTRODUCTION

The D-IV Applied Maritime Transportation study program at Politeknik Pelayaran Sumatera Barat is designed to produce graduates who are technically competent and job-ready for the shipping and logistics sectors (Baum-Talmor & Kitada, 2022). The program's curriculum blends theoretical knowledge with field practice, including port operations, cargo management, and maritime safety (Dewan & Godina, 2024; Pruyn, 2024). Instruction emphasizes professional competencies aligned with industry needs, mastery of operational procedures, and understanding of national and international regulations (Shi et al., 2024). Students are equipped with technical skills, analytical capabilities, and the professional attitudes necessary to manage maritime transport activities (Li & Yuen, 2024; Belabyad et al., 2025). Partnerships with industry stakeholders and internship placements are integral components that strengthen students' applied experience (Weishaupt, 2025; Phanphichit & Bartusevičienė, 2024; Rico et al., 2025). Accordingly, the program aims to

prepare graduates to meet the operational and administrative challenges of modern shipping.

The Maritime Insurance course covers the principles of cargo insurance, policy clauses, claims mechanisms, and risk management in maritime operations (Abravitova et al., 2022). Course content includes the understanding of insurance contracts, policy exclusions, the principle of indemnity, and procedures for handling cargo and hull claims (Ching & Yip, 2022). Mastery of these topics is important because insurance functions as the primary financial risk-mitigation instrument within the maritime supply chain (Jiang et al., 2023). For students in the maritime transport program, insurance knowledge supports operational decision-making, preparation of cargo documentation, and coordination of claims among parties. Beyond technical aspects, the course requires analytical skills for risk assessment and the selection of appropriate coverage options (Nsikan et al., 2023). Therefore, Maritime Insurance constitutes a key component in shaping professional competencies for maritime students, especially within the transport program.

A deep understanding of Maritime Insurance content is a prerequisite for students to apply concepts in real-world settings (Dewan et al., 2024). The degree of understanding influences students' ability to prepare claim documentation, respond to incidents, and communicate effectively with underwriters or brokers (Rawat et al., 2021). Deficits in understanding can lead to poor decisions, potential financial losses, or ineffective claims handling (du Plessis et al., 2024). Conversely, strong comprehension enhances the quality of operational services and reduces the risk of inter-party disputes related to cargo (Wróbel, 2021). From an educational perspective, comprehension also reflects mastery of competencies expected by the program's learning standards (Harris & Clayton, 2020). Consequently, assessing and improving students' understanding is a strategic objective in vocational education for maritime transport.

Students' engagement in the learning process encompasses behavioral, emotional, and cognitive dimensions that collectively determine the quality of learning interactions (Alam & Mohanty, 2024). Behavioral engagement includes attendance, participation in discussions, and involvement in practical tasks; emotional engagement relates to interest and motivation; while cognitive engagement involves deep thinking and reflection (Xu et al., 2023; Lo et al., 2024). High levels of engagement foster active learning activities such as case analysis, claims simulations, and examination of relevant policy documents. These activities enrich learning experiences and thereby strengthen conceptual understanding and applied ability (Singh et al., 2022; Weich et al., 2024). Thus, increasing engagement is regarded as a principal strategy to improve learning outcomes in technically oriented courses like Maritime Insurance (Zhao et al., 2024; Medel et al., 2025). Pedagogical approaches that facilitate active in-class participation are expected to enhance knowledge uptake and transfer (Al Shloul et al., 2024).

Multiple studies in higher education report positive associations between students' engagement and academic outcomes, including improvements in grades and critical thinking (Bruijn-Smolders & Prinsen, 2024; Deng et al., 2025). Meta-analyses and empirical investigations indicate that interventions promoting engagement generally produce significant differences in learning achievement (Yan et al., 2022; Cipriano et al., 2024). Research in vocational and professional education also emphasizes engagement's role in strengthening practical skills and employability (Niittylahti et al., 2023; Weijzen et al., 2024). Furthermore, validated engagement measurement instruments exist and may be adapted to course-specific contexts. However, much of the evidence derives from cross-disciplinary studies, so direct application to technical courses requires empirical validation (Korhonen et al., 2024; Siddiqui et al., 2024; Laranjeira & Teixeira, 2025). Therefore, studies focusing specifically on engagement and comprehension in Maritime Insurance are both relevant and necessary.

