Chapter Four

Findings and Discussion

In this chapter, findings and discussion are presented. The findings are divided into four sections, findings on the research instruments, findings on learning environment, findings on students' critical thinking and the last is findings on the correlation between physical learning environment and students' critical thinking. The discussion part is divided into three sections, namely EED of UMY learning environment, EED of UMY students' critical thinking, and the correlation between physical learning environment and students' critical thinking.

Findings

The findings of this study are divided into four sections. The first section is the findings on the research instruments: reliability and validity. The reliability and validity of the instrument are measured to determine whether or not the instrument used to gather the data is reliable and valid. The second section, findings on learning environment, is to answer the first research question about how learning environment at English Education Department is. The next section is the findings on students' critical thinking to answer the second research question about how students' critical thinking at English Education Department is. The last section is the findings on the correlation between physical learning environment and students' critical thinking to answer last research question about the correlation between the two variables. Before presenting the findings on the

correlation between physical learning environment and students' critical thinking, the result on the test of normal distribution and the test of homogeneity are served.

Findings on the research instruments. In this section, the score of validity and reliability of the instrument is presented. Measuring validity of the instrument is to determine whether or not the instrument used to gather the data is valid. The reliability of the instrument must be measured to determine whether the instrument used is dependable or not to gather the data.

Instrument's validity. In conducting a research, validity of the instrument is important. If the instrument to gather the data is not valid, then the data cannot be trusted. To measure the validity of the instrument used in this study, the researcher used Pearson product moment coefficient (*r*). The findings of the validity for each variable can be seen in the tables below.

Table 4.1 Validity of Questionnaire Items for Learning Environment

Question	*r* value	*r* table	Category
Q1	0.749	>0.232	Valid
Q2	0.671	>0.232	Valid
Q3	0.641	>0.232	Valid
Q4	0.696	>0.232	Valid
Q5	0.548	>0.232	Valid
Q6	0.592	>0.232	Valid
Q7	0.366	>0.232	Valid
Q8	0.351	>0.232	Valid
Q9	0.494	>0.232	Valid
Q10	0.355	>0.232	Valid
Q11	0.419	>0.232	Valid

Question	*r* value	*r* table	Category
Q12	0.248	>0.232	Valid
Q13	0.532	>0.232	Valid
Q14	0.536	>0.232	Valid
Q15	0.494	>0.232	Valid

To determine whether or not the question used is valid, the *r* value should be bigger (>) than *r* table. The value of *r* table with the significance 0.05 and the total of the respondents (n) 79 is 0.232. In the table validity of questionnaire items for measuring learning environment above, statement 1 to 15 were found to be valid since the *r* value was bigger than *r* table (*r* value > 0.232).

Table 4.2 Validity of Questionnaire Items for Students' Critical Thinking

Question	*r* value	*r* table	Category
Q1	0.395	>0.232	Valid
Q2	0.200	<0.232	Invalid
Q3	0.429	>0.232	Valid
Q4	0.419	>0.232	Valid
Q5	0.380	>0.232	Valid
Q6	0.414	>0.232	Valid
Q7	0.219	<0.232	Invalid
Q8	0.353	>0.232	Valid
Q9	0.354	>0.232	Valid
Q10	0.331	>0.232	Valid
Q11	0.455	>0.232	Valid
Q12	0.416	>0.232	Valid
Q13	0.403	>0.232	Valid
Q14	0.319	>0.232	Valid

From the table above, out of 14 statements, there are two statements from the questionnaire items to measure students' critical thinking, Q2 and Q7, found to be invalid because the *r* value is smaller than *r* table (*r* value < 0.232). Q2 is asking whether students like to ask questions in class even when it is not their favorite course. This item's *r* value is 0.200 which is smaller than the *r* table (0.232). Therefore, item Q2 is not valid. Q7 is asking whether students considering their friend's ideas in solving problem given by their teacher inside the classroom. The *r* value for item Q7 is 0.219, meaning that it is not valid (0.219 < 0.232).

