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Correlation of Practical Experience and Learning Effectiveness with Shipping Safety Awareness

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Abstract: Shipping safety awareness is essential for reducing operational risks, yet empirical evidence integrating practical experience and learning effectiveness in Indonesian maritime education remains limited. This study aims to examine the relationships among practical experience, learning effectiveness, and shipping safety awareness among participants in maritime education and training. A quantitative cross-sectional survey was conducted at Politeknik Ilmu Pelayaran Semarang from February to June 2026. Data were collected from 215 respondents using a 30-item questionnaire measured on a five-point Likert scale. The instrument demonstrated acceptable item validity and high internal consistency. Spearman Rank correlation was used as the sole inferential analysis because the questionnaire responses were ordinal and the available normality diagnostics indicated non-normal distributions. The results showed strong, positive, and significant relationships between practical experience and learning effectiveness ($\rho = 0.746$, $p < 0.001$), practical experience and shipping safety awareness ($\rho = 0.782$, $p < 0.001$), and learning effectiveness and shipping safety awareness ($\rho = 0.796$, $p < 0.001$). The contribution of this study lies in examining practical experience and learning effectiveness together as complementary factors associated with shipping safety awareness in the Indonesian maritime education context. The findings provide an empirical basis for integrating practical training and effective instructional processes in maritime education.

Keywords: Practical Experience, Learning Effectiveness, Shipping Safety Awareness, Maritime Education, Maritime Safety.

INTRODUCTION

Maritime transportation is essential for economic activity, passenger mobility, and the distribution of goods, particularly in archipelagic countries such as Indonesia. Increasing vessel traffic and the complexity of maritime operations require seafarers to possess adequate knowledge, practical competence, decision-making ability, and safety awareness to respond

appropriately to operational hazards (Chen et al., 2025). In Indonesia, maritime transportation is particularly important for connecting islands and supporting remote and outermost regions, making the competence of maritime personnel an important component of transportation safety and reliability.

Despite the importance of maritime safety, vessel accidents in Indonesian waters continue to be associated with human factors, including inadequate knowledge, limited safety awareness, and insufficient practical experience in dealing with emergency situations. Formal certification and theoretical instruction alone may therefore be insufficient to ensure safe operational behavior. Seafarers need opportunities to practice emergency procedures, use safety equipment, identify hazards, and respond to realistic situations. Shipping safety awareness encompasses not only knowledge of safety procedures but also attitudes, compliance, responsibility, and the ability to apply safety principles consistently.

One important factor in developing such competence is practical experience. Direct participation in safety drills, emergency simulations, operational activities, and the use of safety equipment enables learners to connect theoretical knowledge with real or simulated situations. This perspective is consistent with experiential learning, in which concrete experience contributes to the development of knowledge and professional competence (Bui & Yarsi, 2023; Stein, 2004). In maritime education, simulator-based and practical training can provide controlled environments for developing technical skills, decision-making, and professional competence (Kim et al., 2021; Sellberg et al., 2018; Wiig et al., 2023).

Recent studies further indicate that the effectiveness of maritime simulation depends not only on technological sophistication but also on instructional design, curriculum alignment, scenario development, and organizational factors (Karahalil et al., 2025; Tusher et al., 2024). Effective simulation scenarios should correspond to learning objectives and professional competencies, thereby facilitating the transfer of training into operational practice (Harrington et al., 2025). Simulation-based training has also been associated with safety-oriented learning and practical competence in maritime contexts, including evidence from Indonesia (Gumelar et al., 2025; Seniza et al., 2024). These findings suggest that practical experience becomes more meaningful when it is supported by effective instructional processes.

Learning effectiveness is therefore another important factor. Effective learning involves clear and relevant learning materials, appropriate instructional methods, interaction, learning media, active participation, and evaluation. In maritime education, these elements are expected to facilitate the transfer of theoretical knowledge into practical competence and safety-related behavior. The quality of training may also be associated with safety-related cognitive and behavioral outcomes, including self-awareness and emergency decision-making. Thus, practical experience and learning effectiveness may function as complementary dimensions in developing shipping safety awareness.

