

## **CHAPTER III**

### **RESEARCH METHOD**

#### **A. Research Design**

The aim of the study is to evaluate the research proficiency, critical thinking abilities among English as a foreign language (EFL) students, as well as their capabilities in digital literacy. To determine whether there is a significant correlation between the digital literacy, critical thinking skills, and research competency of EFL students. This means that researchers examine the correlation between digital literacy, critical thinking skills, and research competence of EFL students based on scores. Therefore, the author uses quantitative approach in this research.

Quantitative methodology, as defined by Creswell, is a systematic approach used to evaluate objective ideas by analyzing the impact of one variable on another. This study approach necessitates the collection of empirical data to investigate the association between variables (Creswell, 2003). The study used a correlational research approach, using quantitative methodologies. According to Creswell (2018) correlation research is a statistical method used to ascertain the consistent variation between two or more variables or sets of data. Data is analysed to ascertain the presence and extent of a correlation between two or more measurable variables. Following is a description of the procedure for correlational study:

### 1. Formulate a proposition or generate a hypothesis

The first step in any research is frequently to formulate a claim or a hypothesis. Correlational research can reveal a definite relationship or not. Make a clear assumption about the relationship between two items in hypothesis. When formulating the hypothesis, identifying both of the variables may help in deciding how to collect the data.

#### a. Alternative Hypothesis (H1):

There is a significant positive correlation between EFL students' digital literacy and critical thinking skills simultaneously to their research competence.

#### b. Null Hypothesis (H0):

There is no significant correlation between EFL students' digital literacy and critical thinking skills to their research competence.

### 2. Identify Research Variables

Identify the main variables of interest, namely research competence, digital literacy, and critical thinking skill.

### 3. Sampling Procedure

- a. Determine the research population. In this study, the author chooses EFL students from UIN Antasari Banjarmasin especially the Faculty of Tarbiyah and Teacher Training's English Education Department from 8<sup>th</sup> semester students.

- b. Select a representative sample from the population using stratified sampling method.

#### 4. Data collection

- a. Use constructed instruments or tests to measure the levels of research competence, digital literacy, and critical thinking skill.
- b. Administer the tests to respondents and collect the data.

#### 5. Data Analysis

- a. Utilize the multiple linear regression statistical method to analyze the relationship between digital literacy and critical thinking skill with research competence.
- b. Calculate correlation coefficients, coefficients of determination, F-test, t-test, and Unstandardized B (regression coefficients). And interpret the results to determine the strength and direction of the relationships among variables.

#### 6. Interpretation of Result

- a. Interpret the analysis results to draw conclusions about the relationships between digital literacy, critical thinking skill, and research competence.
- b. Discuss the implications of this research findings and their relevance in the context of education or other fields under investigation.

#### 7. Consider Limitations

Reflect on any potential limitations of the study, such as sample size, the tools used for assessment, or other variables that might influence the observed relationships.

#### 8. Reporting Results

- a. Present the research findings in a clearly structured report, including introduction, methodology, results, and conclusions.
- b. Ensure that the report reflects the steps taken in the research process and contributes significantly to the understanding of the researched topic.

#### 9. Draw Conclusions

Based on the analysis, draw conclusions about the proficiency in digital literacy, the ability to think critically, and research competence among EFL students and discuss the significance of any correlations and contribution found. Consider implications for teaching or educational strategies to enhance these skills in EFL settings.

### **B. Research Setting**

This study was conducted at the English Education Department, Faculty of Tarbiyah and Teacher Training, UIN Antasari Banjarmasin, located at KM 4.5 on Jendral Ahmad Yani Street, South Kalimantan, Indonesia. UIN Antasari is a state Islamic university with four faculties, and its English Education Department

offers a curriculum that prepares students to become competent EFL teachers and researchers.

The 8<sup>th</sup> semester students from class of 2021 was selected as the research population due to their academic progression. By this stage, most students have completed key courses such as Research in ELT and Seminar in ELT, and have either conducted or are currently conducting their undergraduate thesis research. This ensures that participants possess not only theoretical understanding but also hands-on experience with academic research in the EFL context.

The selection of UIN Antasari as the research setting was made deliberately based on both academic and practical considerations. As the researcher is an active member of this academic environment, there is deeper familiarity with the curriculum, student development, and research culture, which enhances the contextual relevance and feasibility of the study. Additionally, this study is context-specific, focusing on a single institution to allow for more in-depth and manageable analysis. While future studies may include broader or comparative samples, the present research prioritizes depth and coherence within one well-understood educational setting.

### **C. Population and Sample/Participants**

To ensure the validity and generalizability of findings in quantitative research, it is crucial to clearly define the target population and select a sample that accurately represents it. The primary goal of sampling in quantitative research is to

obtain a representative sample, a smaller subset that closely reflects the key characteristics of the larger population (Delice, 1981).