Instrument's reliability. Measuring the reliability of the instrument is important. By measuring the reliability of the instrument, the researcher knows whether or not the instrument used is trustworthy. With a reliable instrument, the data and finding are also reliable or can be trusted. In this section, the reliability of questionnaire items for learning environment and students' critical thinking are presented in form of tables below.

Table 4.3 Reliability Statistics of Questionnaire Items for Learning Environment

Reliability Statistics

Cronbach's Alpha	N of Items
.870	15

The researcher used Cronbach's Alpha scale to measure the reliability of the instruments. An instrument is believed to be reliable if the reliability coefficient

(α) is higher than 0.70 (Field, 2009). In the table of reliability statistics for learning environment, the score of Cronbach's alpha is 0.870 for total 15 items, which means that the instrument to measure learning environment is reliable because Cronbach's Alpha coefficient (α) is higher than 0.70.

Table 4.4 Reliability Statistics of Questionnaire Items for Students' Critical Thinking

Reliability Statistics

Cronbach's Alpha	N of Items
.788	14

From the table 4.4, the score of Cronbach's Alpha is 0.788 for total 14 items of students' critical thinking in reliability statistics test of questionnaire items. It means that the Cronbach's Alpha coefficient (α) is higher than 0.700. Consequently, the instrument of this study is reliable.

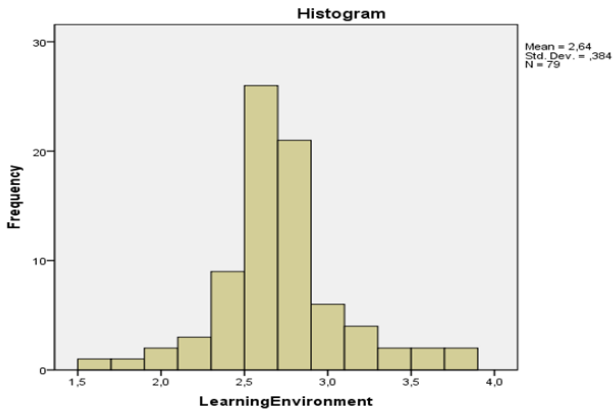
Findings on EED of UMY learning environment. In this section, the findings of learning environment are presented to answer the first research question about how the learning environment at English Education Department is. Using descriptive statistic, the findings are presented in the table of statistics frequencies. Then, the researcher uses the average mean value to answer the research question.

Table 4.5 Statistics Frequencies of Learning Environment

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
N	Valid	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3,08	3,15	3,14	2,81	2,73	2,75	2,15	2,23	2,66	2,66	2,82	1,47	2,67	2,75	2,57
Median		3,00	3,00	3,00	3,00	3,00	3,00	2,00	2,00	3,00	3,00	3,00	1,00	3,00	3,00	3,00
Mode		3	3	3	3	3	3	2	2	3	3	3	1	3	3	3

From the table above, mean, median and mode scores are presented. The score is divided into three categories, poor (0 – 1.9), sufficient (2 – 2.9) and good (3 – 4). The table shows that every item has different mean value. The highest mean of the data is 3.15 included in good category for the statement number 2 about the safety of the room. The lowest mean is 1.47 included in poor category for the statement number 12 about the internet connectivity provided inside the classroom. Averagely, eleven items fall into sufficient category and the rest of the two items fall into good category. The mode of the data is ranged into three scale, 3, 2, and 1, which indicates that the participants either chose strongly disagree, disagree, or agree based on the questionnaire answer.

Figure 4.1 Histogram of Average Score for Learning Environment



The figure 4.1 above presents the result of average score for learning environment variable. The result for mean value of learning environment is 2.64 which mean that the learning environment at English Education Department is sufficient.