Although previous studies have examined experiential learning, simulator-based training, maritime competency, and safety awareness, empirical evidence integrating practical experience and learning effectiveness in relation to shipping safety awareness remains limited, particularly in Indonesian maritime education and training. The present research background also identifies limited empirical evidence combining practical field experience with the effectiveness of formal learning in the Indonesian maritime context. This gap is important because safety awareness is unlikely to depend exclusively on either theoretical learning or practical exposure; rather, both may interact in supporting the development of knowledge, attitudes, and safety behavior.

Accordingly, this study aims to examine the correlations among practical experience, learning effectiveness, and shipping safety awareness among participants in maritime education and training. Specifically, the study investigates the correlation between practical experience and learning effectiveness, the correlation between practical experience and shipping safety awareness, and the correlation between learning effectiveness and shipping safety awareness.

Based on the theoretical arguments and previous empirical findings, the hypotheses of this study are:
H1: There is a positive and significant correlation between practical experience and learning effectiveness.
H2: There is a positive and significant correlation between practical experience and shipping safety awareness.
H3: There is a positive and significant correlation between learning effectiveness and shipping safety awareness.

METHODS

Research Design

This study employed a quantitative cross-sectional survey design to examine the relationships among practical experience, learning effectiveness, and shipping safety awareness. A quantitative design was appropriate because the study involved structured measurement of predefined variables followed by statistical analysis of the relationships among those variables. Survey research is also appropriate when information is collected systematically from a defined group of respondents using standardized instruments

The study was conducted at Politeknik Ilmu Pelayaran (PIP) Semarang from February to June 2026. Three variables were examined: practical experience (X1), learning effectiveness (X2), and shipping safety awareness (Y). Because observations were collected during a single research period, the design was cross-sectional. Consequently, the findings were interpreted as relationships or associations rather than causal effects.

Population and Sampling

The study population consisted of cadets and seafarers participating in maritime education and training programs at PIP Semarang. The population included cadets in semesters VII and VIII, participants in the Recognition of Prior Learning (RPL) program, and participants in level I and II upgrading programs. The total population consisted of 395 individuals.

A purposive sampling technique was used because participants were required to meet inclusion criteria relevant to the research objectives. Respondents were required to have documented practical or sailing experience and to have participated in formal maritime safety training. The previous draft specified a minimum of one year of experience; however, the final screened sample included respondents with 6–12 months of experience. To maintain consistency between the stated criteria and the observed sample, the one-year minimum was not retained in the revised manuscript. The final sample comprised 132 respondents with 6–12 months of experience and 83 respondents with more than 12 months of experience.

The minimum sample size was determined using the Slovin formula with a 5% error tolerance, producing a minimum requirement of 199 respondents. Following questionnaire distribution and data screening, 215 respondents provided complete responses and were included in the final analysis. Thus, the final sample exceeded the minimum required sample.

Table 1. Population and Sample Composition

Population Group	Population
Cadets, semesters VII–VIII	232
RPL participants	42
Level I–II upgrading participants	121
Total population	**395**
Final sample analyzed	**215**

Source: Primary data from Politeknik Ilmu Pelayaran (PIP) Semarang, 2026.

Variables and Instrument

The study examined three variables:

Practical experience (X1) was defined as participants' direct involvement in maritime operational and safety activities, including fire-fighting drills, abandon-ship drills, emergency procedures, safety equipment use, and the application of safety procedures. The indicators included frequency of participation, types of simulations attended, duration of practical training, and level of active involvement.

Learning effectiveness (X2) referred to the effectiveness of the formal learning process in facilitating participants' understanding and retention of maritime safety knowledge. Its indicators included training duration and intensity, learning media, instructional techniques, learning interaction, and learning evaluation.

Shipping safety awareness (Y) referred to the level of knowledge, attitudes, and behavior concerning maritime hazards and the consistent application of safety procedures. The indicators included knowledge of safety and emergency procedures, safety attitudes, compliance, safety behavior, responsibility, and responses to risk or emergency situations.

