

CHAPTER IV

FINDINGS AND DISCUSSION

This chapter presents the research findings and discussion, including the validation process of the research instruments through validity and reliability testing. It also outlines the analysis of students' performance on the three assessed variables which are digital literacy, critical thinking skill, and research competence, based on the test results. The data gathered are then analyzed to address the two main research questions: first, to determine the levels of each variable among EFL students; Furthermore, this chapter elaborates on the statistical analysis conducted to examine the correlation and predictive contributions of the independent (digital literacy and critical thinking skill) variables toward the dependent variable (research competence). All analyses are conducted using the procedures established in the previous chapter.

A. Findings

This section presents the findings of the data analysis using the instruments administered to the respondents. The findings are structured systematically to provide a full picture of the participants' performance in each variable, including digital literacy, critical thinking skill, and research competency.

The presentation of findings includes several stages of analysis. First, a descriptive summary of the students' performance in each variable is provided to determine their overall levels. This is followed by the results of the instrument

validation process, which includes both validity and reliability testing. Subsequently, the classical assumption tests, including normality, linearity, multicollinearity, and heteroscedasticity that are described to ensure that the data meet the statistical requirements for further analysis. Finally, the results of the main statistical analysis are presented to address the second research question, which investigates the relationship and potential contribution of digital literacy and critical thinking skill to research competence.

All findings are supported by tables, figures, and interpretations based on the statistical outputs generated through SPSS 26.

1. Overview of Students' Levels of Digital Literacy, Critical Thinking Skill, and Research Competence

To conduct this test, the researcher was carried out with 60 EFL students from the English Education Department (Class of 2022), who were not included in the main research sample. The students' responses were analyzed to determine the validity of each test item on total of 30 multiple-choices (10 questions of each variable), which were distributed across three research variables: Digital Literacy (X1), Critical Thinking Skill (X2), and Research Competence (Y). The validity test was carried out using Pearson Product-Moment Correlation, while the reliability test was conducted using Cronbach's Alpha, both through SPSS version 26.

To evaluate the validity of the instruments, the Product Moment Correlation technique was applied using SPSS software. The results of the validity test indicated that all items from the three variables had correlation coefficients (r-count) greater than the critical value of r-table at the 5% significance level, with 60 respondents ($r\text{-table} = 0.254$), and the result are presented in the tables below:

Variabel X1

Table 4. 1 Validity of Instrument X1 (Digital Literacy)

Statement	r-count	Description
X1_1	0.669	Valid
X1_2	0.661	Valid
X1_3	0.620	Valid
X1_4	0.798	Valid
X1_5	0.824	Valid
X1_6	0.819	Valid
X1_7	0.503	Valid
X1_8	0.746	Valid
X1_9	0.418	Valid
X1_10	0.559	Valid

Variabel X2

Table 4. 2 Validity of Instrument X2 (Critical Thinking Skill)

Statement	r-count	Description
X2_1	0.509	Valid
X2_2	0.741	Valid
X2_3	0.829	Valid
X2_4	0.486	Valid
X2_5	0.830	Valid
X2_6	0.611	Valid
X2_7	0.845	Valid
X2_8	0.616	Valid
X2_9	0.497	Valid

X2_10	0.571	Valid
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Variabel Y

Table 4. 3 Validity of Instrument Y (Research Competence)

Statement	r-count	Description
Y_1	0.641	Valid
Y_2	0.341	Valid
Y_3	0.712	Valid
Y_4	0.568	Valid
Y_5	0.607	Valid
Y_6	0.933	Valid
Y_7	0.380	Valid
Y_8	0.852	Valid
Y_9	0.572	Valid
Y_10	0.806	Valid

Based on the validity result presented in the tables above, this finding confirms that all 30 items are valid and appropriate for use as research instruments.

The reliability test using Cronbach's Alpha showed high internal consistency for each variable, with the following values:

Variable X1

Table 4. 4 Reliability of Instrument X1

Reliability Statistics		
	Cronbach's Alpha Based on Standardized Items	N of Items
Cronbach's Alpha		
.898	.905	10

Variable X2

Table 4. 5 Reliability of Instrument X2

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.897	.900	10

Variable Y

Table 4. 6 Reliability of Instrument Y

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.891	.893	10

Since all Cronbach's Alpha values exceed 0.7, the instruments for all variables are considered reliable and demonstrate excellent internal consistency.

By implementing these validity and reliability tests, this study ensures that the multiple-choice test effectively and consistently measures Digital Literacy, Critical Thinking Skills, and Research Competence among EFL students.

To answer the first research question regarding the students' level of digital literacy, critical thinking skill, and research competence, the data were first analyzed using a distribution-based classification. To classify the students' ability levels, the researcher applied a classification method based on the principles of normal distribution using z-scores. This approach categorizes student performance into five levels: very high, high, moderate, low, and very low, based on their deviation from the mean score. The use of z-score classification enables a standardized interpretation of student performance relative to the group average, which is particularly suitable for normally distributed data.

This classification method allowed the researcher to provide a clearer interpretation of the students' abilities in each measured domain. By comparing individual scores to the overall distribution of scores, the researcher was able to identify how many students fell into each level of competence. This method is commonly applied in educational and psychological research (Widoyoko, 2014; Sudjana, 2005; Azwar, 2003), as it provides an objective basis for determining students' competence levels.