The participants in this study were selected based on specific criteria to ensure the relevance and accuracy of the data collected. The sample included EFL students from the class of 2021 of the English Education Department who fulfilled the following criteria: (1) EFL students, (2) they have taken the Research in ELT course or an equivalent subject such as Seminar in ELT, and (3) they have either conducted or are currently conducting their undergraduate thesis research. These criteria were established to ensure that the participants possess adequate exposure to academic research processes within the context of EFL (English as a Foreign Language) education.

This study employed the purposive sampling method, a non-probability sampling technique commonly used when participants are selected based on certain characteristics relevant to the purpose of the research (Etikan et al., 2016). Since not all students in the population met the predetermined criteria, purposive sampling was considered the most appropriate technique to ensure that only eligible and relevant participants were included. To determine the minimum sample size required for this study, Tabachnick and Fidell (2007), provide a formula for multiple linear regression analysis:

$$N \geq 50 + 8m$$

Where  $N$  represents the minimum sample size, and  $m$  refers to the number of independent variables in the study. Since this research includes two independent

variables (Digital Literacy and Critical Thinking Skill), the minimum required sample size is calculated as:  $N \geq 50 + (8 \times 2) = 66$

Accordingly, a total of 66 participants who met the inclusion criteria were selected purposively. This number matches the minimum requirement calculated through the formula, and is therefore considered sufficient to ensure the reliability and validity of the findings derived from multiple regression analysis. The population consists of 82 students from the 8<sup>th</sup> semester EFL students in English Education Department, class of 2021.

The decision to focus on the class of 2021, which are students in their eighth semester, was purposefully chosen based on the academic advancement of the participants. Although some students in the class of 2022 (sixth semester) might already have taken relevant courses such as Research in ELT or Seminar in ELT, the majority of them are still in the early stages of their research journey, typically planning or proposing undergraduate research. In contrast, the majority of students in the class of 2021 are either finished or are currently conducting their undergraduate thesis research.

This distinction is important because the current study requires participants to have both theoretical knowledge from relevant coursework and practical experience conducting academic research. As a result, deciding on the class of 2021 as participants in this study guarantees that the data collected represents both the understanding and application of research competence, digital literacy, and critical thinking abilities in an actual EFL research setting.

#### **D. Data**

The data in this study were obtained from the scores of multiple-choice tests designed to assess students' digital literacy, critical thinking skills, and research competence. The multiple-choice tests evaluated their abilities across key aspects of digital literacy (communication, information, problem-solving, safety, and content production), and critical thinking skills, based on Facione (1990) theoretical framework (interpretation, analysis, evaluation, inference, explanation, and self-regulation), furthermore, the research competence based on Böttcher and Thiel (2018) theoretical framework (Assessing current research, Methodological expertise, Critical thinking abilities, Effective Communication, and Subject-matter expertise).

To ensure data reliability and accessibility, this study focused on students from the English Education Department as the data source. The data collection took from the class of 2021 students. A total of 66 students participated in this study.

The multiple-choice tests were conducted under standardized conditions to ensure consistency in responses. The multiple-choice test responses were analyzed quantitatively, with item validation performed to ensure reliability and accuracy in measuring the targeted skills.

#### **E. Technique of Data Collection**

Valid and realistic tools are essential in the data collection process for research investigations. The tool used by the researchers to collect data for this



study will be tests, which are widely recognized as an effective technique for measuring participants' competencies in a structured and objective manner. According to Brown (2004), a test is a systematic procedure designed to measure an individual's knowledge, ability, or performance in a particular domain. Tests are commonly used in educational and psychological research to obtain quantifiable data on specific skills and competencies.

The test in this study consisted of multiple-choice questions (MCQs), which served as the instrument to assess students' levels of Digital Literacy (X1), Critical Thinking Skill (X2), and Research Competence (Y). Multiple-choice tests are often used in educational assessment because they allow for standardized scoring, objective evaluation, and efficient administration (Haladyna, 2015).

To ensure the validity and reliability of the collected data, the test was administered following a structured procedure:

### **1. Test Development**

- a. The researcher designed multiple-choice test items based on theoretical indicators relevant to each research variable.
- b. The test items were reviewed and refined to align with the competencies being measured.

### **2. Pilot Testing for Validity and Reliability**

- a. Before the main data collection, a pilot test was conducted on a sample of 60 students from the English Education Department, Class of 2022.

- b. The results were analyzed to assess item validity and test reliability, ensuring that each question effectively measured the intended construct.

### **3. Test Administration**

- a. The final version of the test was administered to 66 students from the English Education Department, Class of 2021, who were selected using stratified random sampling.
- b. The test was conducted under standardized conditions, with clear instructions provided to ensure consistency in administration.

