EFFECT OF THE LEARNING OUTCOMES OF THE TERRESTIAL NAVIGATION COURSE IN COMPETENCE PASSAGE PLANNING FOR CADETS WHO ARE CARRYING OUT SEA PROJECT ON BOARD

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ABSTRACT

Terrestial Navigation is a harmonious union between science and art that teaches us how to sail a ship from one place to another safely, quickly, efficiently, and economically and safely to the destination. Passage Planning is the planning of ship voyages from one place to another safely, quickly and economically, and safely to the destination. Shipping from one port to another must be coordinated by all crew members. Politeknik Pelayaran Malahayati, which is a Technical Implementation Unit under the Ministry of Transportation, the Transportation HR Development Agency, which has the task of implementing Vocational Education, research, and Community Service in the field of Shipping, has organized a Diploma III Nautical Studies, Ship Engineering Studies, and Ship Electrical System Studies. This study aims to evaluate the influence of understanding Passage Planning Terrestial Navigation on the competence of cadets when doing Sea Project on board. The research method used is quantitative research with a sampling technique using purposive sampling on cadets at Voyage schools. Data was collected through questionnaires and regression analysis was used to test the hypothesis. The results of the study show that the understanding of Passage Planning in Terrestial Navigation has a significant effect on the competence of cadets when carrying out maritime practices on board. Therefore, it is suggested for Voyage schools improve the learning of Terrestial Navigation Passage Planning to increase the competence of cadets in carrying out maritime practices on board. The results of the study simultaneously obtained the value of Fcount > Ftable [29.008 > 2.513] at the significance level $\propto$ = 5%, this states that simultaneously the variables Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4), affect competence cadets during Sea Project on board at Politeknik Pelayaran Malahayati.

Keywords: *Terrestial Navigation, Passage Planning, Catalog & Nautical Chart, Position Plotting, Distance and Course Voyage Determination, Voyage Planning Tabulation*

INTRODUCTION

Terrestial Navigation is a science that teaches us how to determine a ship's position by using visible and known land or sea objects and their positions listed on sea charts so that ships can avoid navigational hazards that may exist. Land and sea objects such as islands, mountains, capes, flares, and so on. Of course, for prospective deck officers who can absorb an understanding of the content of this teaching material, this is evidence of increased competency in their field.

Passage Planning is the planning of ship voyages from one place to another safely, quickly and economically, and safely to the destination. Voyage from one port to another must be coordinated by all crew members. One of the most important parts of a voyage is the passage plan or voyage planning, usually carried out by the ship's navigation officer and second *officer* While making plans, officers should keep in mind that the ship must reach its destination safely in compliance with both local and international rules and regulations. The passage plan for a ship involves four stages, including assessment, planning, implementation, and monitoring. At every stage of planning, it is important to carry out careful and up-to-date publications to ensure safe Voyage. At the outset, the initial estimate

consists of the entire Voyage process. Once the initial plans are ready, with details gleaned from publications, weather routing, etc. This process is carried out throughout the assessment and planning stages. In the next two phases, namely, implementation and monitoring, the plan is used as a guideline, and the Voyage is executed taking into account various factors, both observed and predicted.

Politeknik Pelayaran Malahayati which is a Technical Implementation Unit under the Ministry of Transportation HR Development Agency which has the task of implementing Vocational Education, Research, and Community Service in the field of Shipping has organized a Diploma III Program in Nautical Studies, Ship Engineering Studies and Ship Electrical System Studies and Terrestial Navigation is one of the competencies that must be mastered by cadets of the Nautical study program, one of the materials is Passage Planning.

From the description above, the researcher is interested in carrying out research related to the effect of the learning outcomes of the Terrestial Navigation course in competence Passage Planning for cadets who are carrying out Sea Project on board which of course need to have basic competence while carrying out Sea Project. Therefore, the researcher will carry out research with the title "Effect of The Learning Outcomes of the Terrestial Navigation Course in Competence Passage Planning for cadets Who Are Carrying Out Sea Project on Board."

LITERATURE REVIEW
Understanding Passage Plan

Passage Plan is the planning of ship voyages from one place to another safely, quickly and economically, and safely to the destination. Voyage from one port to another

must be coordinated by all crew members. One of the most important parts of the voyage is the passage plan or voyage planning, usually carried out by the ship's navigation officer's second officer, namely making plans, the officer must remember that the ship must reach its destination safely by complying with both local and international rules and regulations.

Passage plans a ship involves four stages, including assessment, planning, implementation, and monitoring. At every stage of planning, it is important to carry out careful and up-to-date publications to ensure safe Voyage. At the outset, the initial estimate consists of the entire Voyage process. Once the initial plans are ready, with details gleaned from publications, weather routing, etc. This process is carried out throughout the assessment and planning stages. In the next two phases, namely, implementation and monitoring, the plan is used as a guideline, and the Voyage is executed taking into account various factors, both observed and predicted.