The statistical intervals (z-score ranges) for each level were derived from the formulas established as: $x > \mu + 1\sigma$ (very high), $\mu < x \leq \mu + 1\sigma$ (high), $\mu - 1\sigma \leq x \leq \mu$ (moderate), $\mu - 2\sigma \leq x < \mu - 1\sigma$ (low), $x < \mu - 2\sigma$ (very low), ensuring consistency and objectivity in interpreting the data.

The following section presents the results of this classification, showing the number and percentage of students at each level for each variable.

a. Digital Literacy

The first assessed variable in this study is digital literacy, which refers to students' ability to effectively access, evaluate, utilize, and produce digital content in the context of academic research. The instrument for measuring digital literacy was developed based on Ferrari (2013) five core components: information, communication, content creation, safety, and problem solving.

The students were presented with ten multiple-choice items that reflected these aspects within the scope of EFL academic settings. The descriptive statistics below summarize the students' performance on the digital literacy test, providing insights into their current level in this domain. Before classifying the students' digital literacy level, the raw scores of all 66 participants are first presented in the following table.

Table 4. 7 EFL Students' X1 Score

No.	Student	Wrong item(s)	X1 Score
1	Student1	[3, 10]	83
2	Student2	[6, 7]	78
3	Student3	[1, 2]	79
4	Student4	[3, 7]	83
5	Student5	[1]	92
6	Student6	[1, 3, 4]	74
7	Student7	[5,6,7]	69
8	Student8	[9]	89
9	Student9	[4,6]	77

No.	Student	Wrong item(s)	X1 Score
10	Student10	[5]	91
11	Student11	[2, 6]	75
12	Student12	[3, 4, 5, 9]	62
13	Student13	[1, 3]	85
14	Student14	[1, 2, 9]	68
15	Student15	[1, 2, 3]	72
16	Student16	[2, 10]	77
17	Student17	[1, 7]	82
18	Student18	[2, 4, 6]	64
19	Student19	[6, 7, 10]	68
20	Student20	[1]	92
21	Student21	[6]	88
22	Student22	[5, 8]	82
23	Student23	[1, 9]	81
24	Student24	[2]	86
25	Student25	[3, 5, 8]	75
26	Student26	[1, 3]	85
27	Student27	-	100
28	Student28	[8]	91
29	Student29	[2, 4]	76
30	Student30	[2, 9]	76
31	Student31	[1, 6]	80
32	Student32	[4,7,10]	69
33	Student33	-	100
34	Student34	[1, 3, 5]	76
35	Student35	[5, 7]	81
36	Student36	[2, 5]	78
37	Student37	[7, 10]	80
38	Student38	[5, 10]	81
39	Student39	[1, 4]	81
40	Student40	[1, 3, 7]	75
41	Student41	[3, 8, 7]	74
42	Student42	[1, 2, 3, 5]	63
43	Student43	[9, 10]	79
44	Student44	[8, 9]	80
45	Student45	[4, 9]	78
46	Student46	[2]	86
47	Student47	[2, 8, 10]	68
48	Student48	[6, 9]	77

No.	Student	Wrong item(s)	X1 Score
49	Student49	[6]	88
50	Student50	[2, 5, 7]	68
51	Student51	[4, 7]	79
52	Student52	[6]	88
53	Student53	[1, 3, 8]	76
54	Student54	[1]	92
55	Student55	[1, 4]	81
56	Student56	[6, 7]	78
57	Student57	[3, 6]	81
58	Student58	[7, 8]	81
59	Student59	[2, 4, 7]	66
60	Student60	[1, 5]	83
61	Student61	[8, 10]	81
62	Student62	[1, 4]	81
63	Student63	[1, 3]	85
64	Student64	[2, 4]	76
65	Student65	[1, 5, 7, 8]	64
66	Student66	[3,4,6,7]	60
Total			5214

Based on the test results from 66 EFL students, the descriptive analysis was conducted to determine the overall level of students' digital literacy. The accumulated score of all students is 5214. To better understand the mean of total score X1, the researcher uses formula as follows:

$$\mu (\text{mean}) = \frac{\sum x}{N}$$

$$\mu = \frac{5214}{66} = 79.00$$

The analysis revealed that the mean score (μ) of digital literacy was 79.00, with a standard deviation (σ) of 8.35. These values were then used

to establish the score intervals for each competency category using the distribution-based classification model. The level categories were divided as follows:

Table 4. 8 EFL Students' Level Category of Digital Literacy

Level Category	Score Range	Total Students	Percentage
Very high	> 87.55	9	13.64%
High	79.00 – < 87.55	20	30.30%
Moderate	70.45 – < 79.00	24	36.36%
Low	61.90 – < 70.45	11	16.67%
Very low	< 61.90	2	3.03%
Total			100%

After categorizing each student's score into these intervals, the frequency and percentage of students at each level were calculated. The results showed that 9 students (13.64%) were in the Very High category, 20 students (30.30%) were in the High category, and 24 students (36.36%) were in the Moderate category. Meanwhile, 11 students (16.67%) fell into the Low category and 2 students (3.03%) were categorized as Very Low.