Findings on EED of UMY students' critical thinking. This section presents the findings on students' critical thinking. The findings on students' critical thinking are used to answer the second research question about how the students' critical thinking at English Education Department is. Descriptive statistics method is used to determine the findings. The value used as the measurement is seen from the average mean score.

Table 4.6 Statistics Frequencies of Students' Critical Thinking

Statistics

		Q1	Q3	Q4	Q5	Q6	Q8	Q9	Q10	Q11	Q12	Q13	Q14
N	Valid	79	79	79	79	79	79	79	79	79	79	79	79
	Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean		2,85	3,25	3,18	3,29	2,85	2,94	2,86	2,97	2,80	2,82	2,96	3,01
Median		3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Mode		3	3	3	3	3	3	3	3	3	3	3	3

In the table 4.6 above, the value of mean, median and mode are presented. The findings of mean value show that there are different ranges of score. In measuring students' critical thinking, the researcher splits the score into four categories. Referring to table 3.3, the categories are divided into low, fair, moderate and high. The result shows the highest mean is 3.29 included in high category for question number 5 about students' willingness to learn new things

inside the classroom. The lowest score is 2.80 included in moderate category for question number 11 about students' self confidence in answering teacher's question. Further, the frequent appeared mode is 3 which means that the frequent chosen answer in the questionnaire is agree.

Figure 4.2 Histogram of Average Score for Students' Critical Thinking

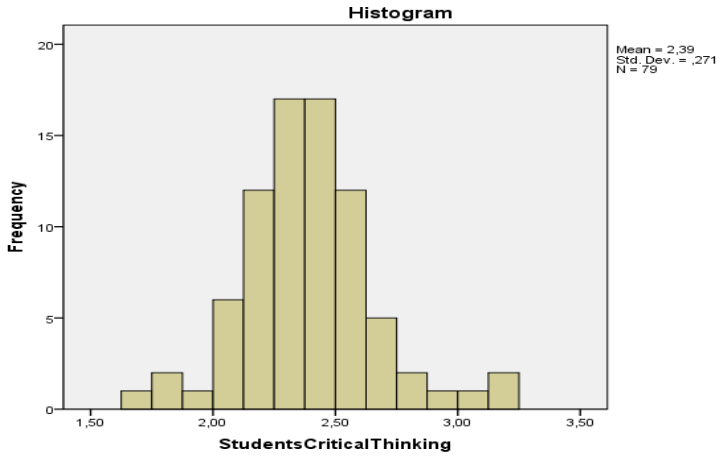


Figure 4.2 presents the result of average mean value of students' critical thinking. From the result, it is found out that the average mean value for students' critical thinking is 2.39, which means that students' critical thinking at English Education Department of Universitas Muhammadiyah Yogyakarta is moderate.

Findings on the correlation between physical learning environment and students' critical thinking. This section presents the findings on the correlation between physical learning environment and students' critical thinking. Before the findings on the correlation are presented, the researcher tested the normality and homogeneity of the data and presented the results in the form of tables.

Normality. Calculating the normality of the instrument used to gather the data is also important. Normality of the instrument is measured to show how far

the data is asymmetrical in relation to a normal curve of distribution. To see the normality of the instrument, the researcher used two methods. The first is the analysis of Q-Q plot distribution to find the normality test with graphic. Using graphic to measure normality, the data is concluded normal if the data plots are distributed close to the diagonal line. The second test is testing normality using descriptive method. There are three tests the researcher took, the values of variant coefficient, skewness ratio and kurtosis ratio. The requirement for normal criterion data using descriptive method is presented in the table.

Normality test for learning environment. There were two tests used to measure the normality of the data. The first test used to measure the normality data for learning environment variable was analysis of Q-Q plot distribution and the second was descriptive method test.