According to Rahardjo (2008), there are four aspects of planning described in general below:

a. Assessment

At this stage, the captain of the ship discusses with the navigation officer or mate II how he intends to sail to the port of destination. (In some ways the captain is decisive). Bearing in mind the captain's consideration guidelines, the ship's company guidelines, the marine environment, and all other factors that may affect the ship, the navigation officer refers to the general track, which the ship must follow. To facilitate planning, these plans are first laid out on small-scale Charts, which are then transferred to larger-scale charts, and then minor changes are made as and when deemed necessary. In

this stage the captain must also be able to carry out Bridge Team Management on the ship, the objectives of Bridge Team Management include: a. To improve and ensure the security and safety of ship navigation of souls and property at sea. b. Arrive at the destination port on time c. To avoid the consequences of total loss that can occur. d. To maintain and protect the marine environment from pollution. e. Cooperation and division of tasks and responsibilities exist between deck officers so that they can carry out work on the bridge with high discipline and full responsibility.

b. Planning

At this stage, the program aims to position the ship on the Chart at the appropriate scale by adding navigational information. The plan is laid out from pier to pier, including piloting waters. This is an important stage for marking dangerous areas such as nearby shipwrecks. Shallow water, reefs, islets, harbor emergency positions, and other information that may aid safe navigation.

c. Execution

The third stage is execution. IMO has been careful to include executions as part of the cruise planning (passage plan). At this stage, we are again reminded of the captain's responsibility and also the responsibility of the navigation officer, in this case, the second officer, to regard the passage plan as a "living document" that can be reviewed or replaced in an unusual case that will arise in a circumstance.

d. Monitoring

Once a voyage begins, monitoring along a predetermined route is necessary, which means determining the ship's position by various methods, using standard methods including flat navigation, astronomical navigation, and electronic navigation. In making a cruise plan one of the things that need to be considered is the position when changing course. Where when changing course, one must pay attention to the navigational hazards that are around, and always maintain a safe speed throughout the voyage. Under keel clearance must be paid attention, publication of navigation that is up to date, and when changing Charts is not done in dangerous waters. Shipping Planning for various waters, during shipping it is necessary to make a shipping plan so that the channel to be traversed can always be safer and the navigational signs must also be considered, for position determination with the help of objects or signs on the ground must be utilized.

Definition of Safety Voyage

According to UU Nomor 17 which has now been amended by Law Number 2 of 2022 Safety Voyage and Security is a condition of fulfilling safety and security requirements relating to transportation in waters, ports, and the maritime environment.

Several things cause accidents on board that endanger the safety of navigation:

a. The human factor is the biggest factor which includes:

1) Carelessness in operating the ship
2) The inability of the ship's crew to master various problems that may arise in the operation of the ship
3) Knowingly overload the ship

b. Technical factors are usually related to inaccuracies in ship design, neglect of ship maintenance resulting in damage to the ship or parts of the ship which causes the ship to have an accident, burning of the ship as happened to the Tampomas ship in Masalembo waters, the Livina ship.

c. Natural factors and bad weather factors are problems that are often considered the main cause of marine accidents. The problems that are usually experienced are storms, high waves that are influenced by the season/storm, large currents, and fog which results in limited visibility.

To control Safety Voyage internationally, it is regulated by the following provisions:

a. International Convention for the Safety of Life at Sea (SOLAS) amendment 2010, as 11 amended: This international rule concerns the following provisions:

1) Construction (structure, stability, machinery, electrical installations, fire protection, and fire fighting.
2) Radio communication, navigation safety
3) Auxiliary devices, such as buoys, navigational safety.
4) Application of provisions to improve Safety Voyageand security including the application of the International Safety Management (ISM) Code and the International Ship and Port Facility Security (ISPS) Code.

b. International Convention on Standards of Training, Certification dan Watchkeeping for Seafarers, tahun 1978.

c. International Convention on Maritime Search and Rescue, 1979.

d. International Aeronautical and Maritime Search and Rescue Manual (IAMSAR) in 3 volumes including:

1) Organization and Management (volume I) Discusses the global SAR system concept, establishment and improvement of national and regional SAR systems, and cooperation with neighboring States to provide effective and economical SAR services.

2) Mission Coordination (volume II) Assists personnel who plan and coordinate SAR operations and exercises.

3) Mobile Facilities (volume III) Is intended to be carried on board rescue units, aircraft, and vessels to help with the performance of a search, rescue, or on-scene coordinator function and with aspects of SAR that pertain to their emergency.

There are several kinds of accidents that occur on the ship, among others:

a. ran aground
b. Construction Damage
c. Machine Damage
d. Explore
e. Hit the Pier
f. Hitting the Bridge Pile
g. oblique h. People Fall into the Sea
h. Sink
i. Burnt
j. Backward
k. Collision
l. Leakage

Definition of Navigation

Hananto Soewedo (2008), Navigation comes from Greek, namely from the word navis which means the boat, and the word rather which means to direct. The literal meaning is directing a ship on a voyage.

In subsequent developments, the word navigation is no longer only intended for the world of shipping but is also used in land travel (land navigation) and air (air navigation). Navigation is a technique for determining the position and direction of the track precisely by using navigation equipment, the personnel who use it are usually called navigators.

To explore the science of navigation, techniques and the use of tools such as compasses, global positioning systems (GPS), and Charts are fundamental to learn. In

addition, another important thing that must be known is reading the terrain and natural and man-made signs as directions.