These findings suggest that most students demonstrated a moderate to high level of digital literacy, with only a small percentage falling below the average performance range. It indicates that the vast majority of EFL students in the sample already possess a fundamental understanding of the digital abilities required for academic settings, including the ability to access and evaluate online sources, communicate through digital platforms,

and use appropriate technical tools. However, the presence of students in the very low category implies that digital literacy gaps still exist and may affect their ability to fully engage in digital academic environments. The overall distribution further emphasizes the need for targeted digital literacy enhancement, particularly for students who may be struggling to keep pace with the increasing demands of digital-based research and learning in EFL settings.

b. Critical Thinking Skill

The second variable investigated in this study is students' critical thinking skill, which plays a vital role in shaping their academic reasoning and research abilities. As EFL students are expected to not only comprehend but also evaluate, analyze, and generate ideas in English, critical thinking becomes a fundamental cognitive asset in their academic journey. The following section presents the results of the descriptive statistical analysis for students' performance in the critical thinking skill test. The data is categorized into five performance levels to illustrate the overall distribution and identify areas that may require further instructional focus.

The students were presented with ten multiple-choice items that reflected these aspects within the scope of EFL academic settings. The descriptive statistics below summarize the students' performance on the

critical thinking test, providing insights into their current level in this domain. Before classifying the students' critical thinking level, the raw scores of all 66 participants are first presented in the following table.

Table 4. 9 EFL Students' X2 Score

No	Student	Wrong item(s)	X2 Score
1	Student1	[3]	92
2	Student2	[1, 3, 5]	73
3	Student3	[6]	93
4	Student4	[2]	87
5	Student5	[4]	89
6	Student6	[5, 10]	80
7	Student7	[9]	89
8	Student8	[6]	93
9	Student9	[10]	90
10	Student10	[1, 3]	83
11	Student11	[7]	88
12	Student12	[1, 8]	82
13	Student13	[2, 5]	77
14	Student14	[2,6]	80
15	Student15	[9]	89
16	Student16	[1]	91
17	Student17	[6]	93
18	Student18	[8,9]	80
19	Student19	[3,8]	83
20	Student20	[5]	90
21	Student21	[6]	93
22	Student22	[1, 3, 8]	74
23	Student23	[1, 2, 3, 8]	60
24	Student24	-	100
25	Student25	[2, 4]	76
26	Student26	[2]	86
27	Student27	[5, 6]	83
28	Student28	[2]	86
29	Student29	[6, 10]	83
30	Student30	[1, 6]	84
31	Student31	[7, 8]	79
32	Student32	[2, 7]	75

No	Student	Wrong item(s)	X2 Score
33	Student33	[2]	86
34	Student34	[1, 5]	81
35	Student35	[3, 5]	82
36	Student36	[6, 9]	77
37	Student37	[3, 10]	83
38	Student38	[6]	93
39	Student39	[1, 2, 3]	70
40	Student40	[2]	86
41	Student41	[6, 8]	84
42	Student42	[3, 6, 8]	76
43	Student43	[3, 8]	83
44	Student44	[7]	88
45	Student45	[2]	86
46	Student46	[3, 6]	85
47	Student47	[6]	93
48	Student48	[2]	87
49	Student49	[3, 5, 6]	75
50	Student50	[10]	90
51	Student51	[5, 8]	81
52	Student52	[1, 6]	84
53	Student53	[4]	89
54	Student54	[3, 4, 8]	72
55	Student55	[2]	87
56	Student56	[8, 10]	81
57	Student57	[5]	90
58	Student58	[1, 3, 6]	76
59	Student59	[2]	86
60	Student60	[1, 2, 6]	71
61	Student61	[6, 9]	82
62	Student62	[6, 8]	84
63	Student63	[1, 2, 5]	68
64	Student64	[8, 9]	80
65	Student65	[3, 6]	85
66	Student66	[2]	87
Total			5509

Based on the test results from 66 EFL students, the descriptive analysis was conducted to determine the overall level of students' critical thinking

skill. The accumulated score of all students is 5509. To better understand the mean of total score X2, the researcher uses formula as follows:

$$\mu = \frac{5509}{66} = 83.47$$

The analysis revealed that the mean score (μ) of critical thinking skill was 83.47, with a standard deviation (σ) of 7.15. These values were then used to establish the score intervals for each level category using the distribution-based classification model. The level categories were divided as follows:

Table 4. 10 EFL Students' Level Category of Critical Thinking Skill

Level Category	Score Range	Total of Students	Percentage
Very high	> 90.62	8	12.12%
High	83.47 – < 90.62	23	34.85%
Moderate	76.32 – < 83.47	25	37.88%
Low	69.17 – < 76.32	8	12.12%
Very low	< 69.17	2	3.03%
Total			100%

After categorizing each student's score into these intervals, the frequency and percentage of students at each level were calculated. The results showed that 8 students (12.12%) were in the Very High category, 23 students (34.85%) were in the High category, and 25 students (37.88%) were in the Moderate category. Meanwhile, 8 students (12.12%) fell into the Low category and 2 students (3.03%) were categorized as Very Low.

In conclusion, the findings indicate that a majority of the students demonstrated a moderate to high level of critical thinking skill, with 23 students categorized as High and 25 students as Moderate. Meanwhile, only 8 students (12.12%) were classified as Very High. This suggests that although a significant number of EFL students possess the ability to analyze, evaluate, and interpret information effectively, there remains a portion of the population—particularly the 8 students (12.12%) in the Low and 2 students (3.03%) in the Very Low category, whose critical thinking skills fall below the average range standard. The presence of these students may point to challenges in reasoning, argument development, or reflective thinking within English academic contexts. These results highlight the importance of reinforcing critical thinking instruction, particularly in tasks related to academic reading, writing, and research in EFL settings.

c. Research Competence

The final variable assessed in this study is students' research competence, a multidimensional construct that reflects their ability to engage effectively with academic research in the EFL context. Drawing upon the framework proposed by Böttcher and Thiel (2018), research competence in this study is measured through five core aspects, which are the proficiency in assessing current research, methodological expertise, critical thinking abilities, effective communication, and subject-matter expertise. These dimensions are essential for ensuring that students can not

only comprehend existing studies but also produce original, well-structured, and academically rigorous research of their own. The following section presents the descriptive statistics of students' performance on this variable, categorized into five classification levels to provide a clear depiction of their research competence distribution.

