

CIPP Evaluation Model and Its Effect on E-Learning

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ARTICLE INFO

Keywords:

Evaluation
CIPP
Effect
E-Learning

Article history:

Received 2021-09-24
Revised 2021-10-19
Accepted 2022-03-29

ABSTRACT

One indicator of the quality of educational institutions is the use of information technology in teaching and learning activities. E-learning is fundamentally a teaching and learning activity using internet-based technology. The purpose of this research is to evaluate teaching and learning activities using e-learning. This study utilized the CIPP (Context, Input, Process, Product) evaluation model related to e-learning. The analysis technique used was multiple linear regression using R Software to see how much effect context and input had on the learning process and how much effect context and input had on the learning product. Based on the study results, Knowledge and understanding of Context component were of more significant concern since 63 (44.68%) of 141 cadets stated 'poor'. The average score of knowledge and understanding of Input component was 41, which was in score interval 33 – 42, included in the good category. Moreover, the average score of knowledge and understanding of Process component was 82, which was in score interval 65 - 84, included in the good category. Importantly, knowledge and understanding of Product component was of greater concern since 69 (48.94%) of 141 cadets showed poor results. Effect size of Context and Input components on Process was 0.5479 or 54.79%, while the remaining 45.21% was affected by other factors not examined in this study. The input component had a significantly more significant effect on Process component with a significance level of 0.001 than Context component. Moreover, effect size of Context and Input components on Product was 0.3303 or 33.03%, while the remaining 66.97% was affected by other factors not examined in this study. Context component had a significantly greater effect on Product with a significance level of 0.001 than Input component.

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1. INTRODUCTION

Use of information technology in learning influences the process of transforming education from a conventional basis into various digital forms, including materials, learning processes, systems, and evaluation. E-learning is basically a teaching and learning activity using internet-based technology. This kind of teaching and learning activities include not only uploading teaching materials to be accessed by Taruna (henceforth-cadets) but also assisting lecturers in evaluating their teaching and learning activities, communicating with their students, monitoring attitudes, observing cognitive, affective and psychomotor development, and managing various other aspects of learning. Uploading teaching materials on an e-learning site is not simply taking material from textbooks, modules, or books, but various aspects of website design are also needed as an attempt to attract cadets to study the materials presented. In March 2020, the Coronavirus disease (COVID-19) pandemic entered Indonesia. Politeknik Ilmu Pelayaran Semarang used to implement Boarding School education where it is more prone to experience COVID-19 transmission; therefore, it then implemented e-learning since October 2020.

In this case, the researcher observed cadets who joined e-learning and found that its implementation was not optimal. Cadets already had an internet network, but its use was still only as a source of information. In fact, not all lecturers were able to make interesting teaching materials in cyberspace, interactive forums on social media, or e-learning-based tests. Furthermore, several cadets also did not understand well importance of e-learning-based teaching and learning activities. Even though they already had supporting facilities including interconnected laptops, smartphones and internet, they tended to prefer playing, joking on social media, playing online games, reading and looking for information that was not related to learning materials.

A study conducted by (Okta, 2015) entitled Evaluation of Distance Learning Program using CIPP (Context, Input, Process, Product) Model concluded that CIPP model had a holistic approach to evaluation. This study aimed at providing a detailed and broad picture of a project, from context to implementation, which had a potential for formative and summative evaluation. (Kurnia & Rosana, 2017) in his study on the evaluation of e-learning implementation demonstrated that e-learning preparation obtained a score of 61.66. Based on Context, Input, Process, Product (CIPP) evaluation model, scores for context and input components were 64.22 and 64.08, respectively, while process and product components obtained scores classified as low: 58.95 and 58.23. Moreover, (Mahmudi, 2011) found that CIPP evaluation model was a complete evaluation model since it included formative and summative evaluations. Evaluation of context, input, process, and product components can be practiced in making decisions (formative) and presenting information on accountability (summative). Thus, it is able to improve strategy that an institution will use in carrying out its educational program. More importantly, (Gede & Divayana, 2015) conducted a study entitled Program Evaluation with Computer-Assisted CIPP Model. In this study, conventional calculation obtained 91.000%, while computer calculation obtained 91.600%. This study then concludes that the computer-assisted CIPP evaluation model obtains faster and more accurate results of calculations than using the conventional calculation method, but not significant.