Although considerable general evidence links engagement to learning outcomes, research specifically examining the effect of engagement on comprehension in Maritime Insurance remains limited, particularly within the context of Politeknik Pelayaran Sumatera Barat (Johansen, 2023). This lack of contextualized studies leaves pedagogical recommendations insufficiently tailored to the needs of maritime vocational programs (Kosman et al., 2024). Research that employs standardized survey instruments and comparative analyses would provide actionable, context-specific empirical evidence (O'Neill et al., 2023; Costa et al., 2024). In addition, effect-size estimates such as Cohen's d can offer practical information on the magnitude of engagement's impact on comprehension (Görlich & Friederichs, 2021; Yan et al., 2023). Hence, this study is urgent and timely to inform the design of more effective, industry-relevant instructional strategies.

The research questions of this study are: (1) Does students' engagement influence comprehension in the Maritime Insurance course? (2) To what extent does students' engagement affect levels of comprehension in the Maritime Insurance course? Based on these questions, the general objective of this study is to examine the influence of students' engagement on comprehension in Maritime Insurance. The specific objectives include measuring the magnitude of engagement's effect on students' comprehension levels in the course.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Learning Comprehension

Learning comprehension refers to students' ability to internalize, organize, and interpret information so as to produce a coherent knowledge structure (Y. Li & Yan, 2024). Cognitively, comprehension involves processes such as concept recognition, establishing relationships among concepts, making inferences, and deriving meaning from context (Ruffini et al., 2023). Within Bloom's taxonomy, comprehension extends beyond mere recall to include application, analysis, synthesis, and evaluation of knowledge. Indicators of strong comprehension include the ability to paraphrase content in one's own words, solve contextualized problems, and transfer concepts to novel situations (Widiana et al., 2023). Comprehension is also determined by depth of processing: the more active and reflective the learning processes, the stronger the resulting understanding (Ogunyemi et al., 2022). From a measurement perspective, comprehension can be assessed via cognitive tests, applied tasks, case studies, and performance observation (Latini et al., 2021). In vocational education contexts such as the Maritime Insurance course, learning comprehension is meaningful when students can apply theoretical principles to operational practice and make appropriate decisions related to maritime insurance (Baartman & Quinlan, 2024).

Students' Engagement

Students' engagement refers to the degree of participation, emotional commitment, and cognitive involvement students exhibit in the learning process (Bergdahl, 2022). The principal components commonly distinguished are behavioral engagement (activity, attendance, task completion), emotional engagement (interest, affect, identification with the material), and cognitive engagement (processing strategies, self-regulation, reflection) (Chiu, 2021). In addition, the agentic dimension emphasizes the proactive role students take in shaping their learning experiences (Assefa et al., 2025). High levels of engagement are typically associated with more frequent interactions, meaningful participation in discussions, and receptivity to constructive feedback (Chiu, 2022). Functionally, engagement acts as a mediator between instructional strategies and learning outcomes because it facilitates deeper information processing. Engagement is commonly measured

using multi-scale questionnaires, classroom observation, and digital behavioral indicators such as LMS activity logs (Armas-Cervantes et al., 2024). In the context of Maritime Insurance, students' engagement is pivotal because it affects their ability to comprehend real cases, practice claims simulations, and develop professional readiness for the maritime sector (Held & Mejeh, 2024). Therefore, this study expects students' engagement to have a positive and significant effect on learning comprehension in the Maritime Insurance course.

Research hypothesis: Students' engagement has a significant effect on learning comprehension in the Maritime Insurance course.