Ten multiple-choice questions reflecting these elements within the context of EFL academic settings were given to the students. The students' results on the research competence test is summarized in the descriptive statistics below, which also reveal their current proficiency in this domain. The following table mainly presents the raw results of all 66 participants before categorizing the students' level of research competency.

Table 4. 11 EFL Students' Y Score

No	Student	Wrong item(s)	Y Score
1	Student1	[1, 5]	85
2	Student2	[1, 2, 5]	73
3	Student3	[3]	91
4	Student4	[2, 4]	77
5	Student5	[7]	90
6	Student6	[5, 8]	75
7	Student7	[1, 6]	79
8	Student8	[5, 8]	85
9	Student9	[2,3]	79
10	Student10	[7, 8]	82
11	Student11	[1, 4, 5]	74
12	Student12	[7, 8, 9]	71
13	Student13	[2, 7]	78
14	Student14	[3, 7, 8]	73
15	Student15	[4, 6]	76
16	Student16	[1, 2]	80

No	Student	Wrong item(s)	Y Score
17	Student17	[1, 5]	85
18	Student18	[1, 2, 6]	67
19	Student19	[1, 2, 5]	73
20	Student20	[1, 5]	85
21	Student21	[5, 8]	85
22	Student22	[1, 8, 9]	73
23	Student23	[2, 3, 8, 10]	60
24	Student24	[7]	90
25	Student25	[6, 9]	76
26	Student26	[4, 10]	81
27	Student27	6	86
28	Student28	[3, 5]	84
29	Student29	[1, 4, 8]	73
30	Student30	[6, 10]	76
31	Student31	[3, 5, 6]	71
32	Student32	[2, 3, 6]	66
33	Student33	[2]	88
34	Student34	[6,8]	79
35	Student35	[6, 7]	77
36	Student36	[2, 9]	77
37	Student37	[3, 5, 8]	76
38	Student38	[4, 7]	79
39	Student39	[2, 5, 7]	71
40	Student40	[1, 5, 8]	77
41	Student41	[4,5,9]	71
42	Student42	[2, 6, 7]	65
43	Student43	[3, 5, 7]	74
44	Student44	[7, 9]	79
45	Student45	[3, 6]	78
46	Student46	[1, 3, 5]	76
47	Student47	[5, 8, 9]	74
48	Student48	[1, 6]	79
49	Student49	[2, 10]	77
50	Student50	[5, 9, 10]	71
51	Student51	[1, 4, 10]	73
52	Student52	[5, 6]	80
53	Student53	[1, 5]	75
54	Student54	[7,10]	79
55	Student55	[4, 9]	78

No	Student	Wrong item(s)	Y Score
56	Student56	[5, 8]	75
57	Student57	[3, 4]	80
58	Student58	[1, 4, 6]	68
59	Student59	[2, 5, 8]	73
60	Student60	[3, 5, 9]	73
61	Student61	[2, 9]	77
62	Student62	[1, 2]	80
63	Student63	[1, 5]	75
64	Student64	[1, 2, 5]	73
65	Student65	[2, 3, 8]	71
66	Student66	[6, 8, 9]	68
Total			5065

To determine the overall level of students' research competency, a descriptive analysis was carried out using the test results from 66 EFL students. The accumulated score for all students is 5065. The researcher applies the following formula to gain a better understanding of the mean of total score variable Y:

$$\mu = \frac{5065}{66} = 76.74$$

The analysis revealed that the mean score (μ) of research competence was 76.74, with a standard deviation (σ) of 6.12. These values were then used to establish the score intervals for each level category using the distribution-based classification model. The level categories were divided as follows:

Table 4. 12 EFL Students' Level Category of Research Competence

Level Category	Score Range	Total of Students	Percentage
Very high	> 82.86	9	13.64%
High	76.74 – < 82.86	22	33.33%
Moderate	70.62 – < 76.74	26	39.39%
Low	64.50 – < 70.62	7	10.61%
Very low	< 64.50	2	3.03%
Total			100%

After categorizing each student's score into these intervals, the frequency and percentage of students at each level were calculated. The results showed that 9 students (13.64%) were in the Very High category, 22 students (33.33%) were in the High category, and 26 students (39.39%) were in the Moderate category. Meanwhile, 7 students (10.61%) fell into the Low category and 2 students (3.03%) were categorized as Very Low.

These findings indicate that the majority of students demonstrated a moderate to high level of research competence, with 72.72% falling within the Moderate, High, or Very High categories. This suggests that most EFL students possess a sufficient foundation to engage with academic research, particularly in relation to assessing current studies, applying appropriate methodologies, and communicating their findings effectively. However, the presence of students in the Low (10.61%) and Very Low (3.03%) categories highlights a notable minority who may require further academic support to strengthen their research-related capabilities.