To be able to understand and master navigation theoretically and practically, the key is:

a. Able to read, understand and interpret images of the earth's surface (*relief*) which is depicted on the topographic Chart sheet.

b. Able to use direction guidance equipment (*compass*) and other navigation aids.

c. Able to apply the use of topographical Charts and direction guide tools.

d. To master these three keys, theoretical understanding of the material is absolute, and practice using it in the field is a must, because many cases that occur in the field cannot be solved solely by relying on theoretical material that can be obtained in class or from reading books alone. , it takes a lot of practical experience in the field to hone skills and feelings in solving 14 different cases in each region. Different places, different cases, and different ways of solving them, the more practice in different fields, the more one's skills and feelings in navigation are honed.

Understanding Chart correction and good Chart selection

As material for the literature review, a little explanation about correcting Charts where we often find different things in a good and correct way to correct Charts. Don't forget that every time we make a Chart correction includes the correction number below the left of the Chart. Where it is useful to keep track of the corrections we have made. And if there are corrections that are missed, we will find out immediately. Correct the Chart using a purple pen. For T&P or temporary & preliminary corrections, use a 2b pencil

because this correction only applies within a certain period which will be removed again later. In this increasingly advanced era, Charts are a much-needed tool in development planning in various fields, such as land, agriculture, plantation, industry and trade, shipping, aviation, education, spatial planning, politics and security, and others.

Especially for thematic Charts which are more specific and specific, have become a necessity for almost every institution, especially those engaged in the planning and development of an area on a local, regional, national, and international scale. A Chart is a conventional depiction of the earth's surface that is reduced by using a scale and drawn on a flat surface as an appearance when viewed from above and added with writing as an identity. For more details, this will be discussed in Chapter 4.15 ICA (International Cartographic Association) is a worldwide association of cartographers. According to the ICA, a Chart is defined as a representation or picture of the elements of the abstract appearance of the earth's surface that have something to do with the earth's surface or celestial bodies and are generally depicted on a flat plane in a reduced or scaled manner.

The conditions of a good Chart are:

a. The Chart edition must be up to date

b. The statements and signs required by a navigator must be real and clear

c. The shoreline must be real, clear, and unbroken

d. The color of the Chart must be clear, each Chart is given a title according to the area being Chartped.

e. The paper used must be good and normal Chart size.

METHODS
Research design

In this study, researchers used a type of quantitative research approach. Quantitative research is a type of activity whose specifications are systematic, planned, and structured clearly from the start of the research design, regarding research objectives, research subjects, research objects, data samples, data sources, and methodology (from data collection to data analysis). Quantitative research is a process of finding knowledge that uses data in the form of numbers as a tool to find information about what we want to know.

Quantitative research methods can also be interpreted as research methods based on the philosophy of positivism, used to examine certain populations or samples, collecting data using research instruments, data analysis is quantitative/statistical with the aim of testing established hypotheses. The purpose of quantitative research is to test the theory, build facts, show relationships between variables, provide statistical descriptions, and estimate and predict results.

Types of research

The type of research is a descriptive correlation. Correlational is research conducted by researchers to determine the level of relationship between two or more variables, without making changes, additions, or manipulation of existing data. In addition, the correlation describes quantitatively associative or the relationship of one interval variable with other interval variables.

The correlational design technique aims to:

a. Looking for evidence based on the results of data collection whether there is a relationship between variables.

b. Answering the question of whether the relationship between these variables includes a strong, moderate, or weak relationship.

c. Obtaining clarity of mathematical certainty, whether the relationship between variables is a meaningful or convincing (significant) relationship, or the relationship is not significant or not convincing.

So correlational is intended to get a description of a fact or test the relationship of reality that already exists or has taken place in the object. Processing and analysis of data to test theory is done through the SPSS 23.0 application.

There are two kinds in this research, namely:

a. Independent Variable (*Independent*)

The independent variable is the variable that influences or causes the change or the emergence of the dependent variable. The independent variable in this study is the Understanding of Terrestial NavigationMaterials called variable X.

X1: Catalogue & Nautical Chart.

X2: Plotting Position

X3: Distance dan Course Voyage Determination

X4: Voyage Planning Tabulation

b. Dependent variable (*depend*) The dependent variable or also called the dependent variable, effect variable, dependent variable, affected variable, or dependent variable is a variable that is affected or becomes the result, because of the independent variables. The dependent variable in this study is the Passage Planning Competence called the Y variable.