METHOD

This study employed a quantitative design using an independent-samples t-test. The t-test was chosen to examine the hypothesis of a significant difference between two groups of data (Abduh et al., 2022). The research framework is presented in Figure 1.

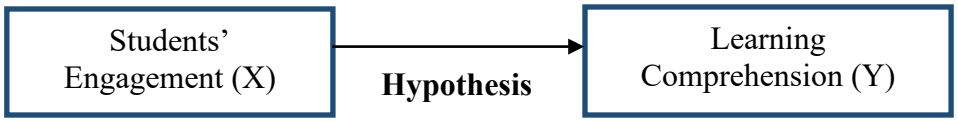

Figure 1. Research Framework

The study was conducted at Politeknik Pelayaran Sumatera Barat. The population comprised 153 students enrolled in the Sea Transportation Study Program in the 2025/2026 academic year. The sample was selected by random sampling using a quota/percentage technique (Mengistu et al., 2023). The sampling breakdown is shown in Table 1.

Table 1. Sampling Procedure

No.	Sea Transportation Study Program	No. of Students	Pilot Sample (33%)	Main Sample (67%)
1	Batch VII	45	15	30
2	Batch IX	108	35	73
	Total	153	50	103

Source: Study Program Data of 2025/2026 Academic Year

Table 1 above indicates the approach used to select both the pilot sample for instrument testing and the main study sample. This quota/percentage procedure ensured balanced representation from both cohorts. Accordingly, 50 students comprised the pilot sample for instrument testing and 103 students comprised the main study sample. The study instrument was a questionnaire; the pilot questionnaire items are presented in Table 2.

Table 2. Trial Questionnaire

Variable	Dimensions	Indicator	Code
Students' Engagement (Xu et al., 2023; Lo et al., 2024)	Behavioral	Attend lectures, practical sessions, and scheduled activities regularly and on time	SE1
		Actively participate in class discussions, group work, and in-class tasks	SE2
		Complete assigned readings, exercises, and coursework before the stated deadlines	SE3

	Emotional	Feel interested in and enthusiastic about the topics covered in this course.	SE4
		Feel a sense of belonging and positive connection with my classmates and instructors	SE5
		Emotionally motivated to succeed in this course	SE6
	Cognitive	Use deep-learning strategies to understand course material	SE7
		Regularly reflect on my learning progress and adjust my study strategies accordingly	SE8
		Try to connect new course content to prior knowledge or real-world/occupational situations	SE9
Learning Comprehension (Swiecki et al., 2022; Daly et al., 2024; Wong et al., 2024)	Concept Mastery	Can accurately explain the core concepts and principles of the course in my own words	LC1
		Can identify and distinguish between related theoretical constructs and their boundaries	LC2
		Can reconstruct the logical sequence of arguments or procedures presented in the course material	LC3
	Case Application	Can apply theoretical concepts to analyze real-world case scenarios relevant to the course	LC4
		Can generate appropriate solutions or recommendations for case problems by using course knowledge	LC5
		Can justify my case-based decisions by linking them to specific theories or empirical evidence	LC6
	Work Readiness	Can translate course learning into practical tasks that mirror workplace responsibilities	LC7
		Feel confident performing job-relevant procedures and decision-making that the course addresses	LC8
		Can critically evaluate professional situations and select actions that reflect industry standards	LC9

Source: Trial Questionnaire

All questionnaire items were rated on a five-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. To compare the mean scores of the study variables students' engagement (X) and learning comprehension (Y), an independent-samples t-test was conducted, followed by calculation of Cohen's d for effect size. In addition to the t-test, a series of supporting analyses were performed, including validity and reliability testing of the instrument and an assessment of data normality prior to the t-test (Nazarwin et al., 2025). All statistical analyses were carried out using IBM SPSS Statistics version 25.

RESULT AND DISCUSSION

The results of the instrument validity and reliability tests are presented in Table 3.