Overall, the classification results across the three assessed variables which are digital literacy, critical thinking skill, and research competence, it indicates that the majority of EFL students demonstrated performance within the moderate to high range. While a portion of students achieved very high scores, suggesting strong proficiency in academic digital engagement, analytical reasoning, and research-related competencies, a notable segment still fell into the lower categories. This distribution implies that although many students have developed foundational skills in these domains, there remains a substantial need for targeted instructional support, particularly in fostering higher-order thinking and research skills in EFL contexts. It is also important to note that the categorization was based on z-score distributions, meaning that even relatively small raw score differences can reflect meaningful variation in students' performance relative to the sample as a whole.

2. The Correlation between Digital Literacy, Critical Thinking Skill, and Research Competence among EFL Students

Before conducting multiple regression analysis, it is crucial to examine whether the dataset satisfies the classical assumptions underlying this statistical method.

a. Assumption Checks for Regression Analysis

These assumptions, which are normality test, linearity test, multicollinearity test, and homoscedasticity test serve as foundational

requirements to ensure the validity, reliability, and interpretability of the regression results. Violations of these assumptions may lead to biased estimates, distorted inferences, or misleading conclusions. These assumption tests were carried out using SPSS 26 software, and the results are presented in the following tables.

1) Normality Test

Before performing multiple regression analysis, it is essential to assess whether the data meet the assumption of normality. This test evaluates whether the residuals (i.e., the differences between the observed and predicted values) are normally distributed. A normal distribution of residuals ensures the validity of parametric statistical procedures and enhances the reliability of the inferential outcomes derived from the model.

To assess the normality of the data distribution, the Kolmogorov-Smirnov or Shapiro-Wilk test was employed. In interpreting the results, a significance value (Sig.) greater than 0.05 indicates that the data are normally distributed, suggesting no significant deviation from a normal curve. Conversely, if the Sig. value is less than 0.05, it implies that the data deviate significantly from normality, and the assumption is not fulfilled.

Before proceeding to further analysis, the researcher conducted a normality test to determine whether the data distribution of each

variable followed a normal distribution. This was done using SPSS 26, and the results are shown in the table below.

Table 4. 13 Test of Normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.093	66	.200*	.976	66	.232

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The normality test was conducted using the Kolmogorov-Smirnov method to determine whether the distribution of the data approximates a normal distribution. The result showed a significance value of 0.200, which is greater than the threshold of 0.05. This indicates that the data distribution does not significantly deviate from normality, and therefore, the assumption of normality is fulfilled.

2) Linearity Test

The linearity test aims to verify whether a linear relationship exists between the independent variables and the dependent variable. Multiple linear regression requires that the effect of each independent variable on the dependent variable is linear in nature. If this assumption is violated, the regression estimates may become biased or misleading. Therefore, it is crucial to ensure that the data points do not exhibit a curvilinear or non-linear pattern.

The linearity test was conducted to determine whether there is a linear relationship between the independent and dependent variables. The interpretation refers to the "Deviation from Linearity" Sig. value, where a result greater than 0.05 suggests that the relationship is linear, thus satisfying the assumption. If the Sig. value is less than 0.05, the deviation is statistically significant, indicating a nonlinear relationship and a violation of the linearity assumption.

The linearity assumption was tested to examine whether there is a linear relationship between the independent variables and the dependent variable. The results are as follows:

Table 4. 14 X1 and Y Linearity Test

ANOVA Table			Sum of Squares	df	Mean Square	F	Sig.
Research Competence * Digital Literacy	Between	(Combined)	1314.932	24	54.789	2.010	.024
	Groups	Linearity	1053.011	1	1053.011	38.627	.000
		Deviation from Linearity	261.921	23	11.388	.418	.986
	Within Groups		1117.689	41	27.261		
	Total		2432.621	65			

The significance value for linearity was 0.000, indicating a statistically significant linear relationship. Meanwhile, the significance value for deviation from linearity was 0.986, which is greater than 0.05,

meaning there was no significant deviation from linearity. Thus, the relationship between digital literacy and research competence is linear.

Table 4. 15 X2 and Y Liniarity Test

ANOVA Table			Sum of Squares	df	Mean Square	F	Sig.
Research Competence * Critical Thinking Skill	Between Groups	(Combined)	1365.788	25	54.632	2.048	.021
		Linearity	936.554	1	936.554	35.115	.000
		Deviation from Linearity	429.234	24	17.885	.671	.849
	Within Groups		1066.833	40	26.671		
	Total		2432.621	65			

The significance value for linearity was 0.000, and the deviation from linearity was 0.849. This indicates a significant linear relationship and no significant deviation from linearity. Therefore, the relationship between critical thinking skill and research competence is also linear.

3) Multicollinearity Test

This test is conducted to detect any high intercorrelations among the independent variables. Multicollinearity occurs when two or more independent variables are strongly correlated, which may distort the estimation of regression coefficients and reduce the interpretability of the model. A good regression model assumes that the predictor variables are relatively independent from each other to produce stable and meaningful results.

Multicollinearity was examined using Tolerance and Variance Inflation Factor (VIF) values. The assumption of no multicollinearity is met if Tolerance values are greater than 0.10 and VIF values are below 10. If Tolerance is less than or equal to 0.10 and/or VIF is equal to or greater than 10, it signals multicollinearity, which may distort the regression estimates.

A multicollinearity test was conducted to check whether the independent variables were highly correlated with each other, which could affect the regression model. This test was carried out using SPSS 26, and the results can be seen in the table below.