Based on the above conditions, researchers argue that research is needed to evaluate and measure the influence of e-learning on learning outcomes, especially in courses taught for the first-semester Engineering Cadets at Politeknik Ilmu Pelayaran Semarang. The researcher was interested in finding out the implementation and management of e-learning activities carried out by lecturers in terms of Context, Input, Process and Product; the extent to which cadets understood in the following lesson; how supporting facilities and infrastructure were used; and challenges faced. Therefore, the researcher conducted a study entitled "Evaluation of E-learning Implementation in Learning Process at Politeknik Ilmu Pelayaran Semarang".

Accordingly, a further empirical study was needed to investigate this controversy. Researcher was interested in evaluating e-learning implementation at Politeknik Ilmu Pelayaran Semarang. There were basically two questions to answer: 1) How is the evaluation of e-learning implementation at Politeknik Ilmu Pelayaran Semarang? and 2) How is the effectiveness of e-learning at Politeknik Ilmu Pelayaran Semarang implemented and developed using CIPP evaluation. The authors want to give to this study to

measure how much influence the implementation of e-learning in vocational schools. Shipping education is done through CIPP Techniques. This research is necessary because it was first conducted at the Politeknik Ilmu Pelayaran Semarang, which organized boarding schools carrying out distance learning.

2. METHODS

This study used the descriptive method, which is a research method to create a picture of a situation or event, so that this method will only accumulate basic data. Evaluation model used in this study is CIPP model (context, input, process, product) in relation to e-learning implementation (Kurnia & Rosana, 2017). It was conducted at Politeknik Ilmu Pelayaran Semarang, that has implemented e-learning, in the first semester during the COVID-19 outbreak in November 2020-March 2021. The subject was evaluation of e-learning at Politeknik Ilmu Pelayaran Semarang, involving 141 cadets as respondents/data sources.

Various methods for data collection were used in this study, including observation, questionnaire, interview, and documentation. Observation was done by making direct observations to research object. Questionnaire was a collection of data using a list of questions in written form given to respondents at Politeknik Ilmu Pelayaran Semarang. Interview was chosen to collect data and information through instruments that researcher had prepared for parties who had a role in e-learning. The last one, documentation, was to reveal assessment process of evaluation results carried out.

Questionnaire was tested on 30 respondents with a significance level of 5% and obtained values of r-count were greater than r table = 0.30. Therefore, it can be said that questionnaire was valid for conducting research (Hakan & Seval, 2011). Reliability testing was used to make measurements and then showed the extent to which measuring instruments could be used. It was carried out using Alpha Cronbach technique using SPSS Statistics 25 which obtained a reliability score of 0.934 more than specified reliability score (0.60). Thus, it can be said that measuring instruments were reliable and could be used for this study. Regression testing was done using R Software. In addition, analysis was carried out using Simple Linear Regression Technique.

3. FINDINGS

3.1. Effect of Context, Input, Process, Product (CIPP)

Impact of Context and Input Components on Process of E-Learning

Multiple regression done on Context and Input Components in the e-learning process at Politeknik Ilmu Pelayaran Semarang was to see how much effect Context and Input components had on the learning process. Regression was performed using R Software.

Normality Test

Normality test was used to see normality of data under study using QQ Plot Method with Code:

```
> resid1<-resid(LinModel_1)
```

```
> qqnorm(resid1)
```

```
> qqline(resid1, col="red")
```

Here is an output (plot) produced in the form of figure 1:

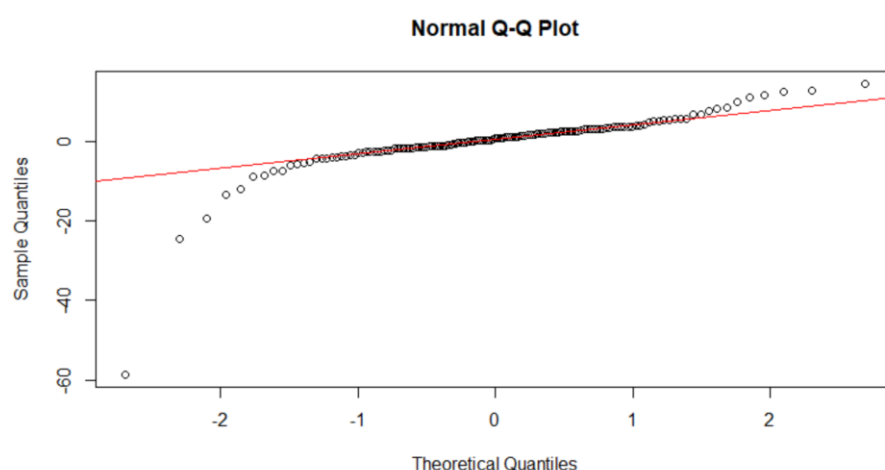


Figure 1. Normality Test

Source: Processed Research Data, 2021

Based on diagram 1 showing the normality test results, it can be seen that most of the data shown by small circles tend to approach linear lines. Accordingly, it can be concluded that data are normally distributed.

Homoscedasticity Test

The second test that needed to be done in making Classical Assumption Interpretation of Linear Regression with statistics was the heteroscedasticity or homoscedasticity test. There are basically many types of heteroscedasticity tests, including Glejser test, Park test, etc. However, this study only used Breusch-Pagan Test. The code used was:

```
> library(lmtest)
> bptest(LinModel_1,data=Data)
```

Here is an output produced in the form of Figure 2:

```
studentized Breusch-Pagan test
data: LinModel_1
BP = 0.91953, df = 2, p-value = 0.6314
```

Figure 2. Breusch-Pagan Test Output

Source: Processed Research Data, 2021.

Based on the results of the Breusch-Pagan Test, it can be seen that p-value is $0.6314 > 0.05$, indicating that the regression model is free from heteroscedasticity or is homoscedasticity. It is said to be free from heteroscedasticity if P-value, indicated by "Prob > chi2", is > 0.05 .

Autocorrelation Test

The autocorrelation test was used to perform statistical analysis to determine whether there was a correlation between variables in the prediction model and changes in time. This study used the Durbin-Watson method, with Code:

```
> library(lmtest)
> dwtest(LinModel_1)
```

Here is an output produced in the form of Figure 3:

```
Durbin-watson test
data: LinModel_1
DW = 1.5619, p-value = 0.003774
alternative hypothesis: true autocorrelation is greater than 0
```

Figure 3. Autocorrelation Test Output

Source: Processed Research Data, 2021

Based on the results of the Autocorrelation Test, it can be seen that DW and P-values are more than zero, indicating that there is no positive and negative autocorrelation in the analysis. Thus, it can be concluded that there is absolutely no autocorrelation.

Multicollinearity Test

The multicollinearity test in this study was used to determine whether or not there was a deviation from the classical assumption of multicollinearity; the linear relationship between independent variables in the regression model. It was performed to ascertain whether an intercorrelation or collinearity between independent variables in a regression model. Intercorrelation is a linear relationship or a strong relationship between one independent variable or predictor variable with other predictor variables in a regression model. It can be seen by the value of correlation coefficient between independent variables, VIF and Tolerance values, Eigenvalue and Condition Index values, as well as standard error value of beta coefficient or partial regression coefficient. In this study, VIF (Variance Inflation Factor) method was used with Code:

```
> library(car)
> vif(LinModel_1)
```

Based on the results of the Multicollinearity Test, the range value is narrow and does not even exist; namely, $X_1 = 1.00183$ to 1.00183 . It indicates that multicollinearity is not detected. Thus, it can be concluded that there is no Multicollinearity.

Model and Effect Size

To determine effect size of Context and Input components on Process, R Software application was used with Code:

```
> LinModel_1<-lm(process~context + input,data=Data)
> summary(LinModel_1)
```

Here is an output produced in the form of Figure 4:

```
Call:
lm(formula = process ~ context + input, data = Data)

Residuals:
    Min       1Q   Median       3Q      Max
-58.785  -1.876   0.835   3.000  14.604

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  11.4277     6.0491   1.889  0.06097 .
context       0.2172     0.0771   2.817  0.00557 **
input         1.4711     0.1155  12.732 < 2e-16 ***
---
Signif. codes:
  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.2 on 138 degrees of freedom
Multiple R-squared:  0.5479,    Adjusted R-squared:  0.5414

F-statistic: 83.63 on 2 and 138 DF,  p-value: < 2.2e-16
```

Figure 4. Output of Effect Size of Context and Input Components on Process

Source: Processed Research Data, 2021.