From the explanation above, the Conceptual Framework for this research is as follows:
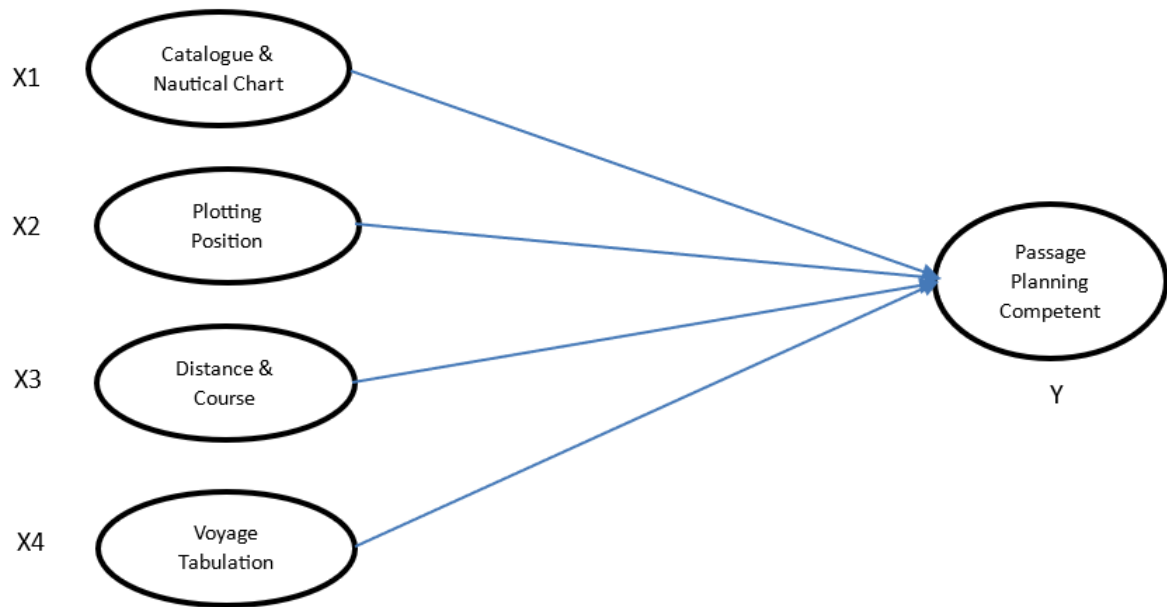
Population and Sample

a. The population is a generalized area consisting of objects and subjects that have certain qualities and characteristics determined by the researcher to study and then draw conclusions. In this case, the population in this study were all Diploma III Cadets Batch VIII Semester V and VI who were carrying out Sea Projecton board.

b. The sample is part of the number and characteristics possessed by the population. If the population is large, and it is impossible for the researcher to study everything in the population, for example, due to limited funds, manpower, and time, the researcher can use samples taken from that population.

c. Sampling Technique Sampling technique is a method or way of determining the sample and sample size. There are two sampling techniques, namely probability sampling and non-probability sampling. In each type of selection technique, there are more specific techniques. In the probability sampling technique, several techniques are known, namely simple random sampling, stratified random sampling, cluster sampling, systematic sampling, and area sampling. Meanwhile, in non-probability sampling, several techniques are known, namely convenience sampling, purposive sampling, quota sampling, and snowball sampling.

In this study, researchers used techniques of probability sampling where more specifically the technique of proportionate stratified random sampling. The determination of this technique is the recruitment of sample members when the population has members/elements that are not homogeneous and stratified proportionally. In determining the size of the sample in this research using the table for determining the number of samples developed by Isaac and Michael with an error rate of 5%, due to the limited time and cost of the researcher. The size of the sample taken is 70, consisting of 5-semester classes totaling 110 respondents.

Data Analysis Tools

To test the hypothesis, a multiple regression measuring instrument is used in which the Y (cadet competence) quantitatively will be known for each X variable with the following formula.

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 +$ and

Where:

Y = Passage Planning Competency

X_1 = Catalogue & Nautical Chart

X_2 = Plotting Position

X_3 = Distance dan Course Voyage Determination

X_4 = Voyage Planning Tabulation

a = Constant

b_1 = Catalog & Nautical Chart Regression Coefficient

b^2 = Plotting Position Regression Coefficient

b_3 = Distance Regression Coefficient and Course Voyage Determination

b_4 = Voyage Planning Tabulation Regression Coefficient

It is = Std. error

The regression calculation will show the strength of the functional relationship between the dependent variable (Y) and the independent variable (x_1, x_2, x_3, x_4, x_5). To measure the closeness of the relationship between the dependent variable and the independent variable as a whole a correlation analysis is used by looking for the correlation coefficient (R), while to see how much influence the independent variables have on the dependent variable on the learning outcomes of students at the Shipping Polytechnic Malahayati Aceh as a whole used the coefficient of determination (R^2).

Test the Validity and Reliability of Measuring Instruments

Data collection was carried out using a questionnaire, so the ability of respondents to answer questions is important in this study. Obtaining a reliable research result is largely determined by the measurement tools used to measure the variables to be studied.

Therefore, to measure whether or not the questionnaire is reliable, validity and reliability analysis are used. A valid instrument means that the measuring instrument used to obtain (measure) data is valid. Valid means that the instrument can be used to measure what should be measured. Meanwhile, a reliable instrument is an instrument that, when used several times to measure the same object, will produce the same data.

To see the reliability of each instrument used, researchers use the coefficients *Cronbach Alpha*. An instrument is reliable if it has an alpha value greater than 0.50 (Malhotra, 2012: 305). Testing the validity of the data in this study was carried out statistically, namely by using a test Pearson *product-moment coefficient of correlation* with the help of SPSS 23.0 all statements are declared valid if they have a significance level below 5%.

Hypothesis test

To test the hypothesis in this study the authors used the F-test and t-test, namely at the confidence level (95% confidence interval) error rate (alpha).*a* by 5%.

a. If the t-statistic$_{count}$> statistik t-t$_{abel,}$ then Ha is accepted

b. If the t-statistic$_{count}$< statistik t-t$_{abel}$, then Ha is rejected

c. If the F-statistic$_{count}$> F-t statistical, then Ha is accepted

d. If the F-statistic count < F-t statistical, then Ha is rejected

At the confidence level (*inviting interval* 95%) or the error rate (alpha) *amounting* to 0.5%, then if the significant value is < from the alpha value (5%) then Ha is accepted, and on the other hand if the significant value is > from the alpha value (5%) then Ha is rejected.