Table 2. Operationalization of Study Variables

Variable	Operational definition	Indicators	Items
Practical Experience (X1)	Direct involvement in maritime operational and safety activities	Safety drills, simulations, practical duration, active participation, safety equipment use, application of procedures	10
Learning Effectiveness (X2)	Effectiveness of formal learning in facilitating understanding and retention	Training intensity, instructional methods, learning media, interaction, material clarity, evaluation	10
Maritime Safety Awareness (Y)	Knowledge, attitudes, and behavior related to maritime safety	Safety knowledge, attitudes, compliance, responsibility, risk awareness, emergency response	10

Source: Developed by the authors based on the operational definitions and research instrument.

The research instrument consisted of 30 questionnaire items, with 10 statements assigned to each variable. Responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The X1 items addressed practical and operational experience, safety drills, safety equipment, and application of safety procedures. The X2 items assessed learning methods, clarity of materials, media, interaction, and evaluation, while the Y items assessed safety prioritization, compliance, risk awareness, emergency preparedness, and responsibility.

Instrument Testing

The questionnaire was developed by the authors from the operational definitions and indicators of the three constructs, with item content aligned to practical maritime activities, instructional processes, and safety awareness. Content validity was assessed before the main data collection, and a pilot test involving 20 participants outside the final sample was used to examine item stability. Item validity was assessed using corrected item-total correlation, with a value above 0.30 considered acceptable. Reliability of each construct was evaluated using Cronbach's Alpha, with a coefficient of at least 0.70 considered acceptable.

The validity analysis indicated that all 30 questionnaire items met the required criterion. The corrected item-total correlations ranged from 0.593 to 0.871 for X1, 0.714 to 0.882 for X2, and 0.789 to 0.894 for Y. Therefore, all items were retained for further analysis.

The reliability analysis indicated very high internal consistency. Cronbach's Alpha was 0.954 for Practical Experience, 0.964 for Learning Effectiveness, and 0.967 for Shipping Safety Awareness. These coefficients indicate strong internal consistency, although values this high may also indicate some overlap or redundancy among items. The coefficients are therefore

interpreted as evidence of consistency rather than as evidence that the constructs are free from item redundancy.

Data Collection and Processing

Data were collected using the structured questionnaire distributed to respondents who satisfied the sampling criteria. Completed responses were coded and entered into SPSS version 31. The data-processing procedure included checking response completeness, coding the Likert responses from 1 to 5, identifying missing data, and examining potential outliers. Boxplots and the interquartile range criterion were specified for the identification of extreme observations.

Descriptive statistics were subsequently calculated for the study variables, including mean, median, mode, standard deviation, frequency, and percentage. These analyses were used to describe respondent characteristics and the general tendency of responses before inferential testing.

Data Analysis

Normality was assessed as a preliminary diagnostic using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The available SPSS output reported item-level diagnostics, with significance values below 0.001 for the reported items. Because the questionnaire used five-point Likert responses and the observed distributions were non-normal, a non-parametric correlation approach was selected. The inferential analysis itself was performed on the total/composite scores for Practical Experience (X1), Learning Effectiveness (X2), and Shipping Safety Awareness (Y).

The reported normality diagnostics showed significance values below 0.05. These diagnostics were treated as supporting evidence for the use of a non-parametric procedure rather than as a basis for regression or causal analysis.

The primary and only inferential analysis employed Spearman Rank correlation (ρ) to examine the direction and strength of the monotonic relationships among the three composite scores: (1) Practical Experience and Learning Effectiveness, (2) Practical Experience and Shipping Safety Awareness, and (3) Learning Effectiveness and Shipping Safety Awareness. Statistical significance was evaluated at $\alpha = 0.05$.

Correlation coefficients were interpreted as follows: 0.00–0.19 = very weak, 0.20–0.39 = weak, 0.40–0.59 = moderate, 0.60–0.79 = strong, and 0.80–1.00 = very strong. Positive coefficients indicate positive associations. Because the study used a cross-sectional correlational design, the results are interpreted as associations and not as causal effects.