Based on figure 4, the effect size of Context and Input components on Process is 0.5479 or 54.79%, while the remaining 45.21% is affected by other factors not examined in this study. Input component has a significantly greater effect on the Process component with a significance level of 0.001 than the Context component. It can be formulated as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + e$$

then

$$Y = 11,4277 + 0,2172X_1 + 1,477X_2 + e$$

Information:

Y = Process

X_1 = Context

X_2 = Input

Generally, it can be shown in figure 5 below:

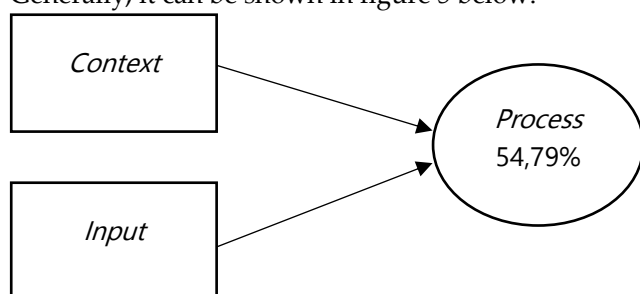


Figure 5. Effect of Context and Input Components on e-learning process

Source: Processed Research Data, 2021.

Effect of Context and Input Components on Product of E-Learning

Multiple regressions on Context and Input Components on Product of e-learning at Politeknik Ilmu Pelayaran Semarang was carried out to see how much effect Context and Input components had on Product of learning. Regression was performed using R Software.

Normality Test

Normality test was used to see normality of data under study using QQ Plot Method with Code:

```
> resid2<-resid(LinModel_2)
```

```
> qqnorm(resid2)
```

```
> qqline(resid2, col="red")
```

Here is an output (plot) produced in the form of Figure 6:

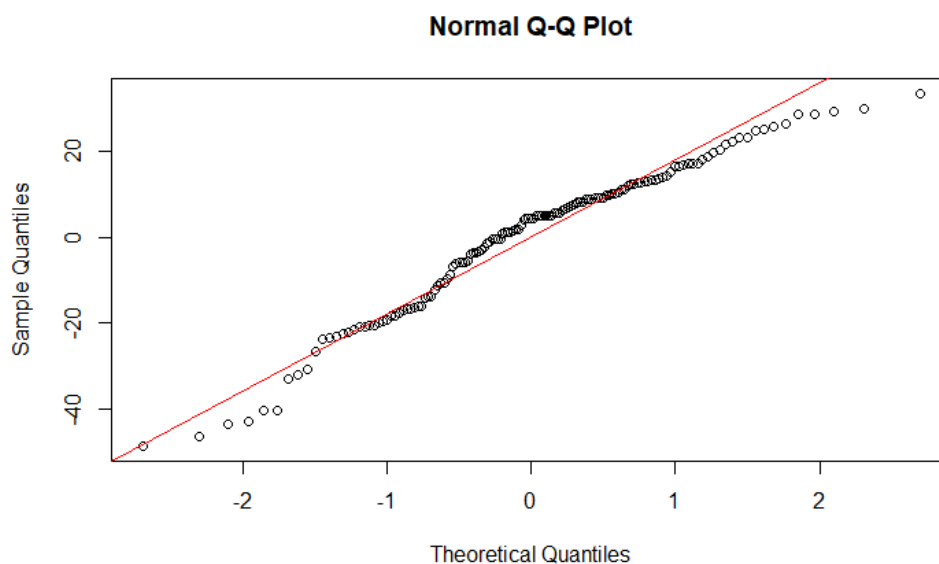


Figure 6. Normality Test

Source: Processed Research Data, 2021.

Based on figure 6 showing the normality test results, it can be seen that most of the data shown by small circles tend to approach linear lines. Accordingly, it can be concluded that data are normally distributed.

Homoscedasticity Test

The second test that needed to be done to make Classical Assumption Interpretation of Linear Regression with statistics was the heteroscedasticity or homoscedasticity test. There are basically many types of heteroscedasticity tests, including the Glejser test, Park test, etc. However, this study only used Breusch-Pagan Test. The code used was:

```
> library(lmtest)
> bptest(LinModel_2,data=Data)
```

Here is an output produced in the form of figure 6:

```
studentized Breusch-Pagan test

data: LinModel_2
BP = 0.86145, df = 2, p-value = 0.65
```

Figure 6. Breusch Pagan Test

Source: Processed Research Data, 2021.