Table 4. 16 Result of Multicollinearity Test

Coefficients ^a			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Digital Literacy	1.000	1.000
	Critical Thinking Skill	1.000	1.000

a. Dependent Variable: Research Competence

To assess whether the independent variables are highly correlated with each other, the Tolerance and Variance Inflation Factor (VIF) values were examined:

Tolerance = 1.000 (greater than 0.10)

VIF = 1.000 (less than 10)

These results indicate that there is no multicollinearity between the independent variables. Thus, the multicollinearity assumption is met.

4) Heteroscedasticity Test

Heteroscedasticity refers to a condition in which the variance of the residuals are not constant across all levels of the independent variables. This violates a key assumption of regression analysis, potentially leading to inefficient estimates and inaccurate conclusions. The heteroscedasticity test is therefore performed to ensure that the residuals exhibit homoscedasticity (i.e., equal variance throughout the data range).

To check for heteroscedasticity, the Glejser test was applied by regressing the absolute value of residuals against the independent variables. The assumption of homoscedasticity is fulfilled if the significance value (Sig.) is greater than 0.05, which means the residuals are evenly distributed across the predicted values. A Sig. value less than 0.05 indicates the presence of heteroscedasticity, violating the assumption.

To check the consistency of error variances across all levels of the independent variables, a heteroscedasticity test was performed using SPSS 26. The findings are displayed in the following table.

Table 4. 17 result of Heteroscedasticity Test

Coefficients^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.216	3.342		1.561	.124
Digital Literacy	-.024	.026	-.113	-.902	.370
Critical Thinking Skill	-.016	.032	-.063	-.504	.616

a. Dependent Variable: ABS_RES

The Glejser test was used to assess the assumption of homoscedasticity. The results showed:

Digital Literacy (X1): Sig. = 0.370

Critical Thinking Skill (X2): Sig. = 0.616

Since both significance values are greater than 0.05, there is no indication of heteroscedasticity. Therefore, the assumption of homoscedasticity is satisfied.

All assumptions for conducting multiple linear regression analysis have been met. The data is normally distributed, the relationships between variables are linear, there is no multicollinearity, and the error variances are homoscedastic. These results validate the use of multiple regression as an appropriate statistical technique for analyzing the relationship between digital literacy, critical thinking skill, and research competence among EFL students.

This section presents the results of a multiple linear regression analysis conducted to examine the correlation and contribution between digital literacy and critical thinking skill as the independent variables, and research competence as the dependent variable. The primary aim of this analysis is to answer the second research questions whether there is a statistically significant correlation between the EFL students' digital literacy and critical thinking skill to their research competence. Through this analysis, the study seeks to identify both the strength of the correlation and the magnitude of the contribution of each predictor variable toward the outcome variable.

b. SPSS Output Overview

Based on the predetermined decision criteria, a p-value less than 0.05 is considered statistically significant, indicating a meaningful relationship between the variables.

In order to examine the statistical correlation between digital literacy, critical thinking skills, and research competence, a multiple linear regression analysis was conducted using SPSS 26 software. The analysis involved the major tables, namely Model Summary, which provide information regarding the strength of correlation, overall model significance, and the contribution of each predictor variable. The results are presented in the following tables.

Table 4. 18 Model Summary

Model Summary									
Model	R	R	Adjusted R	Std. Error of the Estimate	R Square	Change Statistics			Sig. F Change
		Square	Square		Change	F Change	df1	df2	
1	.897 ^a	.804	.798	2.752	.804	129.155	2	63	.000

a. Predictors: (Constant), Critical Thinking Skill, Digital Literacy

Based on the output above, further interpretation is necessary to determine the significance correlation and contribution of each independent variable, as well as the overall strength of the statistical relationship between the variables under study.

c. Interpretation of Findings

The following section provides a comprehensive interpretation of the results obtained from the multiple linear regression analysis. The interpretation includes an explanation of the strength of correlation between the independent variables (digital literacy and critical thinking skill) and the dependent variable (research competence). This interpretation is also intended to address Research Question 2 of this study.

1) Multiple Correlation Coefficient (R)

The multiple correlation coefficient (R) represents the degree of correlation between the set of independent variables (digital literacy and critical thinking skill) and the dependent variable (research competence). In the output, the R value is 0.897, which indicates a very strong positive correlation between the predictor variables and

the outcome variable. This suggests that digital literacy and critical thinking skills are closely associated with students' research competence.

To conclude, this section has presented the complete set of findings derived from the data analysis, and the results of assumption checks and multiple regression analysis.

3. The Contribution of Digital Literacy and Critical Thinking Skill to Research Competence

This section summarizes the findings of a multiple linear regression analysis used to investigate the contribution of digital literacy and critical thinking skill as independent factors and research competence as the dependent variable. The main purpose of this analysis is to answer the third research question, which is to what extent these two independent variables contribute to the students' research competence. Through this analysis, the study seeks to identify the strength of the magnitude of the contribution of each predictor variable toward the outcome variable.

a. SPSS Output Overview

Based on the predetermined decision criteria, a p-value less than 0.05 is considered statistically significant, indicating a meaningful relationship between the variables.

In order to examine that digital literacy and critical thinking skills contribute simultaneously and partially to their research competence, a multiple linear regression analysis was conducted using SPSS 26 software. The analysis involved three major tables, namely Model Summary, ANOVA, and Coefficients, which provide information regarding the strength of correlation, overall model significance, and the contribution of each predictor variable. The results are presented in the following tables.