In general, hypothesis testing in this study is formulated as follows:

Ha1= Catalog & Nautical Chart, Plotting Position, Distance and Course Voyage Determination, and Voyage Planning Tabulation simultaneously have a significant influence on the competence of cadets during Sea Project on board.

Ha2= The Catalog & Nautical Chart has a significant influence on the competence of cadets when practicing sea on board at Politeknik Pelayaran Malahayati

Ha3= Plotting position has a significant influence on the competence of cadets when practicing sea on board at Politeknik Pelayaran Malahayati

Ha4= Distance and Course Voyage Determination have a significant influence on the competence of cadets when practicing sea on board at Politeknik Pelayaran Malahayati

Ha5= Voyage Planning Tabulation has a significant influence on the competence of cadets when practicing sea on board at Politeknik Pelayaran Malahayati

Classic assumption test

This classical assumption test was conducted to find out whether the estimation model used meets the assumptions of classical linear regression. This is important to obtain valid and reliable parameters. Diagnostic tests consist of:

a. Normality Test. This test is conducted to determine the normality of the residual variables. Classical normal linear regression assumes that each ± (residual) is normally distributed. For 2 normally distributed variables,m and not only uncorrelated but also independently distributed (Gujarati, 2013:166). The residual variables that are normally distributed will lie around the horizontal line (not spread far from the diagonal line).

b. Multicollinearity test, that is, there is a strong relationship between the independent variables in the regression equation. The existence of multicollinearity in the regression equation model used will result in estimation uncertainty, thus directing the conclusion to accept the null hypothesis. To detect whether the independent variables used have high collinearity or not, you can use the variance *Inflation Factor (VIF)*, and Anderson *Correlation Matrix*. According to Gujarati, the greater the VIF value, the more problematic or the higher the collinearity between the independent variables. As*Rule of Thumb*, if the VIF value is equal to one, it indicates that there is no collinearity between the independent variables, and if the VIF value is less than 10, then the collinearity level is not classified as dangerous. *The person Correlation Matrix* is used to determine the value of the coefficient between independent variables. If the coefficient value is less than 0.80, then there is already dangerous multicollinearity in the study (Gujarati, 2013).

c. Heteroscedasticity test, an important assumption of the classical linear model is that the disturbances that appear in the regression function are homoscedastic, that is, all disturbances have the same variables (Gujarati, 2013). If the coefficient of the beta parameter of the regression equation is statistically significant, this indicates that in the estimated empirical model data there is heteroscedasticity, and vice versa if the beta parameter is not statistically significant, then the assumption of

homoscedasticity in the data model can be rejected (Ghozali, 2012).

RESEARCH RESULT
Characteristics of Cadets

The Politeknik Pelayaran Malahayati is a vocational tertiary institution in Indonesia that is located in Aceh Besar District, Aceh Province. This polytechnic was founded in 2014 and is one of the tertiary institutions in Aceh that focuses on marine and maritime education and training.

The Politeknik Pelayaran Malahayati offers diploma III study programs. The study program is designed to produce graduates who are competent in the maritime and transportation fields so that they can help meet the needs of industry in Aceh and its surroundings.

The Politeknik Pelayaran Malahayati has quite complete facilities, such as a marine laboratory, library, and dormitories for cadets. In addition, this Polytechnic also frequently collaborates with the maritime industry in Aceh to ensure that the curriculum taught is always relevant to industry needs.

As a relatively new maritime college, the Politeknik Pelayaran Malahayati has produced graduates who are successfully accepted into the maritime industry and has continuously made efforts to improve the quality of education and training provided.

Characteristics of cadets in this study only looked at the age level of cadets who filled out understanding questionnaires passage planning Terrestial Navigation on the competence of cadets during Sea Project on board, as explained in table 4.1 below:

Table of Cadets Age Characteristics

No.	Description	Frequency	Percentage
1.	Age ▪ 18 years	4	5,7
	▪ 19 years	21	30,0
	▪ 20 years	29	41,4
	▪ 21 years	13	18,6
	▪ 22 years	3	4,3
Amount		70	100.0

Source: Primary data processed, (2023)

Based on the age of cadets, it can be explained that as many as 4 people or 5.7% of cadets are 18 years old, then cadets with an age level of 19 years are 21 people, or 30.0%, cadets with a level of 20 years are 29 people or 41.4%, then cadets aged 21 years were 13 people or 18.6% and cadets aged 22 years were 3 people or 4.3% of the total cadets. In the study, it can be explained that respondents with an age level of 20 years are respondents with a dominant age level or at most compared to respondents with an age level of less than 20 years or more than 20 years.

Instrument Testing Results
a. Validity Testing

Validity testing is a testing process to determine the extent to which a measuring instrument (such as a questionnaire or test) is reliable in measuring the concept or variable you want to measure. Validity refers to the extent to which the measuring instrument measures what it is supposed to measure. Validity testing is carried out to ensure that the measuring instruments used can produce accurate and reliable data in the research or measurements carried out.