Based on the results of Breusch-Pagan Test, it can be seen that p-value is $0.65 > 0.05$, indicating that regression model is free from heteroscedasticity or is homoscedasticity. It is said to be free from heteroscedasticity if P-value, indicated by "Prob > chi2", is > 0.05 .

Autocorrelation Test

The autocorrelation test was used to perform statistical analysis to determine whether there was a correlation between variables in the prediction model and changes in time. This study used the Durbin-Watson method, with Code:

```
> library(lmtest)
> dwtest(LinModel_2)
```

Here is an output produced in the form of figure 7:

```
Durbin-watson test

data: LinModel_2
DW = 0.96638, p-value = 2.066e-10
alternative hypothesis: true autocorrelation is greater than 0
```

Figure 7. Durbin-Watson Test

Source: Processed Research Data, 2021

Based on the results of the Autocorrelation Test, it can be seen that DW and P-values are more than zero, indicating that there is no positive and negative autocorrelation. Thus, it can be concluded that there is absolutely no autocorrelation.

Multicollinearity Test

The multicollinearity test in this study was used to determine whether or not there was a deviation from the classical assumption of multicollinearity; linear relationship between independent variables in regression model. It was performed to ascertain whether an intercorrelation or collinearity between independent variables in a regression model. Intercorrelation is a linear relationship or a strong relationship between one independent variable or predictor variable with other predictor variables in a regression model. It can be seen by value of correlation coefficient between independent variables, VIF and Tolerance values, Eigenvalue and Condition Index values, as well as standard error value of beta coefficient or partial regression coefficient. In this study, VIF (Variance Inflation Factor) method was used with Code:

```
> library(car)
> vif(LinModel_2)
```

Based on the results of the Multicollinearity Test, range value is narrow and does not even exist, namely $X_1 = 1.00183$ to 1.00183 . It indicates that multicollinearity is not detected. Thus, it can be concluded that there is absolutely no Multicollinearity.

Model and Effect Size

To determine effect size of Context and Input components on Product, R Software application was used, producing Output (Plot) in the following figure 8:

```
Call:
lm(formula = product ~ context + input, data = Data)

Residuals:
    Min       1Q   Median       3Q      Max
-48.61 -12.07   4.41  12.12  33.50

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  25.3459   14.6647   1.728  0.0862 .
context       1.5416    0.1869   8.248 1.14e-13 ***
input         0.1435    0.2801   0.512  0.6092
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 17.45 on 138 degrees of freedom
Multiple R-squared:  0.3303,    Adjusted R-squared:  0.3206
F-statistic: 34.03 on 2 and 138 DF,  p-value: 9.694e-13
```

Figure 8. Output of Effect Size of Context and Input Components on Product

Source: Processed Research Data, 2021

Referring to figure 8, the effect size of Context and Input components on Product is 0.3303 or 33.03%, while the remaining 66.97% is affected by other factors not examined in this study. Context component has a significantly greater effect on Product with a significance level of 0.001 than Input component. It can be formulated as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + e$$

then

$$Y = 25,3459 + 1,5416X_1 + 0,1435X_2 + e$$

Information:

Y = Product

X₁ = Context

X₂ = Input

Generally, it can be shown in figure 9 below:

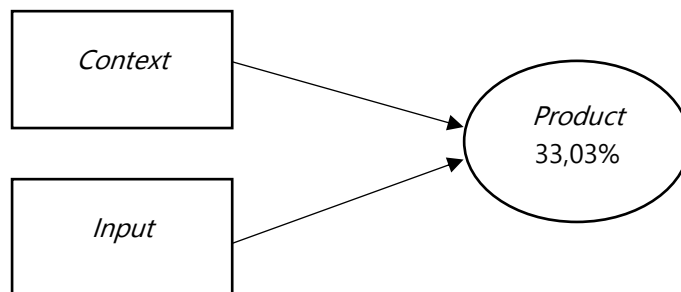


Figure 9. Effect of Context and Input Components on Product

Source: Processed Research Data, 2021

4. DISCUSSION

Effect of Context and Input Components on the E-Learning Process

Based on figure 4, the effect size of Context and Input components on Process is 0.5479 or 54.79%, while the remaining 45.21% is affected by other factors not examined in this study. Context factor, in this case, is the ability of the lecturer to plan and create e-learning materials, especially on all subjects from the 1st meeting to the 14th meeting, plus one Mid Test and One Final Semester Examination. Besides, factors that were not examined could be delivery methods, teaching methods, time allocation, application views, ease of access, etc., which contributed 45.21%. Input component has a significantly greater effect on Process component with a significance level of 0.001 than Context component, which can be formulated as follows:

$$Y = 11,4277 + 0,2172X_1 + 1,477X_2 + e$$

In this matter, Y = Process, X_1 = Context, X_2 = Input. It can be interpreted that the greater the Context and Input values, the greater the effect on Process component. Input component in this study is mastery of information technology during teaching and learning activities (Suryaman et al., 2020). Cadets considered that lecturers' mastery of information technology during e-learning implementation had a greater effect on the virtual learning process. Lecturers who seem to be very proficient in teaching in conventional learning, although not face-to-face learning, generally make the teaching and learning process more real, where students can understand the material presented and get additional abilities in terms of cognitive, affective and psychomotor aspects.

Lack of learning planning and teaching materials in e-learning can be improved by mastering information technology (Maló et al., 2008) and understanding the importance of distance learning with an interesting and humanist delivery. Quizzes, entertainment, and ice breaker activities related to learning, packaged in quiziz/kahoot can increase learning motivation and interest (Solihat et al., 2020) in doing practice questions.

Effect of Context and Input Components on E-Learning Product

Based on figure 8, the effect size of Context and Input components on Product is 0.3303 or 33.03%, while the remaining 66.97% is affected by other factors not examined in this study. Context factor, in this case, is the ability of the lecturer to plan and create e-learning materials, especially on all subjects from the 1st meeting to the 14th meeting, plus one Mid Test and One Final Semester Examination. Besides, factors that were not examined could be in the form of delivery methods, teaching methods, time allocation, application views, ease of access, etc. which contributed 66.97%. Input component had a significantly greater effect on Process component with a significance level of 0.001 than Context component, which can be formulated as follows:

$$Y = 25,3459 + 1,5416X_1 + 0,1435X_2 + e$$

In this matter, Y = Product, X_1 = Context, X_2 = Input. It can be interpreted that the greater the Context and Input values, the greater the effect on Process component. Input component in this study is mastery of information technology during teaching and learning activities. Cadets considered that lecturers' mastery of information technology during e-learning implementation had a greater effect on virtual learning process. Lecturers who seem to be very proficient in teaching in conventional learning, although not face-to-face learning, generally make the teaching and learning process more real, where students can understand material presented and get additional abilities in terms of cognitive, affective and psychomotor aspects. Lack of learning planning makes the level of mastery of cadets less optimal. They become lazy to study since learning materials are monotonous and only link to existing materials or videos to be studied independently without any explanation from lecturers.

This study is in line with research conducted by (Gede & Divayana, 2015), that by using the computer-assisted CIPP evaluation model, the results of calculations are faster and more accurate than using the calculation method, the influence of Context and Input factors is proven to be significant in influencing the factors of the learning process using E-medium. The novelty of this research is using

the Context, Input, Process and Product (CIPP) method in e-learning which was carried out during the Covid-19 Pandemic.

5. CONCLUSION

The Context component in the form of the ability to make e-learning based learning plans is in the good category on average. Input components in the form of skills in the use of information technology and e-learning-based learning media, on average, are in a good category. Process components in the form of the ability to manage and explain e-learning-based learning materials, on average, are in a good category. Product components in the form of teaching materials and better mastery of materials in e-learning-based learning are included in the good category. The e-learning learning method is proven to be feasible for cadets to learn as an effort to improve cognitive, affective and psychomotor abilities. This can be seen from the magnitude of the influence of the Context and Input components on the learning process. The e-learning learning method is proven to be good and feasible to be used for cadets for teaching and learning activities and increasing professionalism to be applied on board. The limitations of this study are that the research was only conducted at the Semarang Shipping Science Polytechnic and was conducted in Semester 1. However, the author hopes that the results of this research can be continued with more in-depth research in the future, adapted to the development of each science.

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