Table 4. 19 Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.897 ^a	.804	.798	2.752	.804	129.155	2	63	.000
a. Predictors: (Constant), Critical Thinking Skill, Digital Literacy									

Table 4. 20 ANOVA

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1955.650	2	977.825	129.155	.000 ^b
	Residual	476.971	63	7.571		
	Total	2432.621	65			

a. Dependent Variable: Research Competence

b. Predictors: (Constant), Critical Thinking Skill, Digital Literacy

Table 4. 21 Coefficient table

Coefficients^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-3.376	5.051		-.668	.506
Digital Literacy	.463	.040	.647	11.602	.000
Critical Thinking Skill	.521	.048	.609	10.919	.000

a. Dependent Variable: Research Competence

Based on the output above, further interpretation is necessary to determine the significance and contribution of each independent variable, as well as the overall strength of the statistical relationship between the variables under study.

b. Interpretations of Findings

The following segment provides an in depth interpretation of the multiple linear regression study results. The interpretation contains an explanation of the extent to which the independent variables contribute the dependent variable, as well as the statistical significance of the regression model and each predictor. This interpretation is also intended to address Research Question 3 in this study.

1) Coefficient of Determination (R^2)

The R^2 value or the coefficient of determination indicates the proportion of variance in the dependent variable that can be explained by the independent variables. In this study, the R^2 value

is 0.804, which means that 80.4% of the variance in research competence can be explained by the students' digital literacy and critical thinking skills. The remaining 19.6% is attributed to other factors not examined in this study.

2) Simultaneous Significance (F-test)

The significance of the regression model as a whole is assessed using the F-test provided in the ANOVA table. The result shows that the F value is 129.155 with a significance value (Sig.) of 0.000, which is lower than the threshold of 0.05. This indicates that the regression model is statistically significant. In other words, the combination of digital literacy and critical thinking skill can significantly predict the variation in research competence among EFL students.

3) Partial Significance (t-test)

The t-test results assess the individual contribution of each independent variable in the regression model. The significance value for digital literacy is 0.000, and the significance value for critical thinking skill is also 0.000. Since both values are below the threshold of 0.05, it can be concluded that each independent variable has a statistically significant relationship with the dependent variable. This means that digital literacy and critical thinking skill each make a meaningful contribution to predicting students'

research competence when considered separately in the regression model.

4) Regression Coefficients (Unstandardized B)

The unstandardized coefficients (B) indicate the extent to which each independent variable contributes to the dependent variable in their original measurement units.

- The B value for digital literacy is 0.463, which means that for every one-unit increase in digital literacy, the students' research competence increases by 0.463 units, assuming other variables remain constant.
- The B value for critical thinking skill is 0.521, meaning that for every one-unit increase in critical thinking skill, the students' research competence increases by 0.521 units.

These unstandardized values implies that critical thinking skill has a slightly greater contribution to research competence than digital literacy, reinforcing the importance of strengthening students' critical thinking in enhancing their overall research competence.

To conclude, this section has presented the complete set of findings derived from the data analysis, including the validity and reliability of the research instruments, the classification of students' digital literacy, critical thinking skill, and research competence levels, and the results of assumption checks and multiple regression analysis.

All findings have been organized to provide a comprehensive overview of the observed patterns and relationships among the variables, which will be further discussed and interpreted in the following section.

B. Discussion

1. The Level of Digital Literacy, Critical Thinking skill, and Research Competence Among EFL Students

The findings revealed that the majority of EFL students demonstrated a moderate to high level of digital literacy, critical thinking skill, and research competence. This suggests that while a strong foundational ability exists among students in all three domains, a notable proportion of students remain in the low and very low categories, indicating a need for targeted support.

Theoretically, these findings align with Ferrari's (2013) digital competence framework, which emphasizes that proficiency in accessing, evaluating, and creating digital content is essential in modern education. The students' moderate to high performance reflects their familiarity with digital tools for academic purposes, particularly in accessing and evaluating scholarly content. However, gaps in areas such as digital safety or content creation may still exist for students in the lower categories.

For critical thinking, the results support Facione's (1990) definition, which includes interpretation, analysis, inference, and self-regulation. Students' performance suggests they are generally capable of engaging in

logical reasoning and evaluating information, though those in the lower categories may struggle with higher-order thinking and reflective judgment, particularly in English academic contexts.

In terms of research competence, the findings confirm that most students possess a sufficient understanding of research processes, aligning with Böttcher and Thiel's (2018) five-dimension model. Nevertheless, the presence of students in lower categories indicates potential weaknesses in methodological expertise or effective communication in English.

Compared to previous studies, these results provide more nuanced insights. While Peoni and Tungka (2022) and Nawawi et al. (2020) also found intermediate levels in digital literacy and critical thinking respectively, the current study differs by using a performance-based assessment rather than self-reported data. Furthermore, by measuring all three variables and situating them within the EFL research context, this study offers a more integrative and academically focused understanding

2. The Correlation Between Digital Literacy, Critical Thinking Skill, and Research Competence

The results of the multiple linear regression analysis revealed a very strong positive correlation between the combined independent variables which are digital literacy and critical thinking skill, and the dependent variable, research competence. This indicates that as EFL students' digital literacy and

critical thinking abilities increase, so does their research competence. Moreover, the significance value of the F-test confirms that the regression model is statistically significant, suggesting a meaningful and non-random relationship between the predictor and outcome variables.