### **4. Data Collection and Scoring**

- a. After test completion, students' responses were collected and analyzed.
- b. Each correct answer was assigned a predetermined score, with a total score calculated for each participant.

This study ensures that the measurement of Digital Literacy, Critical Thinking Skill, and Research Competence is conducted in a structured, objective, and reliable manner. The standardized administration and scoring of multiple-choice tests allow for accurate comparison and analysis of the participants' competencies.

## **F. Research Instrument**

In this study, three primary variables are measured: research competence, digital literacy, and critical thinking skills. The measurement design involves the use of test instruments to gather relevant data for each variable.

### **1. Digital Literacy (X1):**

Digital literacy is assessed using a set of 10 multiple-choice questions. Each question is designed to evaluate different aspects of digital literacy, such as the ability to analyze data, synthesize information, and collaborate online. Each question carries a varies weight of points, making the total possible score for digital literacy 100 points. This structured assessment provides a quantitative measure of the students' proficiency in utilizing digital tools and resources effectively.

### **2. Critical Thinking Skills (X2):**

Critical thinking skills are measured using a separate set of 10 multiple-choice questions. These questions are crafted to evaluate various components of critical thinking, including interpretation, analysis, evaluation, inference, explanation, and self-regulation. Each question carries a varies weight of points, resulting in a total possible score of 100 points. This allows for a comprehensive assessment of the students' ability to think critically across different contexts.

### **3. Research Competence (Y):**

Research competence is assessed using a set of 10 multiple-choice questions, each designed to evaluate different aspects of research competency, as outlined by Böttcher and Thiel, (2018). These aspects include proficiency in assessing current research, methodological expertise, critical thinking abilities, effective communication, and subject-matter expertise. Each question carries a varies weight of points, making the total possible score for research competence

100 points. This structured assessment provides a quantitative measure of students' ability to engage in research, apply appropriate methodologies, critically analyze findings, and effectively communicate research outcomes.

By using these instruments, the study aims to quantify the levels of digital literacy, critical thinking skills, and research competence among the students. The data collected through these measurements will be subjected to multiple correlation analysis to explore the relationships between the variables and determine how ELT students' digital literacy and critical thinking skills to their research competence.

### G. Data Analysis

To interpret the students' scores for each variable, the researcher adopted a classification approach based on the principles of normal distribution (based on z-score). This method involves categorizing the data into five levels of competence: very high, high, moderate, low, and very low. The categorization was determined using the mean ( $\mu$ ) and standard deviation ( $\sigma$ ) of each data set. Specifically, the following criteria were applied:

**Table 3. 1 Formula of z-score range (distribution-based classification)**

Level Category	Z-Score Range (Interval)
Very high	$x > \mu + 1\sigma$
High	$\mu < x \leq \mu + 1\sigma$
Moderate	$\mu - 1\sigma \leq x \leq \mu$
Low	$\mu - 2\sigma \leq x < \mu - 1\sigma$
Very low	$x < \mu - 2\sigma$

This classification model is frequently used in educational and psychological research to interpret the distribution of competency levels in standardized test results. The approach provides a statistically sound framework for evaluating student performance across multiple variables. This procedure is supported by theories presented by Widoyoko (2014), Sudjana (2005), and Azwar (2003), who emphasized the use of statistical distribution in the interpretation of assessment outcomes.

The following analysis evaluated the assumption that the greater the students' involvement to gadget or other information technology devices, the far better the research competence the students have. In furthermore, it additionally examines whether the greater students' critical thinking skills, the much better the research competence the students' have. This study employs multiple linear regression analysis as the primary statistical technique to examine the relationship and contribution of two independent variables (digital literacy and critical thinking skill) on the dependent variable, research competence. Multiple linear regression is appropriate when the objective is to determine both the strength of association and the predictive contribution of two or more predictors toward a single outcome variable (Field, 2013). The following steps outline the data analysis procedure

### **1. Data preparation**

- a. Organize and prepare the dataset, ensuring that it includes the variables of interest: research competence, digital literacy, and critical thinking.

- b. Check for any missing or incomplete data and handle them appropriately, such as through imputation or removal.

## **2. Assumption checking**

Before conducting regression analysis, key statistical assumptions must be tested:

- a. Normality: The distribution of data for each variable were normal or not.
- b. Linearity: The relationship between each independent variable and the dependent variable should be linear.
- c. Homoscedasticity: The variance of residuals should be constant across all levels of the independent variables.
- d. Multicollinearity: Independent variables should not be too highly correlated with one another (checked using Variance Inflation Factor or VIF).