Table 3. Data Analysis Procedures

Analysis	Purpose	Criterion
Descriptive statistics	Describe respondent and variable characteristics	Mean, median, mode, SD, frequency, percentage
Validity test	Assess item validity	Corrected item-total correlation > 0.30
Reliability test	Assess internal consistency	Cronbach's Alpha ≥ 0.70
Normality test	Determine data distribution	$p > 0.05$ = normal; $p < 0.05$ = non-normal
Spearman Rank correlation	Test relationships among variables	$\alpha = 0.05$
Correlation interpretation	Determine relationship strength	0.00–0.19 very weak; 0.20–0.39 weak; 0.40–0.59 moderate; 0.60–0.79 strong; 0.80–1.00 very strong

RESULTS AND DISCUSSION

The characteristics of the respondents were analyzed to provide an overview of the demographic and practical background of the 215 participants involved in the study. The respondent characteristics included age, duration of practical experience, and gender. The distribution of respondents based on these characteristics is presented in Table 4. The majority

of respondents were aged 18–30 years (68%), indicating that most participants were within the productive age group and were undertaking maritime education or seafarer training. In terms of practical experience, 61% of respondents had 6–12 months of experience, while 39% had more than 12 months of practical experience. This indicates that most respondents had sufficient practical exposure to support their understanding of maritime safety. Regarding gender, the respondents were predominantly male (91%), while female respondents accounted for 9%.

Table 4. Respondent Characteristics

Characteristic	Category	Frequency	Percentage (%)
Age	18–30 years	147	68
	30–50 years	62	29
	>50 years	6	3
Duration of Practical Experience	<6 months	0	0
	6–12 months	132	61
	>12 months	83	39
Gender	Male	196	91
	Female	19	9
Total Respondents		215	100

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Descriptive Analysis of Research Variables

Table 5. Descriptive Statistics of Study Variables

Variable	Item mean range	Item SD range	Interpretation
Practical Experience (X1)	4.5395–4.6837	0.51–0.68	High
Learning Effectiveness (X2)	4.4698–4.5814	0.52–0.62	High
Shipping Safety Awareness (Y)	4.5907–4.6744	0.48–0.54	High

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Practical Experience (X_1)

Based on the descriptive analysis, the Practical Experience variable obtained the lowest average value of 4.5395 and the highest average value of 4.6837, which were categorized as high. This indicates that respondents had obtained sufficiently good practical experience through sea practice activities, simulations, and seafarer training.

Table 6. Descriptive Statistics of Practical Experience (X1)

Item	N	Minimum	Maximum	Mean	SD
X1.1	215	2.00	5.00	4.6837	0.51380
X1.2	215	1.00	5.00	4.5814	0.68470
X1.3	215	1.00	5.00	4.5907	0.57997
X1.4	215	1.00	5.00	4.6419	0.55292
X1.5	215	1.00	5.00	4.6000	0.58645
X1.6	215	2.00	5.00	4.5581	0.54268
X1.7	215	3.00	5.00	4.5581	0.52518
X1.8	215	3.00	5.00	4.5721	0.52343
X1.9	215	2.00	5.00	4.5581	0.55122
X1.10	215	2.00	5.00	4.5395	0.54436

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

N=215 represents the total number of respondents who provided complete answers for each item. Minimum = 1 represents the lowest value provided by respondents on the Likert scale (1 = strongly disagree, 5 = strongly agree). Maximum = 5 represents the highest value and indicates that most respondents provided positive assessments. Mean = 4.54–4.68 indicates that respondents' answers tended to fall within the high category, meaning that they had good practical experience. The Std. Deviation values of 0.51–0.68 were relatively small, indicating that respondents' answers were relatively homogeneous or did not vary substantially.

The item with the highest mean (4.6837) indicates the strongest aspect of practical experience perceived by respondents. The item with the lowest mean (4.5395) was still within the high category but indicated an aspect that was slightly weaker than the others. All average values were above 4.5, indicating that respondents had a high and consistent level of practical experience.

Learning Effectiveness (X_2)

The Learning Effectiveness variable obtained the lowest average value of 4.46 and the highest average value of 4.58, all of which were categorized as high. This condition indicates that the learning process received by respondents was considered capable of improving their understanding of shipping safety procedures.