This result is highly consistent with Indah et al. (2022), who found a significant correlation between digital literacy and research competence, especially in the context of academic research among university students. Their study emphasized that digital literacy enhances access to scholarly sources, supports paraphrasing and citation practices, and enables students to avoid plagiarism, factors that directly influence research quality. Similarly, the positive relationship observed in this study aligns with Gilster's (1997) assertion that digital literacy is fundamental for navigating the digital information landscape, which is indispensable in academic research processes. In addition, the strong correlation observed between critical thinking skill and research competence supports the theoretical framework of Facione (1990), who posits that critical thinking is essential for interpreting findings, evaluating evidence, and constructing coherent arguments, all of which are core elements of research competence.

While the current study did not explicitly test the correlation between digital literacy and critical thinking skill themselves, as was done in Indah et al. (2022) (who reported a non-significant correlation between the two), the strong collective correlation of both predictors with research competence suggests that

these skills may operate synergistically. That is, while they may not necessarily influence each other directly, they collectively enhance students' capacity to conduct academic research when developed in parallel.

Therefore, the findings provide empirical support for the conceptual assumption that digital and cognitive competencies are essential pillars in building academic research competence, especially in EFL contexts where language proficiency and digital navigation are equally critical.

3. The Contribution of Digital Literacy and Critical Thinking Skill to Research Competence

The results of the regression analysis indicated that digital literacy and critical thinking skill contribute significantly to the research competence of EFL students, both simultaneously and partially. The coefficient of determination suggests that 80.4% of the variance in students' research competence can be explained collectively by their levels of digital literacy and critical thinking skill. This demonstrates a very high explanatory power and highlights the central role these two competencies play in supporting students' academic research development.

The significance of the regression model was further supported by the results of the ANOVA test, which showed an F value and a p-value, confirming that the overall model is statistically significant. This suggests that the

combination of digital literacy and critical thinking skill reliably predicts students' research competence in the EFL context.

In terms of partial contributions, the coefficients table showed that both independent variables had a significant individual effect on the dependent variable. The *t* value for digital literacy and the *t* value for critical thinking skill, both exceeding the critical threshold, which reinforces the strength and reliability of each variable's contribution. The unstandardized coefficient (*B*) for digital literacy and for critical thinking skill means that for every one-point increase in digital literacy, the research competence score is expected to increase by 0.463 points, assuming critical thinking skill remains constant. Similarly, a one-point increase in critical thinking skill contributes to a 0.521-point increase in research competence, controlling for the effect of digital literacy.

These results are theoretically grounded. According to Böttcher and Thiel (2018), research competence is a multidimensional construct that includes methodological expertise, critical thinking, effective communication, information evaluation, and subject-matter knowledge. The observed contribution of critical thinking in this study echoes Facione's (1990) argument that reasoning skills such as analysis, inference, and evaluation are essential for interpreting data, forming conclusions, and maintaining objectivity in the research process. In an EFL academic context, these skills are crucial,

particularly because students must not only comprehend academic materials in English but also construct logical and well-supported research arguments.

The substantial contribution of digital literacy also reinforces the role of digital tools and practices in shaping students' academic competence. Gilster (1997) and Ferrari (2013) both emphasize that digital literacy extends beyond technical know how it involves critically navigating, producing, and communicating digital content. In the context of this study, students who are digitally literate are more likely to access credible sources, use reference management tools (e.g., Mendeley), and engage with plagiarism checkers or academic writing platforms, all of which are vital for producing high-quality research.

Unlike previous studies that have mostly examined correlations between these variables (e.g., Indah et al., 2022), the current study extends the scope by analyzing the extent to which digital literacy and critical thinking skill contribute to research competence. This makes the present findings particularly valuable for curriculum development, as they identify not only whether these skills are related to research competence, but also how much they influence it both simultaneously and partially.

These findings have important implications: they suggest that instructional programs in EFL departments should simultaneously foster both cognitive and digital competencies, as they together form the foundation for research success.

C. Implication of The Study

The results of this study offer several theoretical and pedagogical implications, particularly within the context of English as a Foreign Language (EFL) education. The significant relationship between digital literacy, critical thinking skill, and research competence underscores the importance of integrating these competencies into the academic curriculum of English education programs.

From a theoretical perspective, the findings reinforce the frameworks proposed by Gilster (1997) and Ferrari (2013) regarding the centrality of digital literacy in academic engagement, especially in relation to accessing, evaluating, and producing scholarly information. They also support Facione's (1990) conceptualization of critical thinking as a set of cognitive skills essential for sound reasoning and academic decision-making. Moreover, the study validates Böttcher and Thiel's (2018) model of research competence, highlighting the intertwined nature of digital, cognitive, and methodological dimensions in students' research development.

From a pedagogical standpoint, the strong contribution of both digital literacy and critical thinking skill to research competence suggests that instructional strategies should intentionally foster these areas across the curriculum. Educators may consider embedding digital research tools, critical reading exercises, paraphrasing and citation training, as well as structured opportunities for analytical writing in order to scaffold students' research

competence more effectively. This is particularly important in EFL settings, where students often face additional challenges in academic discourse due to language proficiency constraints.

Furthermore, the findings may inform curriculum designers and faculty members in refining learning outcomes and course content to ensure alignment with the actual skill demands of academic research. Targeted interventions, workshops, and digital tool training could be designed to support students who are still developing these essential academic literacies.

In sum, this study highlights the practical urgency of equipping EFL students with not only the linguistic skills necessary for research, but also the digital and cognitive literacies that empower them to become independent, critical, and competent researchers.