Table 3. Validity Test of Research Variable

Variable	No.	Code	r-calculated	Result
		r-critical = 0.2353		
Students' Engagement	1	SE1	0.699	Valid - usable
	2	SE2	0.651	Valid - usable

Variable	No.	Code	r-calculated	Result
(X)	3	SE3	0.736	Valid - usable
	4	SE4	0.770	Valid - usable
	5	SE5	0.715	Valid - usable
	6	SE6	0.266	Valid - usable
	7	SE7	0.244	Valid - usable
	8	SE8	0.815	Valid - usable
	9	SE9	0.742	Valid - usable
Learning Comprehension (Y)	10	LC1	0.746	Valid - usable
	11	LC2	0.668	Valid - usable
	12	LC3	0.664	Valid - usable
	13	LC4	0.586	Valid - usable
	14	LC5	0.686	Valid - usable
	15	LC6	0.127	Invalid - Unusable
	16	LC7	0.048	Invalid - Unusable
	17	LC8	0.704	Valid - usable
	18	LC9	0.534	Valid - usable

Source: SPSS Analysis

The reliability results for the pilot sample, using Cronbach's alpha, are reported in Table 4.

Table 4. Reliability Test of Instrument

No.	Variable	R-value	R-table	Result
1	Students' Engagement (X)	0.850	0.60	Reliable
2	Learning Comprehension (Y)	0.797	0.60	Reliable

Source: Research Result from SPSS

Based on the validity and reliability findings above, it was concluded that the questionnaire (16 valid items) could be administered to the main study sample (n = 103). Prior to hypothesis testing (t-test), a data normality test is conducted, due to a prerequisite for the independent-samples t-test. The normality test results are presented in Table 5.

Table 5. Data Normality Test Results

No.	Variable	Criterion	Shapiro-Wilk Sig.	Result
1	Students' Engagement (X)	> 0.05	0.82	Normal
2	Learning Comprehension (Y)	> 0.05	0.76	Normal

Source: Research Result from SPSS

Then, the descriptive statistic result from each indicator can be seen below:

Table 6. Descriptive Statistic from Each Indicator

Variable	Mean	Median	Variance	Std. Deviation	Min.	Max.	Range
Students' Engagement (X)	31.32	31.00	7.632	2.763	24	38	14
Learning Comprehension (Y)	22.56	23.00	5.445	2.333	17	29	12

Source: Research Result from SPSS

Hypothesis testing was then conducted using independent-samples t-tests, because both variables were normally distributed. The hypothesis testing is conducted by

comparing the p-values from the independent-samples t-tests in SPSS against the study's significance level (α = 0.05) (Kurniawan et al., 2025). If the p-value is less than 0.05, the alternative hypothesis (Ha) is accepted and the null hypothesis (H_0) is rejected; if the p-value exceeds 0.05, H_0 is retained and Ha is rejected. In addition, the absolute value of the calculated t-statistic (|t-calculated|) was compared to the critical t-value (t-critical): if |t-calculated| > t-critical, H_1 is accepted; if |t-calculated| < t-critical, H_0 is accepted. The result of hypothesis testing is presented in Table 7.

Table 7. Results of Hypotheses Testing

No.	Hypothesis Test	t-critical	t-calculated	Sig. Criterion	Sig. value	Result
1	X towards Y	1.66	24.578	< 0.05	0.000	Accepted Hypothesis

Source: Research Result (2025)

From the results shown in Table 7, the study hypothesis is accepted; that is, students' engagement has a significant effect on learning comprehension in the Maritime Insurance course. To quantify the magnitude of this effect, Cohen's d was computed using the following data (Nordahl-Hansen et al., 2024):

Table 8. Cohen's d Calculation Data

	Group 1	Group 2
Mean (M)	31.32	22.56
Standard Deviation (S)	2.763	2.333
Sample Size (n)	103	103
Cohen's d	(22.56-31.32)/2.557055 = 3.425816	

Cohen's d category is as below (Tagliaferri et al., 2024):

Table 9. Cohen's d Category

Effect Size	Interpretation
ES < 0.20	Weak
0.21 – 0.5	Moderate
0.51 – 1.00	Strong
> 1.01	Very Strong

From Table 8, it can be concluded that the effect of students' engagement on learning comprehension in the Maritime Insurance course is 3.42, which corresponds to a very strong effect.