## **3. Conducting Multiple Linear Regression**

- a. Use statistical software (e.g., SPSS) to perform multiple linear regression, entering digital literacy and critical thinking skill as predictor variables and research competence as the criterion variable.
- b. Analyze the unstandardized and standardized regression coefficients ( $\beta$ ) to determine the direction and strength of the influence of each independent variable

#### **4. Assessing Model Fit and Significance**

- a. Evaluate the overall fit of the model using the coefficient of determination ( $R^2$ ), which indicates how much variance in research competence is explained by the independent variables.
- b. Use F-test to assess the significance of the overall regression model.
- c. Use t-tests to evaluate the significance of each individual predictor ( $\beta$  coefficients).

#### **5. Decision Making Using Significance Criteria**

The significance level for this study is set at  $\alpha = 0.05$ .

A p-value  $< 0.05$  indicates a statistically significant contribution of the predictor variable to the dependent variable. Conversely, a p-value  $> 0.05$  suggests the relationship is not statistically significant.

#### **6. Interpretation of Results**

- a. Interpret the results of the multiple linear regression analysis to understand the extent to which digital literacy and critical thinking skill predict research competence.
- b. Discuss the practical implications of the findings and their relevance to the research objectives (the context of English as a Foreign Language (EFL) research education).

## **7. Sensitivity Analysis (optional)**

Conduct sensitivity analyses to assess the robustness of the results by testing different model specifications or including additional control variables if deemed necessary.

## **8. Reporting the Analysis**

- a. Present the statistical findings in clear tables and figures (e.g., model summary, ANOVA table, coefficients table).
- b. Provide tables, figures, or visualizations to enhance the presentation of the findings in the research report.
- c. Include detailed interpretations to support the conclusions drawn from the data, in alignment with the research objectives and questions.

## **H. Technique of Data Validity**

Before distributing the final version of the test instruments to the main participants, the researcher conducted a try-out to examine the validity and reliability of the instruments. For this purpose, 60 students from the class of 2022 of the English Education Department were selected as pilot respondents. This group was chosen because they had taken relevant courses such as Research in ELT or Seminar in ELT, and were considered to possess sufficient background knowledge aligned with the instrument content. Although they were not included as the main participants, their academic profile made them appropriate for evaluating the quality of the test items.



To ensure that the research instruments accurately measure the intended variables, this study conducts validity and reliability tests before administering the final test to the main research sample. Validity refers to the extent to which an instrument measures what it is intended to measure (Creswell, 2015), while reliability concerns the consistency and stability of the measurement results (Sugiyono, 2017).

### **1. Validity Test**

The test is considered to possess high validity when it effectively fulfills its intended measurement function by yielding results that are both precise and aligned with the specific objectives of the assessment. Conversely, a test that generates data unrelated to the intended purpose of measurement is regarded as having low validity. To assess the validity of research instruments such as multiple choices questions, the Pearson Product Moment Correlation is commonly employed, including its application in factor analysis and principal component analysis. Within this framework, the outcomes of the statistical correlation test inform the researcher about both the direction (positive or negative) and the magnitude of the relationship between the variables involved.

The validity of the multiple-choice test items was assessed using Pearson Product-Moment correlation analysis, which determines whether each question is significantly correlated with the total score. According to Tabachnick and Fidell (2007), an item is considered valid if its correlation

coefficient (r-count) exceeds the critical r-table value. Items that do not meet this criterion were revised or removed.

## 2. Reliability Test

Reliability, as described by various statisticians referenced in Dyah Budiastuti (2018), pertains to the stability and consistency of the procedures, conditions, and resulting data. This understanding is reinforced by the perspectives of Best and Kahn (1998), Manning and Don Munro (2006), Pallant (2005), and Wiersma and Jurs (2005). In this study, the researcher utilized the Cronbach's Alpha formula, computed through SPSS, to evaluate the reliability of the instrument. According to Cohen et al. (2007), as cited in Wildawati (2020), the reliability coefficient represents a numerical indicator that empirically reflects the degree of consistency within a measurement.

The reliability of the test was measured using Cronbach's Alpha, which determines the internal consistency of the test items. A Cronbach's Alpha value of 0.70 or higher is considered acceptable, indicating that the test consistently measures the intended construct (Pallant, 2010).

**Table 3. 2 Coefficient of Cronbach's Alpha**

No	Coefficient of Cronbach's Alpha	Reliability Level
1	More than 0.90	Excellent
2	0.80-0.89	Good
3	0.70-0.79	Acceptable
4	0.60-0.69	Questionable
5	0.50-0.59	Poor
6	Less than 0.59	Unacceptable

The reliability test was conducted using the same pilot test responses. If the reliability coefficient was below the acceptable threshold, items negatively affecting the internal consistency were revised or removed to ensure that the final test was both valid and reliable.