Table 7. Descriptive Statistics of Learning Effectiveness (X2)

Item	N	Minimum	Maximum	Mean	SD
X2.1	215	2.00	5.00	4.5209	0.56227
X2.2	215	2.00	5.00	4.5302	0.53631
X2.3	215	1.00	5.00	4.4930	0.61803
X2.4	215	3.00	5.00	4.5163	0.54556
X2.5	215	1.00	5.00	4.5628	0.56743
X2.6	215	1.00	5.00	4.4698	0.62485
X2.7	215	2.00	5.00	4.5860	0.55601
X2.8	215	3.00	5.00	4.5674	0.52406
X2.9	215	2.00	5.00	4.5767	0.54035
X2.10	215	3.00	5.00	4.5814	0.53094

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

This table presents the descriptive analysis results for 10 statement items (indicators) of the Learning Effectiveness variable completed by 215 respondents. Each item has a minimum value, maximum value, mean, and standard deviation (Std. Deviation). N = 215 represents the number of respondents who provided complete answers for each item. Minimum = 1–3 represents the lowest value given by respondents on the Likert scale (1 = strongly disagree, 5 = strongly agree). A value of 5 is the highest value and indicates that most respondents provided positive assessments of learning effectiveness.

Mean = 4.46–4.58 indicates that respondents' answers tended to fall within the high category, meaning that learning was considered effective. Std. Deviation = 0.52–0.62 was relatively small, indicating that respondents' answers were relatively homogeneous or did not vary substantially.

The item with the lowest mean (4.4698) was still categorized as high, although it indicated an aspect that was slightly weaker than the others. All mean values were above 4.4, indicating that respondents considered the learning process effective and supportive of material comprehension.

Overall, the Learning Effectiveness variable showed that respondents had positive perceptions of the learning process. The variation in responses among respondents was low, indicating relatively uniform perceptions. These data support the hypothesis that learning effectiveness plays an important role in increasing shipping safety awareness and learning outcomes

Shipping Safety Awareness (Y)

The Shipping Safety Awareness variable obtained the lowest average value of 4.59 and the highest average value of 4.67, with all values categorized as high. These results indicate that respondents had good understanding and concern regarding the implementation of safety in maritime activities.

Table 8. Descriptive Statistics of Shipping Safety Awareness (Y)

Item	N	Minimum	Maximum	Mean	SD
Y1	215	1.00	5.00	4.6744	0.53481
Y2	215	1.00	5.00	4.6465	0.54316
Y3	215	1.00	5.00	4.6233	0.54893
Y4	215	2.00	5.00	4.6047	0.53563
Y5	215	3.00	5.00	4.6698	0.48121
Y6	215	3.00	5.00	4.5907	0.52942
Y7	215	3.00	5.00	4.6233	0.50458
Y8	215	3.00	5.00	4.5907	0.51146
Y9	215	3.00	5.00	4.6093	0.50780
Y10	215	3.00	5.00	4.5953	0.51968

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

This table presents the descriptive analysis results for 10 statement items (indicators) of the Shipping Safety Awareness variable completed by 215 respondents. Each item has a minimum value, maximum value, mean, and standard deviation (Std. Deviation). N = 215 represents the number of respondents who provided complete answers for each item. Minimum = 1–3 represents the lowest value on the Likert scale (1 = strongly disagree, 5 = strongly agree). Maximum = 5 represents the highest value and indicates that most respondents provided positive assessments of safety awareness. Mean = 4.59–4.67 indicates that respondents' answers tended to fall within the high category, meaning that respondents' shipping safety awareness was very good. Std. Deviation = 0.48–0.54 was relatively small, indicating that respondents' answers were relatively homogeneous or did not vary substantially.

The item with the highest mean (4.6744) indicates the strongest aspect of safety awareness perceived by respondents. The item with the lowest mean (4.5907) was still categorized as high but represented an aspect that was slightly weaker than the others.

Overall, the Shipping Safety Awareness variable showed that respondents had high understanding and concern regarding safety procedures aboard ships. The variation in responses among respondents was low, indicating relatively uniform perceptions. These data support the hypothesis that shipping safety awareness is a result of good practical experience and effective learning

Validity Test

The validity test was conducted to determine the ability of each statement item to measure the variables being studied. The decision criteria were as follows:

a. If r-count > r-table, the item was declared valid.
b. If r-count < r-table, the item was declared invalid.