Practically, these findings indicate that increasing students' engagement can contribute substantially to concept mastery and applied competence within the maritime context (Aliabadi & Weisi, 2023; Starup et al., 2024; Korhonen et al., 2024). Higher engagement strengthens comprehension because more intensive activities promote deeper processing, such as elaboration, organization, and retrieval that link new information to existing cognitive schemas (Broeren et al., 2021; Thompson & Hughes, 2023). High engagement also increases time-on-task and affords more opportunities for distributed practice, so that concepts are not merely memorized but can be applied across varied cases (Wu et al., 2024). Emotional commitment (interest and belonging) enhances motivation and persistence when confronting complex problems in maritime insurance, enabling students to better withstand initial failure and learn more effectively from feedback (Niki, 2024). Behavioral and agentic aspects, such as active participation, question-asking, and initiative in simulations facilitate collaborative learning and

perspective exchange that are important for solving operational cases (Siry et al., 2024). Therefore, students are advised to adopt active learning strategies (pre-reading, summarizing, periodic reflection), actively participate in discussions and claims simulations, and use LMS analytics to monitor learning progress (Shwartz-Asher et al., 2022). Instructors should design authentic, industry-scaled tasks, provide targeted scaffolding and formative feedback, and integrate case studies and industry partnerships to enrich applied contexts (Ajjawi et al., 2024; Khan et al., 2025). With synergy between students' proactive behaviors and instructor-supported learning design, together with continuous monitoring and instructional adjustment, the positive impact of engagement on conceptual mastery and job readiness will be better assured.

Theoretically and pedagogically, these findings enrich the vocational education literature by reaffirming the central role of engagement in transferring knowledge into work-relevant skills for the Maritime Insurance course (Ramsarup et al., 2023). The results support the implementation of active learning strategies, for example, claims case studies, insurance process simulations, and industry-based collaborative projects to enhance behavioral, emotional, and cognitive aspects of students' engagement (Thomann et al., 2024). Educators and curricula should prioritize activities that promote authentic participation, affective attachment, and deep processing of material to maximize gains in comprehension (Christopoulos & Stylios, 2024). Moreover, ongoing authentic assessment and formative feedback will strengthen the relationship between engagement and positive learning outcomes (Pahi et al., 2024). Collaboration with maritime industry stakeholders is likewise recommended to enrich application contexts and improve students' workplace readiness (Relly & Laczik, 2022). Practical implementations proposed include integrating claims simulations, problem-based learning, and routine measurement of engagement as part of course evaluation.

CONCLUSION

The independent-samples t-test results indicate that the research hypothesis is accepted (t-calculated = 24.578, $p < 0.05$), demonstrating that students' engagement significantly affects learning comprehension in the Maritime Insurance course. The computed effect size, Cohen's d = 3.42, according to the categorization used, indicates a very large effect. This magnitude suggests that the mean difference between groups with differing engagement levels is not only statistically significant but also practically substantial. Several limitations should be noted when interpreting these findings, including the non-experimental design and the potential reliance on self-report instruments that are vulnerable to social desirability bias. The unusually large effect size also warrants further scrutiny for possible confounding variables or measurement artifacts that were not controlled. Consequently, future research is recommended to employ longitudinal or experimental designs controlling for baseline ability, motivation, and exposure to industry practice. Subsequent studies should incorporate objective outcomes and digital behavioral indicators (e.g., LMS logs) to validate self-report-based results. Additionally, exploring mediation or moderation mechanisms, for example, the role of self-regulation or feedback quality would help clarify how and when engagement influences comprehension. Such approaches will enhance the reliability and generalizability of findings and render pedagogical recommendations for Maritime Insurance education more robust and trustworthy.

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