Testing the validity of the data in this study using test Pearson *product-moment coefficient of correlation* with the help of SPSS version 23.0. The results of the study show that all statements have a correlation value above the critical value of 5%, which is above 0.235 (See Table of Correlation Critical Value product–*Moment* for n = 70). This means that the data obtained is valid and can

be used for research, as explained in the following table:

Table of Validity Test Results

No. Statement		Variable	Correlation coefficient	Critical Value 5% (N=70)	Is
1.	A1	Catalogue & Nautical Chart (X_1)	0,930	0,235	Valid
2.	A2		0,932		
3.	A3		0,956		
4.	A4		0,924		
5.	B1	Plotting Position (X_2)	0,892	0,235	Valid
6.	B2		0,900		
7.	B3		0,940		
8.	B4		0,917		
9.	C1	Distance dan Course Voyage Determination (X_3)	0,911	0,235	Valid
10.	C2		0,910		
11.	C3		0,858		
12.	C4		0,813		
13.	D1	Voyage Planning Tabulation (X_4)	0,951	0,235	Valid
14.	D2		0,960		
15.	D3		0,952		
16.	D4		0,931		
17.	E1	Cadets Competency (Y)	0,829	0,235	Valid
18.	E2		0,797		
19.	E3		0,920		
20.	E4		0,917		
21.	E5		0,823		
22.	E6		0,821		

Source: Primary Data (2023), (processed)

Based on Table above it can be explained that all the variables used in this study were all declared valid, so that all the questions contained in this research questionnaire were declared valid to be continued in more in-depth research.

Data is said to be valid if the data is accurate, relevant, and reliable. Here are some reasons why data can be considered valid:

1) Accurate: Accurate data is true and correct data. The data is taken from a trusted source and the collection process is carried out properly and precisely. For example, data on the population of a city taken from the Central Bureau of Statistics can be considered valid because it is taken from a reliable source and the collection process is carried out properly.

2) Relevant: Relevant data is data related to the topic or issue being discussed. For example, data on the level of education in a country can be considered valid if it is used to discuss educational issues in that country.

3) Reliable: Reliable data is data taken from reliable sources and the collection process

is carried out correctly. For example, data obtained from research conducted by a trusted research institution can be considered valid because the collection process is carried out properly and can be trusted.

By having valid data, decisions taken or analyses carried out based on these data can be trusted and provide accurate results.

Reliability testing is intended to determine the extent to which the measurement results remain consistent and is also carried out statistically by calculating the Cronbach magnitude *Alpha* with the help of the SPSS version 15.0 program. The results are as shown in the table below which shows that the instrument in this study is reliable (reliable) because the alpha value is greater than 0.60 (Malhotra, 2016).

a. Reliability Testing

Table of Research Variable Reliability (Alpha)

No.	Variable	Rate-rate	Amount Variable	Alpha value	Catalogue & Nautical Chart
1.	Catalog & Nautical Chart (x1)	3,457	4	0,952	reliable
2.	Plotting Position (x2)	3,454	4	0,933	reliable
3.	Distance dan Course Voyage Determination (x3)	3,486	4	0,896	reliable
4.	Voyage Planning Tabulation (x4)	3,546	4	0,963	reliable
5.	Cadets Competency (Y)	3,390	6	0,922	reliable

Source: Primary Data (2023) (processed)

Based on Table above shows that the alpha value for each variable, namely the Catalog & Nautical Chart variable (x1) obtained an alpha value of 95.2 percent, the Plotting Position variable (x2) obtained an alpha value of 93.3 percent, the Distance and Course Voyage Determination variables (x3) obtained an alpha value of 89.6 percent and the Voyage Planning Tabulation variable (x4) obtained an alpha value of 96.3 percent, an alpha value of 92.2 percent was obtained, thus the reliability measurement of the research variable showed that the reliability measurement met the requirements required by Malhotra.

The data in this study are said to be reliable because of the consistency of the data, namely data that does not conflict with the results of other studies or data taken from different sources. For example, if the research results show a relationship between two particular variables, then that relationship should be found in the results of other similar studies.

Classical Assumption Testing

By using the multiple linear regression model in the discussion of data analysis, the classical assumptions are tested first, where in

this case there are 3 types of assumptions used, namely:

Normality

The first classic assumption to be tested is normality. Based on the normal P –P plot on the attachment page shows the distribution standardized *residual* is within the range of the diagonal line. As explained in the following image:

Image of Normality Competence of Cadets

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Kompetensi Taruna
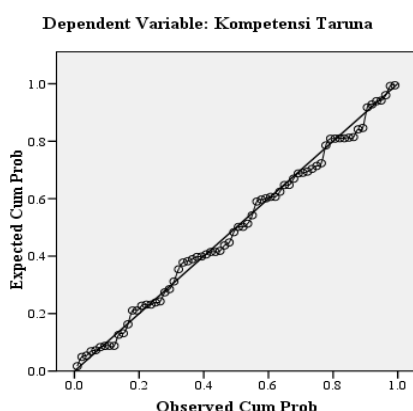
Based on the figure above, it can be explained that the dependent data in this study are normally distributed, meaning that this study is feasible for further research. The normal distribution in this study is characterized by the distribution of data (in the form of dots) around the horizontal line, this indicates that the data is normally distributed.