Figure 4.3 Graphic Normality Test for Learning Environment

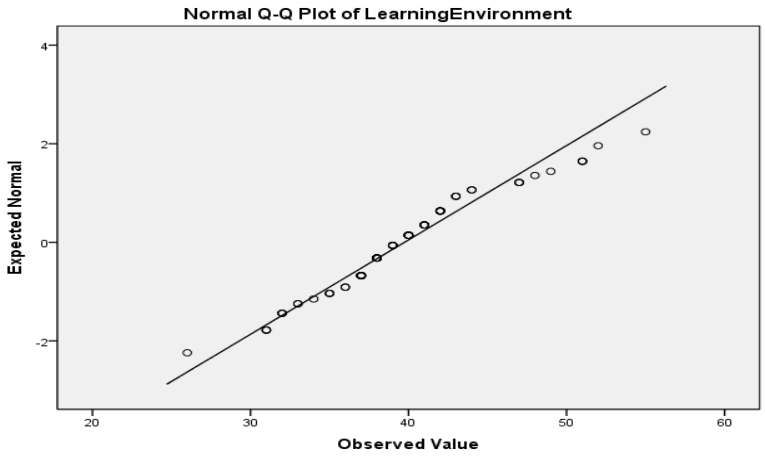


Figure 4.3 presents the finding of normality test through graphic analysis for learning environment variable. From the graphic analysis of normality test, the data plots are scattered close to the diagonal line. It can be said that the data of the independent variable were normally distributed. Furthermore, the findings on the

data analysis using descriptive method showed the normality of the data. Table below presents the normality of the data.

Table 4.7 Learning Environment Statistics Data

Statistics

Learning Environment

N	Valid	79
	Missing	0
Mean		39.75
Std. Deviation		5.224
Skewness		.468
Std. Error of Skewness		.271
Kurtosis		.936
Std. Error of Kurtosis		.535

From the table 4.7, the descriptive result for variable students' critical thinking is presented. The mean, standard deviation, skewness, standard error of skewness, kurtosis and standard error of kurtosis value were used to measure the normality of the data. Table 4.8 presents the normality score for students' critical thinking variable.

Table 4.8 Normality for Learning Environment Data

No.	Parameter	Formula	Result	Normal Criterion	Category
1.	Variant Coefficient	$\frac{SD}{Mean}$ x 100%	13.14%	Variant coefficient <30%	Normal
2.	Skewness Ratio	$\frac{Skewness}{SE\ Skewness}$	1.72	Ratio value in interval -2 to +2	Normal
3.	Kurtosis Ratio	$\frac{Kurtosis}{SE\ Kurtosis}$	1.75	Ratio value in interval -2 to +2	Normal

The data is said to be normal if the score is less than 30% (< 30%) for variant coefficient and in the interval -2 to +2 for skewness and kurtosis ratio. Through variant coefficient, skewness ratio, and kurtosis ratio test, the data for learning environment were found to be normal. From the result, the score for variant coefficient is 13.14% (<30%), skewness ratio is 1.72 and kurtosis ratio is 1.75 (both scores are in the interval -2 to +2).

Normality test for students' critical thinking. Two tests were used to measure the normality of the data. The first test used to measure the normality data for learning environment variable was analysis of Q-Q plot distribution and the second was descriptive method test.