Table 9. Validity Test Results for Practical Experience (X1)

No.	Item	Corrected Item-Total Correlation	Validity
1	X1.1	0.777	Valid
2	X1.2	0.593	Valid
3	X1.3	0.842	Valid
4	X1.4	0.871	Valid

5	X1.5	0.816	Valid
6	X1.6	0.857	Valid
7	X1.7	0.857	Valid
8	X1.8	0.827	Valid
9	X1.9	0.804	Valid
10	X1.10	0.850	Valid

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Table 10. Validity Test Results for Learning Effectiveness (X2)

No.	Item	Corrected Item-Total Correlation	Validity
1	X2.1	0.879	Valid
2	X2.2	0.879	Valid
3	X2.3	0.787	Valid
4	X2.4	0.867	Valid
5	X2.5	0.871	Valid
6	X2.6	0.714	Valid
7	X2.7	0.824	Valid
8	X2.8	0.827	Valid
9	X2.9	0.882	Valid
10	X2.10	0.870	Valid

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Table 11. Validity Test Results for Shipping Safety Awareness (Y)

No.	Item	Corrected Item-Total Correlation	Validity
1	Y1	0.806	Valid
2	Y2	0.831	Valid
3	Y3	0.887	Valid
4	Y4	0.894	Valid
5	Y5	0.804	Valid
6	Y6	0.789	Valid
7	Y7	0.893	Valid
8	Y8	0.847	Valid
9	Y9	0.880	Valid
10	Y10	0.849	Valid

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Based on the testing results for statements X1.1 to X1.10, X2.1 to X2.10, and Y1 to Y10, all statement items had r-count values greater than the r-table value. Therefore, all items were declared valid and could be used in this quantitative study.

Reliability Test

The reliability test was conducted using Cronbach's Alpha, with the criterion that a Cronbach's Alpha value >0.70 indicates that the statement items are reliable.

Table 12. Reliability Test Results

Variable	Cronbach's Alpha	Description
Practical Experience (X_1)	0.954	Reliable
Learning Effectiveness (X_2)	0.964	Reliable
Shipping Safety Awareness (Y)	0.967	Reliable

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

The testing results showed that all variables had Cronbach's Alpha values above 0.70. Therefore, the research instrument was declared reliable and suitable for use.

Normality Test

The normality test was conducted to determine whether the research data were normally distributed. The testing used the Kolmogorov–Smirnov method.

Table 13. Normality Test

Item	Kolmogorov–Smirnov Statistic	df	Sig.	Shapiro–Wilk Statistic	df	Sig.
Practical Experience 1	0.433	215	<0.001	0.597	215	<0.001
Practical Experience 2	0.376	215	<0.001	0.593	215	<0.001
Practical Experience 3	0.383	215	<0.001	0.639	215	<0.001
Practical Experience 4	0.407	215	<0.001	0.601	215	<0.001
Practical Experience 5	0.390	215	<0.001	0.637	215	<0.001
Practical Experience 6	0.369	215	<0.001	0.664	215	<0.001
Practical Experience 7	0.372	215	<0.001	0.668	215	<0.001
Practical Experience 8	0.379	215	<0.001	0.664	215	<0.001
Practical Experience 9	0.370	215	<0.001	0.670	215	<0.001
Practical Experience 10	0.359	215	<0.001	0.669	215	<0.001

Source: Primary data processed using IBM SPSS Statistics 31 (2026)

The criteria were:
Sig. > 0.05 = Data are normally distributed.
Sig. < 0.05 = Data are not normally distributed.

Normality Test of the Data

The normality test was conducted to determine whether the research data were normally distributed so that they could be appropriately analyzed using parametric methods. The testing was conducted using Kolmogorov–Smirnov for respondents >50 and Shapiro–Wilk for respondents <50. In this study, there were 215 respondents, and with the assistance of SPSS, the Kolmogorov–Smirnov column was interpreted.

Normality Test Results

The "Tests of Normality" table showed that all items of the Practical Experience variable had significance values (Sig.) <0.001 in both tests. These values were smaller than the $\alpha = 0.05$ threshold; therefore, it could be concluded that the data were not normally distributed.