Multicollinearity Testing

Multicollinearity is tested by looking at the VIF (Variance Inflating Factor) of each independent variable on the dependent variable. If VIF $<$ 5 then there is no multicollinearity or non-multicollinearity. The test results are shown in the following table:

Table of VIF Values of Independent Variables

| Free Variables	Tolerance	VIF	Information
Catalogue & Nautical Chart (x1)	0,805	1,242	Non-Multicollinearity
Plotting Position (x2)	0,357	2,804	Non-Multicollinearity
Distance dan Course Voyage Determination (x3)	0,367	2,724	Non Multicollinearity
Voyage Planning Tabulation (x4)	0,867	1,153	Non Multicollinearity

Source: Primary data processed, (2023)

Based on table above, it can be explained that all independent variables in this study obtained VIF values (*Variance Inflating Factor*) is less than a value of 5 and has a tolerance value of less than one, so that the independent variables in the study show non-multicollinearity.

Heteroscedasticity Testing

Heteroscedasticity is an indication that the variance between residuals is not homogeneous which results in the estimated value obtained being no longer efficient. One way that can be used to detect the presence or absence of heteroscedasticity can be done with the Glejser test as shown in Figure 4.2. This:

Cadets Competency Scatterplot Image

Scatterplot
Dependent Variable: Kompetensi Taruna
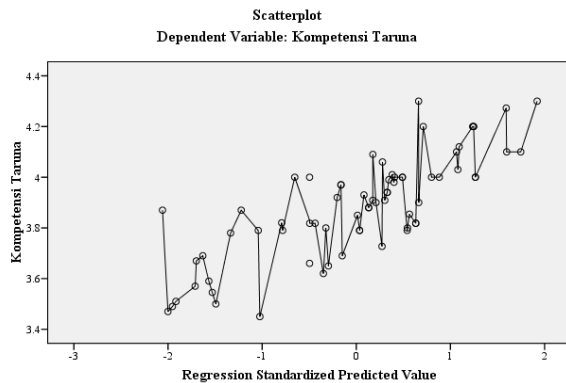
Based on Figure 4.2 above, it can be explained that the points spread above and below the number 0 on the Y axis, there is no heteroscedasticity, meaning that the data in this study can be used as an indicator of variable measurement, (Ghozali, 2017).

Understanding Influence Analysis*Passage*

Planning Terrestial Navigation **Against the Competence of Cadets During Sea Projecton board**

Cadets or students at certain educational institutions have competencies that must be mastered and developed during their studies. The competence of cadets is usually related to scientific fields as well as social skills that are important for future success.

To determine the effect of independent variables, namely Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), and Voyage Planning Tabulation variables (x4) on the competence of cadets when practicing sea on board (Y). The influence of each independent variable on the dependent variable in detail can be seen in the following table:

Table of Influence of Independent Variables on Dependent Variables

Variable Name	ß	Standard Error	count	t_{table}	Say.
constant	2,338	0,154	15,215	1,994	0,000
Catalogue & Nautical Chart	0,149	0,044	3,409	1,994	0,001
Plotting Position	0,068	0,033	2,056	1,994	0,044
Distance dan Course Voyage Determination	0,082	0,029	2,795	1,994	0,007
Voyage Planning Tabulation	0,114	0,029	3,960	1,994	0,000
R	= 0,801				
R_{Square}	= 0,641				
Adjusted R^2	= 0,619	F_{count}	29,008		
Std. Error of the estimate	= 0,126	F_{table}	2,513		
		Say.	$0,000^a$		

Source: Primary data processed, (2023)

Based on the results of the computer output through the SPSS program as shown in the table above, the multiple regression equation is obtained as follows.

$$Y = 2,338 + 0,149x_1 + 0,068x_2 + 0,082x_3 + 0,114x_4 + e$$

From the regression equation above, it can be seen that the results of the study are as follows:

Regression Coefficient (b):

1) In the study, a constant value of 2.338 was obtained, meaning that if the factors of Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), and Voyage Planning Tabulation (x4), are considered constant,

then the competence of cadets when practicing sea on board is 2.338 on the Likert scale unit or competence of cadets when practicing sea on board is still low.

2) The regression coefficient of the Catalog & Nautical Chart (x1) is 0.149, meaning that every 100% change in the Catalog & Nautical Chart variable will increase the competence of cadets during Sea Project on board by 14.9% assuming the variables Plotting Position (x2), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4) are considered constant. This means that a better the Catalog & Nautical Chart will have an impact on the competence of cadets when practicing at sea on board The Politeknik Pelayaran Malahayati.

3) The regression coefficient of Plotting Position (x2) is 0.068, meaning that every 100% change (improvement) in the Plotting Position variable will relatively increase the competency of cadets when practicing sea on board by 6.8% assuming the Catalog & Nautical Chart variable (x1), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4) are considered constant. This means that by increasing Plotting Position, it will directly affect the competence of cadets when practicing sea on board at The Politeknik Pelayaran Malahayati.

4) The regression coefficient of Distance and Course Voyage Determination (x3) is 0.082, meaning that every 100% change (improvement) in the variables Distance and Course Voyage Determination will relatively increase the competence of cadets when practicing sea on board by 8.2% assuming Catalog & Nautical Chart (x1), Plotting Position (x2), Voyage Planning Tabulation (x4) are considered constant. This means that the better the Distance and Course Voyage Determination, it will directly affect the competence of cadets when practicing sea on board at The Politeknik Pelayaran Malahayati.