Figure 4.4 Graphic Normality Test for Students' Critical Thinking

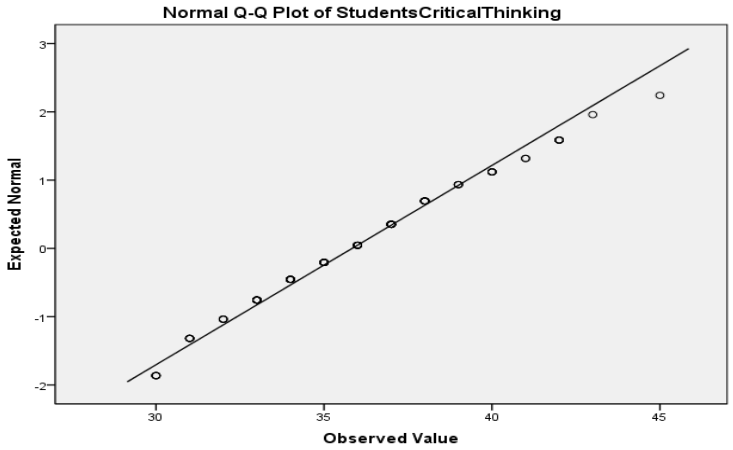


Figure 4.4 shows the finding of normality test for students' critical thinking through Q-Q plot graphic analysis. From the graphic analysis of normality test, the data plots are distributed close by the diagonal line. It can be concluded that the data of dependent variable were normally distributed. Table below presents the normality of the data.

Table 4.9 Students' Critical Thinking Statistics

Statistics

StudentsCriticalThinking

N	Valid	79
	Missing	0
Mean		35.84
Std. Deviation		3.425
Skewness		.307
Std. Error of Skewness		.271
Kurtosis		-.319
Std. Error of Kurtosis		.535

From the table 4.9, the descriptive result for variable students' critical thinking is presented. The mean, standard deviation, skewness, standard error of skewness, kurtosis and standard error of kurtosis value were used to measure the normality of the data. Table 4.10 presents the normality score for students' critical thinking.

Table 4.10 Normality for Students' Critical Thinking Data

No.	Parameter	Formula	Result	Normal Criterion	Category
1.	Variant Coefficient	$\frac{SD}{Mean}$ x 100%	9.55%	Variant coefficient <30%	Normal
2.	Skewness Ratio	$\frac{Skewness}{SE\ Skewness}$	1.13	Ratio value in interval -2 to +2	Normal
3.	Kurtosis Ratio	$\frac{Kurtosis}{SE\ Kurtosis}$	-0.596	Ratio value in interval -2 to +2	Normal

Measuring normality through variant coefficient, skewness ratio, and kurtosis ratio test, the data for students' critical thinking were found to be normal.

The score for variant coefficient is 9.55% (<30%), skewness ration is 1.13 and kurtosis ratio is – 0.596 (both scores are in the interval -2 to +2).

Homogenity. The second analysis test was the test of homogeneity. The researcher used the ANOVA (F test) to see whether the proportion for a variable is equal when several samples are selected from different population. The data is said to be homogenous if *p-value* is higher (>) than 0.05. Two tables below presents the result of the homogeneity test for both learning environment and students' critical thinking.

Table 4.11 Homogeneity of Variance Test

Learning Environment

Levene Statistic	df1	df2	Sig.
1.276	12	64	.255

From the table 4.11 above, the result of the test homogeneity for learning environment (Sig) is 0.255. With the criteria of normality *p-value* > 0.05, it means that the group sampled was homogenous (0.255 > 0.05).

Table 4.12 Homogeneity of Variance Test

Students' Critical Thinking

Levene Statistic	df1	df2	Sig.
1.442	14	58	.163

In table 4.12, the score for homogeneity test for students' critical thinking (Sig) is 0.163 (*p-value* > 0.05). Thus, the population from which the groups were

sampled had equal variances or homogenous because *p-value* was higher than 0.05 (0.163 > 0.05).

Correlation between physical learning environment and students' critical thinking. To investigate the correlation between physical learning environment and students' critical thinking at English Education Department, the researcher used the statistical analysis in SPSS 19 using Pearson Product Moment correlation (*r*). Based on Creswell (2012), the range score is divided into five categories, very weak (0.0 – 0.20), weak (0.21 – 0.40), moderate (0.41 – 0.60), strong (0.61 – 0.80), and perfect (0.81 – 1.00). The finding on correlation can be seen in the table bellow:

Table 4.13 Correlations Result

		Learning Environment	Students' Critical Thinking
Learning Environment	Pearson Correlation	1	.186
	Sig. (2-tailed)		.100
	N	79	79
Students' Critical Thinking	Pearson Correlation	.186	1
	Sig. (2-tailed)	.100	
	N	79	79

In the table correlations above, the score of the correlation between physical learning environment and students' critical thinking is 0.186. Based on the value of correlation coefficient according to Creswell, the correlation between physical learning environment and students' critical thinking for the cause of EED was very weak or non significant.