Table 14. Normality Test Results

Variable	N	K–S Statistic	K–S p	S–W Statistic	S–W p
X1 – Practical Experience	215	0.208	<0.001	0.786	<0.001
X2 – Learning Effectiveness	215	0.222	<0.001	0.792	<0.001
Y – Shipping Safety Awareness	215	0.267	<0.001	0.767	<0.001

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Interpretation and Analytical Implications

The very small significance values indicate a considerable deviation from the normal distribution curve. Therefore, the normality assumption was not fulfilled for the Practical Experience variable.

Because the data were not normally distributed, the subsequent analysis was conducted using a non-parametric method, namely Spearman Rank Correlation, or data transformation could be conducted to meet the normality assumption before applying parametric analysis such as linear regression.

Spearman Rank Correlation Analysis

To determine the relationship between the independent and dependent variables, this study used Spearman Rank correlation (ρ). This method was selected because it is capable of measuring the strength and direction of relationships among ordinal-scale variables or data that are not normally distributed.

Steps in Spearman Rank Correlation Analysis (ρ)

The analysis was conducted using SPSS version 31 through the following menu: Analyze → Correlate → Bivariate → Spearman, selecting Practical Experience (X1), Learning Effectiveness (X2), and Shipping Safety Awareness (Y).

Table 15. Spearman Rank Correlations among Study Variables

Variable 1	Variable 2	Spearman ρ	p-value	N
X1 – Practical Experience	X2 – Learning Effectiveness	0.746	<0.001	215
X1 – Practical Experience	Y – Shipping Safety Awareness	0.782	<0.001	215
X2 – Learning Effectiveness	Y – Shipping Safety Awareness	0.796	<0.001	215

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

The correlation analysis involved 215 respondents, and all three relationships were statistically significant ($p < 0.001$).

Table 16. Relationships among Variables Based on Spearman Rank Correlation (ρ)

Relationship between Variables	Spearman ρ	Sig. (2-tailed)	N	Interpretation
X1 ↔ X2	0.746	<0.001	215	Strong and positive relationship between Practical Experience and Learning Effectiveness
X1 ↔ Y	0.782	<0.001	215	Strong and positive relationship between Practical Experience and Shipping Safety Awareness
X2 ↔ Y	0.796	<0.001	215	Strong and positive relationship between Learning Effectiveness and Shipping Safety Awareness

Source: Primary data processed using IBM SPSS Statistics 31 (2026).

Discussion

The Spearman analysis identified strong, positive, and statistically significant associations among the three constructs. Practical Experience was associated with Learning

Effectiveness ($\rho = 0.746$, $p < 0.001$), Practical Experience was associated with Shipping Safety Awareness ($\rho = 0.782$, $p < 0.001$), and Learning Effectiveness showed the strongest association with Shipping Safety Awareness ($\rho = 0.796$, $p < 0.001$). These findings indicate that respondents reporting stronger practical experience also tended to report more effective learning and higher shipping safety awareness. Because the design is cross-sectional, these relationships should be interpreted as associations rather than effects.

The association between Practical Experience and Learning Effectiveness is consistent with experiential learning perspectives, in which concrete experience can support the connection between conceptual knowledge and practical application (Bui & Yarsi, 2023; Stein, 2004). In maritime education, simulator-based and practical training has also been linked to the development of professional competence and decision-making capabilities (Kim et al., 2021; Sellberg et al., 2018). The present result extends this perspective by showing that practical experience and perceived learning effectiveness are closely related within the Indonesian maritime education and training setting.

The association of both Practical Experience and Learning Effectiveness with Shipping Safety Awareness is also consistent with previous maritime education research emphasizing the relevance of practical exposure, instructional quality, simulation design, and safety-oriented learning (Kim et al., 2021; Sellberg et al., 2018; Harrington et al., 2025). The strongest correlation in this study was between Learning Effectiveness and Shipping Safety Awareness ($\rho = 0.796$), suggesting that respondents who rated instructional processes more positively also tended to report higher safety awareness. This does not establish that learning effectiveness causes higher awareness, but it provides empirical support for considering instructional quality and practical experience together when designing maritime safety education.