5) The regression coefficient of the Voyage Planning Tabulation (x4) is 0.114, meaning that every 100% change (improvement) in the Voyage Planning Tabulation variable will relatively increase the competency of cadets during Sea Project on board by 11.4%, assuming the Catalog & Nautical Chart variable (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3) are considered constant. This means that the better the level of Voyage Planning Tabulation carried out by the cadets, it will directly affect the competence of cadets when practicing sea on board at The Politeknik Pelayaran Malahayati.

Correlation Coefficient and Determination
1. Correlation coefficient (R)

Based on the computer output above, the correlation coefficient in the study obtained a value of 0.801 where with this value there is a relationship between the independent variable and the dependent variable of 80.1%. This means that the competence of cadets during Sea Project on board is closely related to the factors of Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4).

2. Coefficient of Determination (R^2)

Meanwhile the coefficient of determination obtained with a value of 0.641 means that 64.1% of the changes in the

dependent variable (cadet competence when practicing sea on board) can be explained by changes in the factors of the Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4). While the remaining 35.1% is explained by other factors outside the five variables as described above.

3. Simultaneous Testing

Based on the test results from the ANOVA test or F-test (simultaneously) F_{count} of 29.008, while F_{table} at the significance level $\propto = 5\%$ is 2.513. This shows that $F_{count} > F_{table}$, with a significance level of 0.000. The results of this calculation can be drawn a conclusion that the variables Catalog & Nautical Chart (x1), Plotting Position (x2), Distance and Course Voyage Determination (x3), Voyage Planning Tabulation (x4) together have a significant effect on the competence of cadets when sea practice on board.

4. T-test results

To see the effect of each variable on the competence of cadets when practicing at sea on board, it can be seen from the results of the t-test. The results of the calculations shown in table 4.5 can be seen the magnitude of the t value$_{count}$ for each variable with a level of confidence or a degree of significance of a = 5%.

a. **Variabel Catalogue & Nautical Chart (x1)**

The results of research on the Catalog & Nautical Chart variable (x1) obtained the value of t_{count} of 3.409 while the value of t_{table} of 1.994, the results of this calculation show that $t_{count} > t_{table}$ with a significance level of 0.001. Thus the results of statistical calculations show that partially the Catalog & Nautical Chart variables have a significant effect on the competence of

cadets when practicing sea on board.

b. **Variabel Plotting Position (x2)**

The findings of the research results on the Plotting Position variable obtained the value of t_{count} of 2.056, while the value of t_{table} of 1.994, the results of this calculation show that $t_{count} > t_{table}$ with a significance level of 0.044. Thus the results of statistical calculations show that partially the Plotting Position variable has a significant effect on the competency of cadets during Sea Project on board.

c. **Variabel Distance dan Course Voyage Determination (x3)**

The results of research on the variables Distance and Course Voyage Determination obtained the value of t_{count} of 2.795, while the value of t_{table} of 1.994, the results of this calculation show that $t_{count} > t_{table}$, with a significance level of 0.007 or a probability smaller than a = 5%. Based on the results of statistical calculations, it shows that partially the variables Distance and Course Voyage Determination have a significant effect on the competence of cadets when practicing sea on board.

d. **Variabel Voyage Planning Tabulation (x4)**

Based on the findings of the research results on the Voyage Planning Tabulation variable, the value of t is obtained$_{count}$ of 3.960 while the value of t_{table} of 1.994, the findings of this study indicate that $t_{count} > t_{table}$, with a significance level of 0.000. Based on the results of statistical calculations, it shows that partially the Voyage Planning Tabulation variable has a significant effect on the competence of cadets during Sea Project on board.

Research Implications

When doing Sea Project on board,

cadets or students must have special competencies that are different from the competencies in class. Some of the cadet competencies needed when carrying out Sea Project on board include:

1. Navigational skills: Cadets should have good navigational skills, such as an understanding of Charts and the use of navigational instruments, as well as the ability to determine the position of ships. They must also be able to make proper navigational calculations.

2. Ship maneuvering skills: Cadets must have skills in maneuvering ships, such as the ability to steer the ship and deal with emergency situations. They must also be able to control the ship safely and effectively in a variety of weather conditions.

3. Communication skills: Cadets must have the ability to communicate well with crew members and other teams. They must also be able to communicate clearly and precisely in an emergency situation.

4. Safety skills: Cadets must have a good understanding of safety on board, such as handling fire hazards, using safety equipment, and understanding of evacuation procedures. They must be able to maintain the safety of themselves and the crew in various situations.

5. Teamwork skills: Cadets must be able to work well together in a team and understand each other's roles and responsibilities. They must have the ability to adapt to different work environments and be able to work effectively under pressure.

6. Administrative skills: Cadets must be able to carry out ship administration tasks, such as ship maintenance and maintenance, filling out reports, and following

procedures set by the ship.

The competencies above are very important for cadets when doing Sea Project on board. By having these competencies, cadets can carry out their duties properly, maintain the safety of themselves and the crew, and help the success of the mission of the ship and related parties.

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