Discussion

The researcher conducted this research to examine the learning environment and students' critical thinking at English Education Department, Universitas Muhammadiyah Yogyakarta. There are three research questions in this study. The first is how the learning environment at English Education Department of Universitas Muhammadiyah Yogyakarta is. The next is how the students' critical thinking at English Education Department of Universitas Muhammadiyah Yogyakarta is. The last is what the correlation between physical learning environment and students' critical thinking at English Education Department of Universitas Muhammadiyah Yogyakarta is. In this section, the researcher discusses the findings of the study.

The physical learning environment of English Education Department of Universitas Muhammadiyah Yogyakarta. The researcher uses mean value to determine how learning environment at English Education Department of Universitas Muhammadiyah Yogyakarta is. The score is divided into three categories, poor (0 – 1.9), sufficient (2 – 2.9) and good (3 - 4). The result of the study shows that the mean value is 2.64 for learning environment. Based on the mean value category, physical learning environment at English Education Department UMY is in sufficient category. It means that the physical learning environment at English Education Department of Universitas Muhammadiyah Yogyakarta is adequate.

The finding shows that English Education Department of Universitas Muhammadiyah Yogyakarta has sufficient physical learning environment. Earthman (2004) argued that the building where students will spend most of their time learning influence how well they learn. From the questionnaire, it is found that most of the students agreed that their classroom is provided with supportive equipment such as movable chairs, LCD projector, speaker, etc. It can be seen in the questionnaire items number five, which stated about students learn in a fully-equipped classroom, and number six, stated about students learn in a well-equipped classroom. The scores for both items are 2.81 and 2.73. Comfortable classroom with nice temperature, humidity, and lighting is also needed in creating pleasant atmosphere during learning inside the classroom. The mean value for item number one, which stated students lean in comfortable classroom, is 3.08. It means that the comfort of the classroom at EED is in good category. Consequently, students agreed that physical learning environment at English Education Department of Universitas Muhammadiyah Yogyakarta adequate to support students in learning.

The next important element of physical learning environment is space. To foster discovery and thinking, discussion and the sharing of ideas, the physical environment should be provided with a large meeting space for whole-group work and discussions, situated near whiteboards, easels and/or projector screens (Fullan, Luke, & West, 2012). However, the finding shows inadequacy concerning the size of the classroom at English Education Department. Based on the questionnaire for learning environment number seven about the students learn

in spacious classroom, the mean value is 2.15 with frequent chosen mode 2 which means most of the respondents disagreed to the statement. There are currently 12 classrooms in Faculty of Language Department which is used by three majors, English Education Department, Japanese Education Department and Arabic Education Department. Regrettably, the size of the classrooms provided is lack of capacious space by comparison to the amount of students. Usually, there are around 30 to 35 students to occupy one class. The inadequacy about the classroom size is also supported by questionnaire number eight which stated that students learn in the classroom with commodious space to move. The frequent appeared answer is 2 which means most respondents chose disagree to the statement. As the result of this insufficiency, there is not much space remaining to accommodate students learning activities inside the classroom.

Significant changes in schools have been influenced by internet (OECD, 2011). Its efficiency is a one-to-many method of communication (Sponcil & Gitimu, 2013), which means internet allows the users to quickly access information. Unfortunately, it is found that another inadequacy in the learning environment at English Education Department of Universitas Muhammadiyah Yogyakarta is the connection to internet. Based on the finding from question number 12 which stated that the students learn in the classroom with fast internet connection, the frequent chosen answer is 1. It means that most of the respondents strongly disagree with the statement. The mean value for this question is only 1.47, which means that the internet connection provided at EED UMY is in poor category. Since being moved into a new building**,** the students of English

Education Department have difficulty to access internet. As the result, there are not much learning activities which engages students to access information using internet especially inside the classroom. This problem becomes an issue which should be remedied as soon as possible by the institution.