The study's contribution is therefore not a claim that practical experience or learning effectiveness independently causes safety awareness, but that the two dimensions can be examined simultaneously as complementary correlates in an Indonesian maritime education context. Previous studies have often focused on experiential learning, simulator training, or specific safety competencies; the present study adds a quantitative comparison of the relationships among practical experience, learning effectiveness, and shipping safety awareness within one sample.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The findings show statistically significant relationships among Practical Experience (X1), Learning Effectiveness (X2), and Shipping Safety Awareness (Y). The data were analyzed using Spearman Rank correlation because the available diagnostics indicated non-normal response distributions and the study used Likert-scale measurements. The results should be interpreted as associations within the cross-sectional sample.

Practical Experience (X1) and Learning Effectiveness (X2) showed a strong, positive, and significant association ($\rho = 0.746$, $p < 0.001$). Practical Experience (X1) was also strongly, positively, and significantly associated with Shipping Safety Awareness (Y) ($\rho = 0.782$, $p < 0.001$). Learning Effectiveness (X2) showed the strongest association with Shipping Safety Awareness (Y) ($\rho = 0.796$, $p < 0.001$). These findings support the relevance of considering practical exposure and instructional effectiveness together when evaluating maritime safety education, while the cross-sectional design does not permit causal conclusions.

Furthermore, Practical Experience (X1) had a strong, positive, and significant relationship with Shipping Safety Awareness (Y), with $\rho = 0.782$ and Sig. <0.001. Learning Effectiveness (X2) also had a strong, positive, and significant relationship with Shipping Safety Awareness (Y), with $\rho = 0.796$ and Sig. <0.001. These findings indicate that better practical experience and more effective learning are associated with higher shipping safety awareness. Effective learning through appropriate methods, media, and instructional interaction, combined

with direct practical experience involving safety procedures, risks, and emergency situations, can strengthen learners' understanding and awareness of safety principles in maritime activities.

Limitations

This study has several limitations. First, the questionnaire was the sole data collection instrument, so the findings depend on respondents' understanding and self-reported perceptions and do not directly measure safety behavior aboard ships. Second, the final sample included respondents with 6–12 months and more than 12 months of practical experience; therefore, the findings should not be interpreted as representing seafarers with a uniform minimum level of experience. Third, the high item means and relatively small standard deviations suggest a possible ceiling effect that may have restricted variance and affected the magnitude of the observed correlations. Fourth, the study examined only two explanatory constructs and did not include other potentially relevant factors such as safety culture, instructor leadership, practical facilities, previous sailing experience, or regulations. Finally, the study was conducted at one institution using a cross-sectional design, which limits generalizability and prevents causal inference.

Recommendations

Maritime education and training institutions are recommended to improve the quality of practical experience by increasing practical training hours, assigning experienced lecturers or instructors, using more realistic simulations that reflect conditions aboard ships, and providing more structured sea-practice assignments. Learning effectiveness should also be optimized through updated teaching methods, enriched learning media such as videos, simulations, and accident case studies, and strengthened safety competency-based assessments. In addition, a safety culture should be integrated into academic and practical activities so that safety awareness becomes a habitual practice rather than being limited to particular courses.

Instructors and teachers are encouraged to use active learning approaches, including problem-based learning, scenario-based training, and safety drills, to increase cadet engagement. Immediate feedback should also be provided during safety practices to help cadets understand mistakes and risks in real situations. Furthermore, learning materials should be connected with actual maritime accident cases to strengthen risk awareness. Future research is recommended to include additional variables such as safety culture, instructor leadership, practical facilities, and previous sailing experience, as well as to employ mixed-methods approaches involving interviews or direct observation. Longitudinal studies comparing safety awareness before and after sea practice and research involving several institutions or shipping companies are also recommended to improve the generalizability of the findings.

Finally, curriculum development should place greater emphasis on practical competencies and decision-making in emergency situations. Dedicated modules addressing risk awareness, human error, and safety management systems should also be incorporated to strengthen cadets' understanding and support the development of stronger shipping safety awareness.

Author Contributions

All authors contributed to the conception, development, implementation, analysis, and preparation of this research. All authors participated in reviewing and revising the manuscript, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

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