The students' critical thinking of English Education Department of Universitas Muhammadiyah Yogyakarta. To answer the second research question, the researcher also uses the score of mean value. The score for determining students' critical thinking is divided into four categories, low (0 – 0.9), fair (1 – 1.9), moderate (2 – 2.9) and high (3 - 4). The mean value for students' critical thinking founded in this study is 2.39. Based on the mean value category, students' critical thinking at English Education Department, Universitas Muhammadiyah Yogyakarta is in moderate category.

From the finding, students' critical thinking at English Education Department is in moderate level. It means that the critical thinking skill of the students is neither high nor low. Preparing individuals, specifically college students, who willingly and proficiently engage in critical thinking, has been agreed among critical thinking theoreticians to be the goal of education (Facione *et al*,1995). The fact that the participants of the study were from batch 2012, it is understandable that they have fostered the dispositions of critical thinking such as truth-seeking, open-mindedness, inquisitiveness, analyticity, systematicity, critical thinking self-confidence, and cognitive maturity, and developed critical thinking skills, however in average level. Although the result is not very satisfying, it is

common thing among undergraduates to have moderate critical thinking dispositions because fostering the development of strong critical thinking dispositions is proven to give significant challenge to faculty (Broadbear, Jin, & Bierma, 2005). Consequently, it is important for these students to further improve their critical thinking.

From the finding, the mean value of each disposition is diverse. The highest mean value is in item number five, inquiring about students' curiosity to learn new things inside the classroom, with score 3.29 belong into high category. This statement is appointed to measure inquisitiveness. Based on the mean score, it can be said that the students of EED possess a great inclination to acquire and learn new things without any benefits expectation. The lowest mean scores are in number eleven and twelve. These two items have the lowest scores among other items. The scores for questionnaire items number eleven, inquiring about students' confidence with their answers in answering question, and number twelve, examining students' confidence with their arguments, are 2.80 and 2.82. Critical thinking self-confidence is the individual's confidence in him/herself relating to his/her own process of logical thinking (Cubukcu, 2006), therefore he/she will not easily change mind. Accordingly, further research is highly required in order to find the accurate critical thinking measurement.

Correlation between physical learning environment and students' critical thinking. Using Pearson Product Moment, the correlation between physical learning environment and students' critical thinking was statistically

calculated. The finding shows that the Pearson Correlation Coefficient between variable learning environment and variable students' critical thinking is (r = 0.186), which means that based on the criteria for evaluation and interpretation of a correlation coefficient according to Creswell (2012), the correlation between the two variables is very weak. Therefore, the alternate hypothesis (H_a) stated that there is a statistically correlation between physical learning environment and students' critical thinking at English Education Department is accepted and null hypothesis (H_0) states that there is no significant positive relationship between learning environment and students' critical thinking at English Education Department is rejected.

From the finding of the correlation between physical learning environment and students' critical thinking, it is known that there is statistically correlation between physical learning environment and students' critical thinking. Beichner *et al* (2007) argued that learning environment helps to increase levels of conceptual understanding, improve problem-solving skills, attitudes and class attendance rates and a reduction in both the overall and at-risk student failure rates. School with comfortable and fully equipped classroom is favored by students that they would feel at ease even though they have to spend hours to learn at school. The comfort provided inside the classroom will make students learn better since they can solely focus on learning.

However, the correlation between physical learning environment and students' critical thinking is very weak. Therefore, the physical learning environment is not directly influencing students' critical thinking at English

Education Department of Universitas Muhammadiyah Yogyakarta. Possibility, there are still many other factors which are more significantly have influence on critical thinking such as psychological or emotional conditions, social or cultural, virtual spaces, and technology-enhanced environment.